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# Women and the Digital Divide: Access, Agency and Empowerment

## **SPECIAL ISSUE: WOMEN, SCIENCE & SOCIETY**

Progyan Foundation for Research and Innovation (PFRI), Kolkata, India

Author: Dr. Malancho Dey, [office@progyanfoundation.org](mailto:office@progyanfoundation.org).

*The rapid diffusion of internet and mobile technologies has altered participation in education, employment, finance, public services and civic life. Wider connectivity, however, has not eliminated gendered differences in access, patterns of use or representation within technology-intensive fields. Recent international data continue to indicate lower female participation in Internet and mobile-Internet use, stronger disadvantages in rural settings, and marked under-representation of women in senior Science, Technology, Engineering, and Mathematics (STEM) employment. The digital divide must therefore be understood as more than a shortfall in infrastructure or connection. Attention is also required to the degree of control that can be exercised over digital resources and to the extent to which connectivity can be converted into socially and economically valued outcomes.*

## Conceptualising Women's Empowerment in the Digital Context

The empowerment of women is generally conceptualised in terms of an expansion in effective choice, decision-making capacity and control over resources, rather than as the simple possession of assets. A widely used framework within gender-and-development scholarship was developed by Kabeer (1999), in which three interdependent dimensions are distinguished. Resources encompass the material and non-material means through which choice may be exercised; agency refers to the capacity to define and pursue choices; achievements refer to the outcomes that result. The analytical value of the framework lies in the relationship among these dimensions: possession of a resource cannot, by itself, be taken as evidence of empowerment when its use is constrained, while ownership alone provides little indication of whether desired outcomes can actually be realised.

In the digital sphere, this distinction is especially important because connection and control are not equivalent. Device access, electricity, network availability and the capacity to meet hardware or data costs constitute the material conditions through which digital participation becomes possible. Agency is reflected in the degree to which use can be undertaken autonomously, information can be assessed, accounts and credentials can be controlled, transactions can be initiated and unwanted monitoring can be resisted. Outcomes may be expressed through improved learning, income, service access, civic participation or safety. A woman may therefore be counted as connected while having little practical authority over the purposes, frequency or consequences of that connection.



Image: Dr. Malancho Dey, PFRI



Table 1. Application of Kabeer's empowerment framework to digital inclusion

| Dimension    | Analytical meaning                               | Digital application                                                                                    |
|--------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Resources    | Assets and enabling conditions available for use | Device availability; electricity; network connection; ability to meet hardware and data costs          |
| Agency       | Scope for autonomous decision and action         | Independent use; evaluation of information; control of credentials and accounts; selection of services |
| Achievements | Results obtained through exercised agency        | Educational benefit; income; service utilisation; public participation; personal safety                |

Note. The digital categories shown in the final column are interpretive applications of Kabeer's framework.

The emphasis on realised outcomes is particularly relevant because this dimension has received comparatively less attention within digital-divide research. In their systematic review, Scheerder et al. (2017) found that research on the third-level digital divide (concerned with the tangible outcomes derived from Internet use) remained underdeveloped relative

to work on access, skills and patterns of use. This imbalance reinforces the need to assess digital inclusion not only through connectivity or competence, but also through the social and economic outcomes that follow from digital participation.

## Dimensions of Empowerment in the Digital Context

Economic, social and psychological dimensions of empowerment may be distinguished in relation to digital participation. Particular caution is required in the use of the term 'psychobiological'. In the available literature on gendered digital confidence, self-efficacy, self-assessment and social context are examined, whereas biological capacity is not measured. Reported differences in confidence should therefore not be treated as evidence of innate variation in technological aptitude.

### *Social Empowerment: Spatial Inequality, Participation and Safety*

Persistent gender inequality is evident even in basic Internet use. For 2025, Internet participation was estimated by International Telecommunication Union (ITU) at 77% among males and 71% among females. Expressed in population terms, roughly 280 million fewer women than men were online. The global female-to-male parity ratio remained at 0.92, the same level recorded in 2019. Parity-band values were recorded for Europe and Commonwealth and Independent States (CIS), while the Americas also met the threshold; lower ratios were reported for Asia-Pacific (0.91), Arab States (0.86) and Africa (0.78). The African value nevertheless increased from 0.70 (2019) to 0.78 (2025) (ITU, 2025).

The gender divide is further intensified by spatial inequality. Internet participation in 2025 was estimated by ITU at 85% for urban populations and 58% for rural populations, while about 2.2bn people remained offline (ITU, 2025). A comparable rural disadvantage is evident in GSMA data on mobile connectivity. Across countries classified in the low- or middle-income groups (LMICs), the female-male disparity in mobile-Internet use was reported to be roughly double to triple the urban difference in rural locations, with especially pronounced disparities in



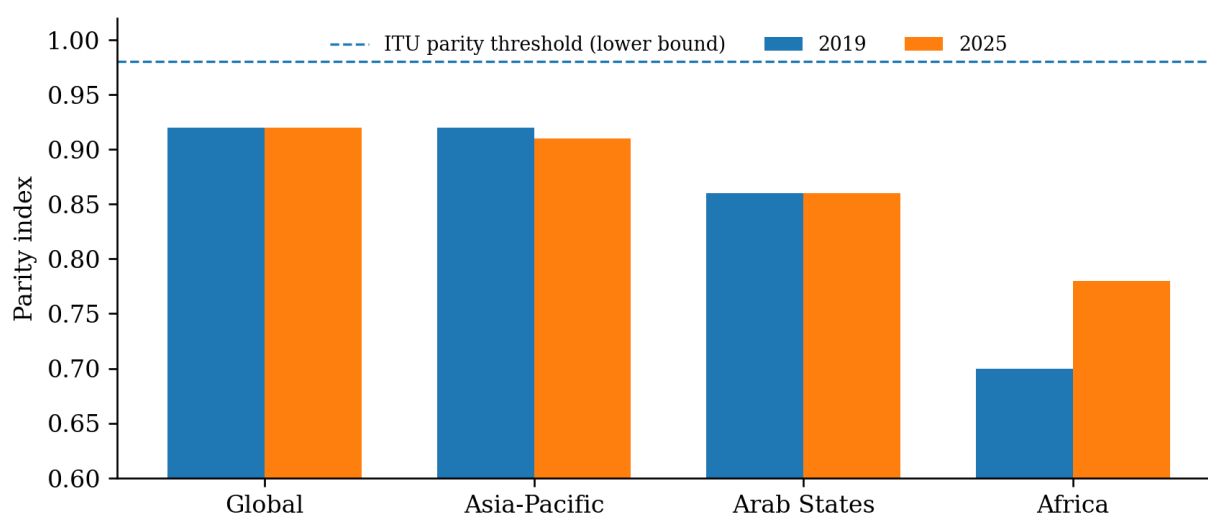


the MENA (Middle East and North Africa) region, in South Asian countries and in sub-Saharan African countries (GSMA, 2026). Gender and place of residence should therefore be regarded as intersecting sources of digital exclusion rather than as independent disadvantages.

Digital access may support education, health information, financial activity and livelihood opportunities, but exposure to coercion and abuse may also be widened. Estimates collated by UN Women place the prevalence of technology-mediated

violence affecting women between 16% and 58% across available studies. Legal protection is also incomplete: about 44% of the global female population, equivalent to approximately 1.8bn female individuals, was estimated to be outside the protection of laws addressing cyber-harassment or cyberstalking (UN Women, 2025a, 2025b). Meaningful inclusion cannot therefore be inferred from connection alone where use occurs under conditions of harassment, surveillance or coercive control.

Figure 1. Gender-parity ratios for Internet use by ITU region, 2019 and 2025



Source: ITU (2025); ratios were plotted from the reported regional values. The parity band applied by ITU extends from 0.98 to 1.02.

### ***Economic Empowerment: Access, Use and Labour-Market Representation***

Economic consequences have also been associated with unequal digital participation. In GSMA's 2023-2030 scenario modelling, removal of the female-male disparity in mobile-Internet uptake across LMICs was associated with an additional Gross Domestic Product (GDP) contribution of approximately USD 1.3tn. A separate estimate within the modelling placed the potential gain to mobile-sector revenue at about USD 230bn if inequalities in handset possession alongside usage were eliminated during 2023-2030 (GSMA, 2025). These values describe modelled scenarios rather than forecasts, but the scale of economic activity linked to more equal digital participation is clearly indicated.

Despite gradual improvement, substantial inequality remained in 2025. Across LMICs, female mobile-Internet uptake was estimated to be 12% below the corresponding male level, and roughly 810m female non-users were recorded. More than two out of every

three were concentrated across the South Asian and sub-Saharan African regions. The South Asian gap was estimated at 25%, while the sub-Saharan African gap was 26% (GSMA, 2026). Affordability also remained strongly gendered. For an entry-level Internet-capable handset, the estimated cost corresponded to 24% of average monthly income for women and 12% for men (GSMA, 2025).

Formal financial access has expanded more rapidly than equivalent patterns of use. Global Findex 2025, based on surveys undertaken in 2024, estimated account ownership at 77% for women and 81% for men worldwide; within LMICs, the respective values were 73% and 78% (Klapper et al., 2025; Salman & Murthy, 2025). In India, ownership was approximately 90% for each sex, yet equality in access was not matched by equality in digital transactions. An 11-percentage-point sex difference was reported for digital-payment use. Inactive accounts were reported for 18% of female account holders and 11% of male account holders (Salman & Murthy, 2025).



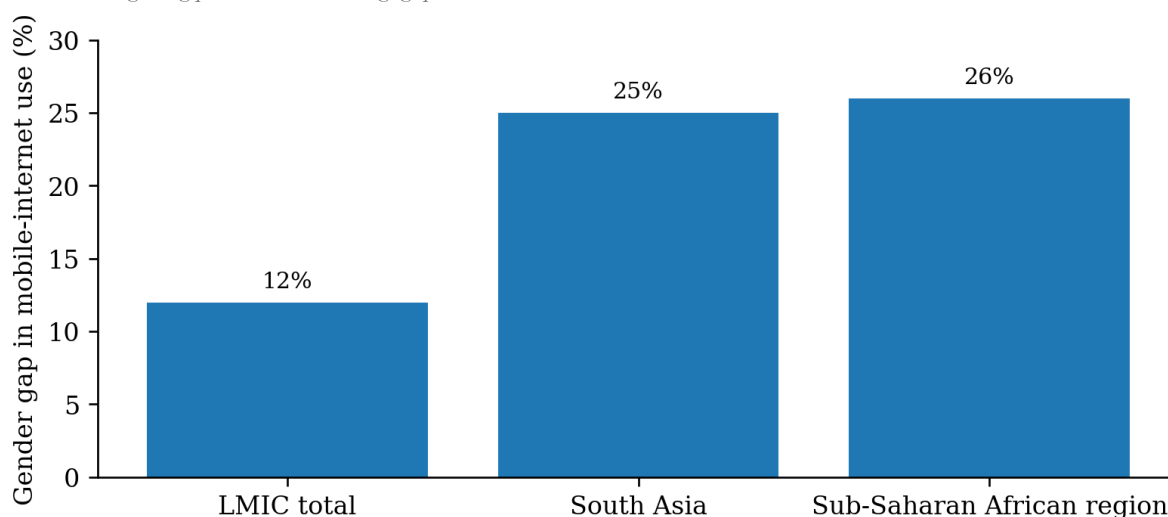
Account ownership should therefore not be used as a sufficient indicator of effective financial participation.

Under-representation remains pronounced in technical education and employment. Female students accounted for approximately 35% of Science, Technology, Engineering, and Mathematics (STEM) graduates worldwide, with little change over the previous decade (UNESCO, 2024). For 2024, the female share of STEM employment was 28.2%, against 47.3% outside STEM (WEF, 2024). A steeper decline was apparent at higher occupational levels in the later World Economic Forum (WEF)-LinkedIn analysis: the female share for that year was 29% at entry level, 24.4% at managerial level and 12.2% at C-suite level within STEM roles (WEF & LinkedIn, 2025). The pattern is consistent with cumulative

barriers to retention and progression rather than a single point of exclusion.

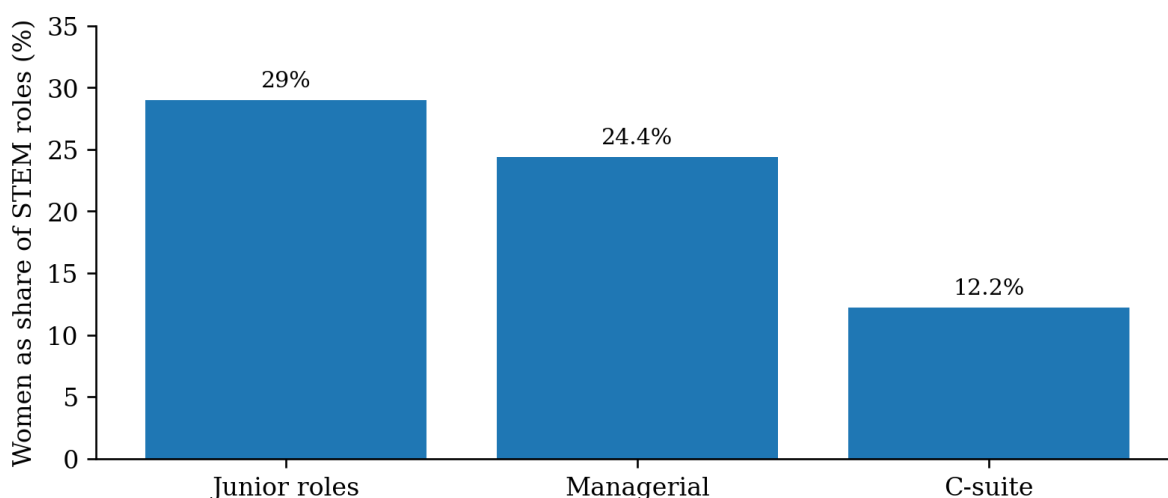
Female representation among profiles listing Artificial Intelligence (AI)-engineering skills has moved in a more favourable direction. Within the 75-economy LinkedIn sample used by WEF and LinkedIn (2025), women constituted 23.5% of AI-engineering skill lists in 2018 and 29.4% in 2025. Only one economy in the sample failed to record a narrowing of the gender difference. The improvement is notable, although the level remains far from parity. Taken together with the STEM evidence, the data indicate that inequality may arise during educational specialisation, entry into technical work, occupational retention and advancement into senior roles.

Figure 2. Mobile-Internet gender gap across selected LMIC geographies, 2025



Source: GSMA (2026); the plotted values show the female shortfall in mobile-Internet uptake relative to the male level.

Figure 3. Female representation in STEM positions by seniority, 2024



Source: WEF and LinkedIn (2025); occupational shares refer to the same calendar year and do not represent a longitudinal cohort.



### ***Psychobiological Empowerment: Distinguishing Confidence from Aptitude***

Any claim concerning 'digital aptitude' requires a separation of perceived competence from demonstrated ability. Gender variation in self-rated competence is not, in itself, evidence of biological variation in technological capacity. The relevant empirical literature is therefore more appropriately interpreted as research on confidence and efficacy beliefs than as a direct assessment of innate aptitude.

In Christensen's (2023) cross-national meta-analysis, the evidence base comprised 115 studies distributed across 22 countries, and 120 effect estimates were obtained. Publication dates ranged between 1990 and 2019. A modest male-favouring difference was obtained for self-rated technological competence, but substantial cross-national variation was observed in both its size and its direction. The difference also declined over successive study years. Such heterogeneity is inconsistent with a uniform, context-independent sex effect and is more compatible with the influence of social and cultural conditions on self-evaluation.

A second meta-analysis, reported by McMichael et al. (2026), was focused on self-efficacy within six STEM domains. The synthesis contained 145 effect estimates. Male-favouring differences were detected in five domains; biology was the exception, and the largest contrasts were observed in physics

and computer science. Generalisation beyond the United States is limited because eligible samples were restricted to that country. The results should therefore be interpreted as estimates of field-specific efficacy beliefs within a particular national context rather than as universally applicable sex differences.

Notably, biological aptitude was not measured in either meta-analysis. A distinction between confidence and capacity is therefore required. Educational experience, social context and gendered expectations could shape self-beliefs, but no inference about the biological origin of ability could be drawn from such studies. Lower self-reported confidence should therefore not be treated as evidence of lower innate capability.

Evidence on measured digital skills provides vital information in this regard. Among Internet users in countries reporting sex-disaggregated ICT-skills data, no consistent gender disadvantage in digital skills was identified by the ITU (2025), although limited country coverage prevents broader generalisation. This distinction further cautions against interpreting lower self-reported technological confidence as evidence of lower demonstrated capability.



## **Digital Inclusion and Women's Empowerment: Trade-Off or Conditional Relationship?**

Digital inclusion is frequently used as a proxy for empowerment because connectivity, subscriptions and device possession are readily quantifiable. Such

indicators, however, describe only part of the process. Within the framework set out above, connectivity is most appropriately treated as a resource. An increase



in agency or in valued outcomes depends on the. The distinction becomes especially important when technology is used within unequal social relationships. Location tracking, surveillance of accounts, threats and harassment can all be enabled through digital devices or platforms, while weak legal protection may increase the burden imposed on those targeted (UN Women, 2025a, 2025b). Lower frequency of mobile-Internet use and use of fewer service categories among connected women than among connected men have also been reported; affordability, safety, skills and network quality are among the identified constraints (GSMA, 2025). Formal connection may therefore coexist with restricted practical use.

No inherent opposition between digital inclusion and empowerment follows from these constraints. Instead, a conditional relationship is indicated. Greater agency is more likely where continued use is affordable, sufficient digital competence is available, control over devices and accounts is retained, and

circumstances under which that resource can be used. effective protection against abuse exists. An intervention confined to access may therefore improve a connectivity measure without changing the social and institutional conditions that determine how technology can actually be used.

An illustrative example of this conditional relationship is provided by Internet Saathi. Digital access was combined with locally delivered instruction and repeated peer support rather than being treated as a sufficient intervention in itself. Gains in digital competence, confidence and selected livelihood- or service-related outcomes have been reported in programme reach statistics and subsequent assessments. However, substantial variation is present in the design and strength of the available evidence, and a general causal conclusion cannot be drawn. The case is therefore most appropriately treated as an illustration of the potential value of embedding access within locally delivered capacity-building.

### INTERNET SAATHI, INDIA

Internet Saathi was introduced in 2015 through a partnership between Google and the Tata Trusts organisation to address low rural female digital participation. In Google's account published the following year, women were estimated to constitute about one-third nationally, whereas their share within the rural Internet-user population was only around one-tenth (Barjatya, 2016). A peer-training structure was used, under which locally recruited women received digital-literacy instruction and subsequently supported other women in their communities.

By 2021, cumulative programme reach was reported by Google at more than 30 million rural women in roughly 300k villages, supported by a female trainer network exceeding 80k members (Gupta & Chadha, 2021). These figures represent programme-reported coverage and should not be interpreted as independently verified impact estimates.

An IPSOS assessment summarised by Tata Trusts recorded that 45% of participants believed newly learned skills had contributed to higher income, while 57% believed that their knowledge of investment had improved (Tata Trusts, n.d.). Since the findings are based on participant perceptions, they should be interpreted as self-reported change rather than as evidence of a measured causal effect on earnings.

In the later study by Vasava (2025), structured interviews were conducted with 60 tribal women selected purposively across four talukas in Narmada district, Gujarat. Improvements were reported in digital awareness, routine smartphone use, access to government-benefit schemes and confidence, together with continuing infrastructural and socio-cultural constraints. The small purposive sample and its restriction to one district limit representativeness; the findings are therefore most appropriately treated as illustrative evidence.

## Conclusion

A multidimensional interpretation of the digital divide is supported by the available evidence. Expansion in connectivity has been considerable, yet gender differences persist in Internet and mobile-Internet use; rural populations remain less connected; comparable account ownership is not necessarily followed by comparable digital financial use; and female representation falls sharply at senior levels of STEM employment. As these inequalities are





observed at different stages, they cannot be represented adequately by a single access indicator.

An important implication is that gendered digital inequality may be displaced rather than eliminated as basic access expands. Near-parity in one dimension can coexist with substantial differences in how technology is used, who controls that use, what benefits are derived from it and who progresses into positions of greater economic or professional advantage. Improvements in headline connectivity measures should therefore not be assumed to indicate equivalent progress across the wider dimensions of digital inclusion.

Analytical attention should therefore be directed beyond connection towards the conditions under which technology is used. Affordability, autonomy, digital competence, control over devices and accounts, the capacity to convert connectivity into education or income, and protection from digital

abuse are all relevant. Through these conditions, the practical consequences of access are shaped, including whether a wider range of action becomes available or whether only formal connectivity is achieved.

Digital inclusion and women's empowerment are consequently best treated as related but distinct processes. Connectivity constitutes an increasingly important resource, but empowerment depends on whether that resource can be exercised through agency and translated into valued outcomes. Where affordability, skills, autonomy and safety are neglected, a statistical access gap may be narrowed without a corresponding reduction in deeper inequalities. More equitable outcomes are therefore likely to require digital infrastructure to be accompanied by the social, financial and institutional conditions needed for autonomous and secure use.

## References

- Barjatya, N. (2016, June 15). Saathis bring the Internet to life for thousands of women across rural India. Google. <https://blog.google/company-news/inside-google/around-the-globe/google-asia/indias-saathis-bring-internet-to-life/>
- Christensen, M. A. (2023). Tracing the gender confidence gap in computing: A cross-national meta-analysis of gender differences in self-assessed technological ability. *Social Science Research*, 111, 102853. <https://doi.org/10.1016/j.ssresearch.2023.102853>
- GSMA. (2025). The Mobile Gender Gap Report 2025. GSMA Connected Women. <https://www.gsma.com/gender-gap-2025/>
- GSMA. (2026). The Mobile Gender Gap Report 2026. GSMA Connected Women. <https://www.gsma.com/gender-gap/>
- Gupta, S., & Chadha, S. (2021, March 8). WomenWill - Our commitment to support economic empowerment of women in rural India. Google India. <https://blog.google/intl/en-in/company-news/outreach-initiatives/womenwill-our-commitment-to-support/>
- International Telecommunication Union. (2025). Measuring digital development: Facts and Figures 2025. ITU. <https://www.itu.int/itu-d/reports/statistics/facts-figures-2025/>
- Kabeer, N. (1999). Resources, agency, achievements: Reflections on the measurement of women's empowerment. *Development and Change*, 30(3), 435-464. <https://doi.org/10.1111/1467-7660.00125>
- Klapper, L., Singer, D., Starita, L., & Norris, A. (2025). The Global Findex Database 2025: Connectivity and financial inclusion in the digital economy. World Bank. <https://doi.org/10.1596/978-1-4648-2204-9>
- McMichael, S. L., West, S. G., & Kwan, V. S. Y. (2026). The enduring gender gap in STEM: A meta-analysis of gender differences in self-efficacy in STEM fields. *Behavioral Sciences*, 16(1), 141. <https://doi.org/10.3390/bs16010141>
- Salman, A., & Murthy, G. (2025, August 12). From access to agency: The next chapter in women's financial inclusion. CGAP. <https://www.cgap.org/blog/access-to-agency-next-chapter-in-womens-financial-inclusion>
- Scheerder, A., van Deursen, A., & van Dijk, J. (2017). Determinants of Internet skills, uses and outcomes: A systematic review of the second- and third-level digital divide. *Telematics and Informatics*, 34(8), 1607-1624. <https://doi.org/10.1016/j.tele.2017.07.007>
- Tata Trusts. (n.d.). Internet Saathi. <https://www.tatatrusts.org/our-work/digital-transformation/digital-literacy/internet-saathi>
- UN Women. (2025a, November 13). FAQs: Digital abuse, trolling, stalking, and other forms of technology-facilitated violence against women and girls. <https://knowledge.unwomen.org/en/articles/faqs/digital-abuse-trolling-stalking-and-other-forms-of-technology-facilitated-violence-against-women>
- UN Women. (2025b, November 18). Digital violence is intensifying, yet nearly half of the world's women and girls lack legal protection from digital abuse. <https://www.unwomen.org/en/news-stories/press-release/2025/11/digital-violence-is-intensifying-yet-nearly-half-of-the-worlds-women-and-girls-lack-legal-protection-from-digital-abuse>
- UNESCO. (2024). Global Education Monitoring Report: Gender report - Technology on her terms. UNESCO.
- Vasava, D. N. (2025). Digital inclusion and women's empowerment in tribal Gujarat: An empirical study of the Internet Saathi Programme in Narmada District. *Research Review Journal of Social Science*, 5(2), 136-141. <https://doi.org/10.31305/rjss.2025.v05.n02.016>
- World Economic Forum. (2024). Global Gender Gap Report 2024. <https://www.weforum.org/publications/global-gender-gap-report-2024/>
- World Economic Forum, & LinkedIn. (2025). Gender parity in the intelligent age. World Economic Forum. <https://www.weforum.org/publications/gender-parity-in-the-intelligent-age-2025/>





# Living Encyclopaedias of the Eastern Himalaya

*Women as Custodians of Traditional Ecological Knowledge Across the Tribes of Arunachal Pradesh*

Progyan Foundation for Research and Innovation (PFRI), Kolkata, India

Authors: Dr. Malancha Dey, [office@progyanfoundation.org](mailto:office@progyanfoundation.org); Dr. Chandreyi Sengupta, [research@progyanfoundation.org](mailto:research@progyanfoundation.org); Mr. Somnath Samanta, [research@progyanfoundation.org](mailto:research@progyanfoundation.org) & Ms. Shreya Ghosh, [pfrioff@gmail.com](mailto:pfrioff@gmail.com)

## Abstract

**T**his paper examines the central role of Indigenous women in sustaining Traditional Ecological Knowledge in Arunachal Pradesh. Drawing on the ecological diversity of the state, it shows how women participate in seed selection, cultivation, food preparation, home-garden management, and medicinal plant use through their daily chores, enabling the transmission and renewal of knowledge across generations. By comparing communities such as the Wancho, Adi, Apatani, Monpa, and Mishmi, the paper argues that women are not passive holders of tradition but active agents in maintaining biodiversity, food security, and local resilience. It also highlights how resource depletion, commercialization, and lack of formal recognition weaken these living knowledge systems. The paper concludes that protecting Traditional Ecological Knowledge requires recognizing women's ecological expertise as essential to conservation, agriculture, and climate adaptation.

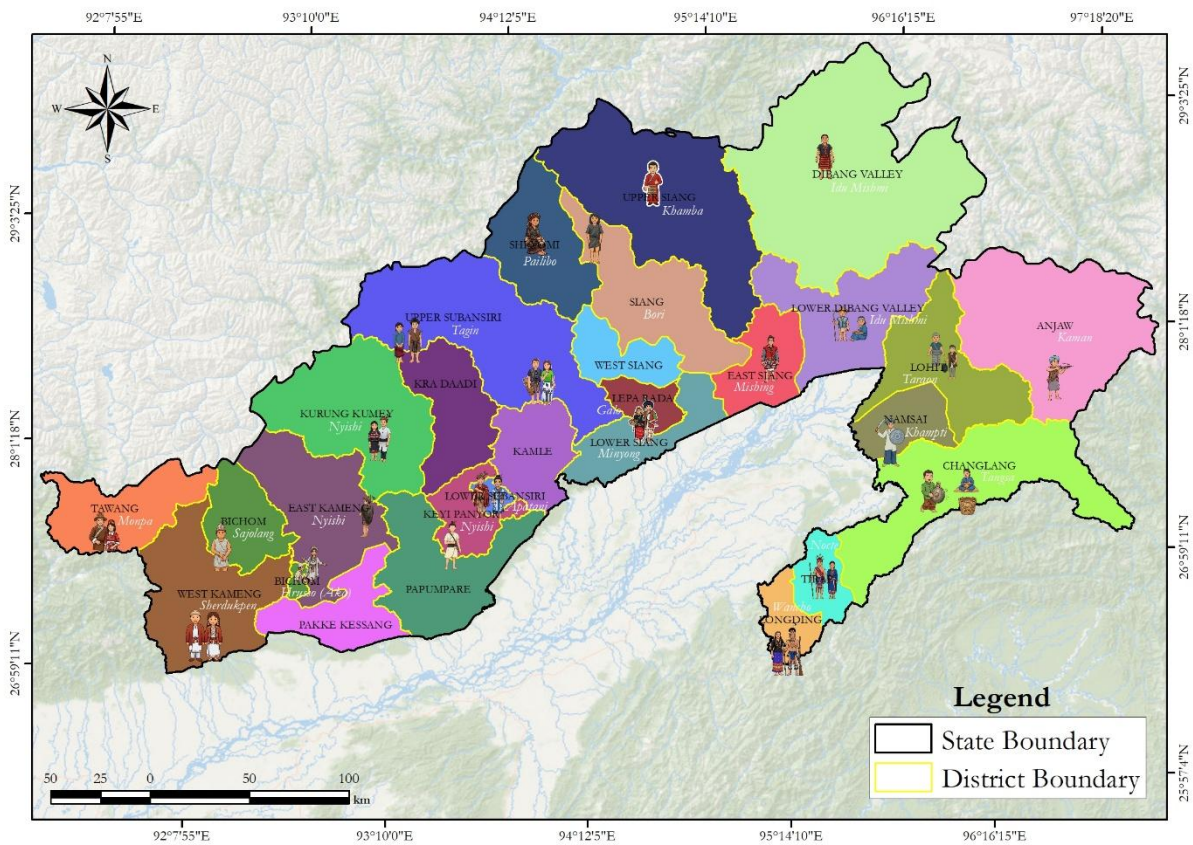
## Introduction

Traditional Ecological Knowledge is a cumulative and adaptive system of knowledge, practice and belief through which communities make sense of their relationship with land, water, plants, animals, seasons and one another. It is shaped through long experience, refined through use, transmitted across generations, and held not only in memory but also in institutions, social norms, work routines and ethical ideas about how resources should be used. TEK is therefore not merely about knowing nature but about living within an ecological world in ways that are practical, socially regulated and historically rooted. This is also why TEK is so closely associated with Indigenous Peoples and Local Communities (IPLCs). Across the world, such knowledge has developed where people have lived with particular ecologies for long periods, depended on them materially, and built collective ways of using and regulating them. In these settings, knowledge of crops, forests, soils, water, species behaviour and seasonal change is not an optional layer added to life but a part of how life is organised. That is why international biodiversity frameworks now treat the knowledge of Indigenous peoples and local communities as central to conservation and sustainable use,

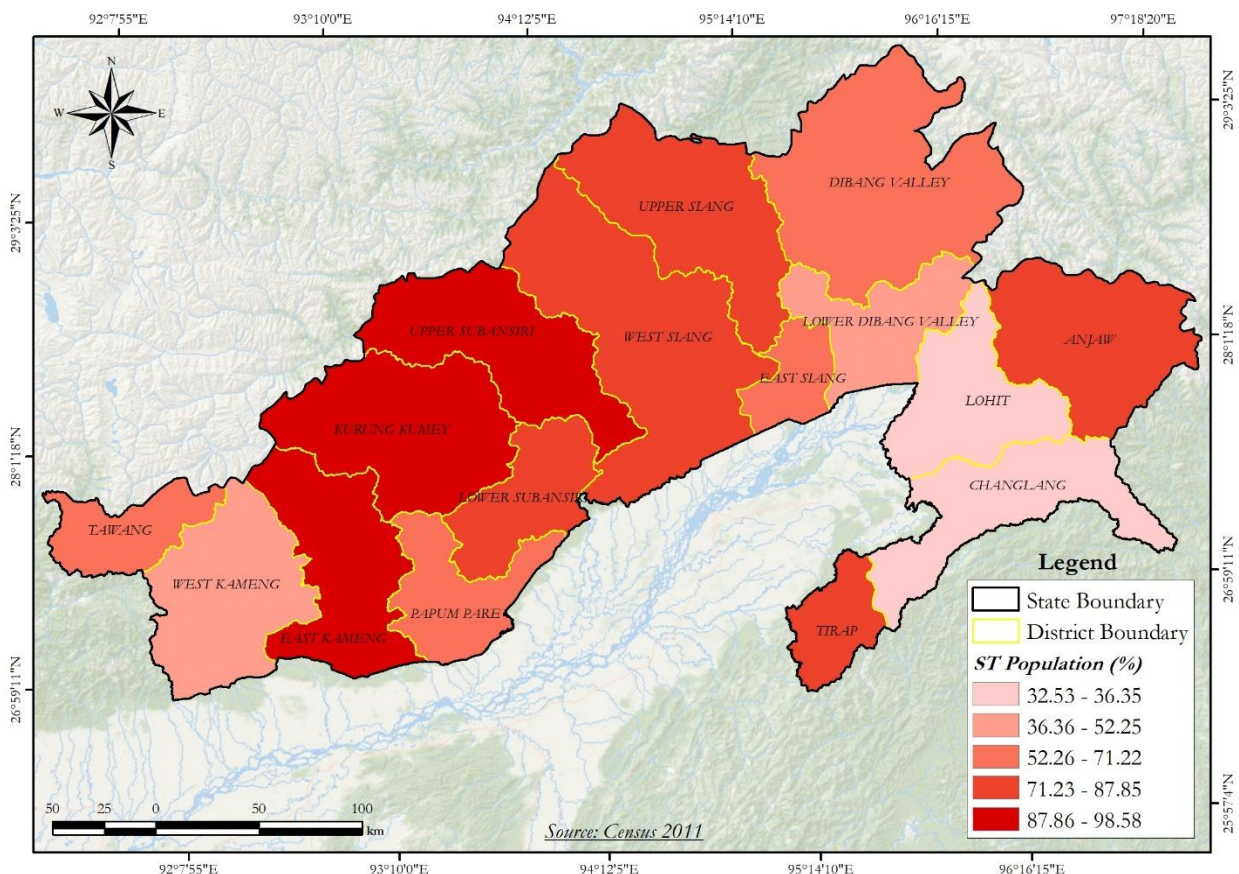
rather than as an interesting cultural afterthought (IPBES, 2022).

Arunachal Pradesh in India, offers an especially rich setting for examining this relationship as it is marked by considerable ecological, cultural and agro-climatic diversity, within which Indigenous communities have developed knowledge systems closely tied to their specific landscapes and livelihood practices. Situated between 26°28' and 29°30' North latitude and 91°30' to 97°30' East longitude in the extreme northeastern part of the country, the state, constitutes a dominant portion of the Eastern Himalayan biodiversity hotspot, an area classified among the world's 25 most biologically significant regions (Myers *et al.*, 2000). Spanning approximately 83,743 km<sup>2</sup>, it is inhabited by 26 major tribes and over 100 sub-tribes, comprising approximately two-thirds of its 1,383,727 inhabitants as of the 2011 Census (Registrar General of India, 2011) making it one of the most ethnolinguistically diverse polities in South Asia. Moreover, Arunachal Pradesh has been identified as the Indian state most vulnerable to climate change, being particularly susceptible to rainfall variability and drought (Ravindranath *et al.*, 2011).





Map: Distribution Of Indigenous Tribe Across Arunachal Pradesh, India



Map: Proportion of Schedule Tribe Population Across Arunachal Pradesh, India

Across this ethnolinguistic diversity, a consistent pattern emerges from both ethnographic records and peer-reviewed research: women are the principal custodians of the traditional ecological knowledge (TEK) that has sustained these communities across generations as seed-keepers, foragers, herbalists, weavers, ritual food-preparers, and oral historians (Singh *et al.*, 2011; Singh *et al.*, 2020).

This compendium presents an overview of the traditional ecological knowledge maintained by women across the major tribes of Arunachal Pradesh, highlighting the diverse ecological practices, livelihood systems and cultural institutions through which women continue to conserve, apply and transmit TEK in different socio-ecological settings (Ravindranath *et al.*, 2011).

## The Adi Tribe

*Siang district cluster (East/West/Upper/Lower Siang, Shi-Yomi) | ~2,000– lakh+ population | Jhum cultivation, mithun rearing*

**Ecological & Cultural Context:** The Adi (historically 'Abor') are among the most populous and territorially extensive tribes of Arunachal Pradesh, tracing mythological descent to Abotani and organised into Boeums and Bomis divisions with sub-tribes including Minyong, Padam, Pasi, Karko, Shimong, and Milang. Their subtropical-to-temperate habitat sits within the Eastern Himalayan biodiversity hotspot. Livelihoods combine jhum cultivation of rice, maize, and millet with mithun husbandry, hunting, and fishing, governed the Kebang village council and the Donyi-Polo faith.

**Women's Role in Conserving TEK:** In the Adi community, women's TEK is especially visible in food systems, seed management, medicinal knowledge and the everyday use of biodiverse landscapes. The preparation of a traditional dish may involve ingredients drawn from jhum fields, home gardens, community forests or *morang*, and riverine areas, each requiring specific knowledge of seasonality, habitat, edibility, processing and use. Food preparation is therefore not merely a domestic activity, but an important medium through which ecological knowledge is practised, tested and transmitted. Elderly women are especially important in this regard, as they often

retain wider knowledge of wild vegetables, medicinal plants, beverages, preserved foods and foods used during scarcity or illness. Their knowledge extends beyond recipes to include where particular species grow, the optimal time of collection, appropriate processing methods, combinations of ingredients, and the customary norms regulating their use. This knowledge system has also been documented in relation to a wide range of plant resources, including species used in food systems and ethnomedicine, with women's knowledge concentrated across jhum lands, community forests and home gardens (Singh, Rallen & Padung, 2013). Adi women's



*Image: Museum diorama depicting Adi Padam community members engaged in traditional handloom weaving and bamboo craftsmanship*



identification and use of bioculturally important species also connect household nutrition with cultural practice and local livelihoods, since several culturally shared species are also sold for household income (Singh et al., 2021). The same pattern is visible among Adi sub-groups, though with local variations. Among the Adi Bori, women's agricultural knowledge is linked to jhum cultivation, seed stewardship, crop processing, forest-garden use and the preparation of *Tanget*, an indigenous cereal substitute for rice. Among the Adi Padam, women's TEK is also carried through weaving and food preparation, taught in the former *Raseng*, or girls' dormitory, where young women historically learned livelihood skills, social responsibilities and ecological

knowledge from elder women before marriage. These examples show that Adi women's TEK is consistently rooted in food, seeds, forest resources, textiles, ritual and intergenerational learning. Through seed selection, communal food preparation, ritual chanting and the maintenance of culturally valued plant species, Adi women function as de facto stewards of seed heritage, food sovereignty and biodiversity conservation. The importance of women's TEK is further reflected in its positive association with conservation outcomes, suggesting that women's everyday knowledge practices contribute directly to the protection and continuity of biocultural resources (Singh et al., 2020).



Image: Museum diorama depicting Adi Minyong community members demonstrating the traditional use of a bamboo water container as part of their indigenous daily life and ecological practices

## The Apatani Tribe

Ziro Valley, Lower Subansiri district | ~24 villages | Integrated wet-rice/fish cultivation (*Aji-Nii*)



Image: Museum diorama depicting the Apatani community practicing traditional wet rice cultivation through paddy field preparation and rice transplantation

**Ecological & Cultural Context:** The Apatani (self-identified Tani) inhabit the Ziro Valley at 1,525–2,900 m, with origins traced through oral chants (*miji*) and folk narratives (*migung*) rather than written record. Their integrated rice-fish system, practised without draught animals or machinery, has been proposed by UNESCO for World Heritage recognition and is now an FAO-recognised Globally Important Agricultural Heritage System. Governance rests in the *bulyang* village council; *Myoko* and *Dree* are the principal festivals.

**Women's Role in Conserving TEK:** Women's TEK among the Apatani is embedded most strongly in the integrated wet-rice and fish cultivation system known as *Aji-Nii*. This system depends on a finely balanced understanding of water flow, paddy-field ecology, fish behaviour, soil moisture, bamboo-channel irrigation, seed selection and seasonal labour. Women are not marginal assistants within this system; they form

its everyday operational base, participating in fish stocking, feeding, harvesting and even pond construction, with nearly 80 percent of farmers maintaining the integrated rice-fish system reported to be women (India Water Portal, 2025). Their knowledge links cultivation with water management, as the success of the paddy-fish fields depends on maintaining the correct depth, timing and movement of water across terraced plots without the use of draught animals or machinery. Apatani women also sustain TEK through the management and transmission of indigenous rice varieties such as *Emo*, *Mipya* and *Pyaping*. Their knowledge includes not only the names of varieties, but also their ecological suitability, taste, yield, storage quality, ritual significance and performance under different seasonal conditions. This makes women central to the continuity of agrobiodiversity and food sovereignty in Ziro Valley. Their year-round involvement in farming, horticulture and forest-resource use shows that Apatani women's ecological knowledge extends beyond the paddy field into the wider landscape, where plants, water, soil and household subsistence are understood as connected components of a shared socio-ecological system (Yamang and Singh, 2021). The transmission of this knowledge takes place through daily work as well as through ritual and cultural institutions. During *Dree* and *Myoko*, women help sustain the ritual protocols, food practices and seasonal meanings through which agricultural knowledge is publicly remembered and renewed. Their weaving also functions as an important cultural archive, preserving artistic memory, cosmological motifs and historical identity in textile form. In this sense, Apatani women conserve TEK not only by cultivating fields, but also by maintaining the material, ritual and aesthetic practices through which ecological knowledge remains socially meaningful across generations.



## The Nyishi Tribe

*Papum Pare, Kra Daadi, Kurung Kumey, East/West Kameng, Lower/Upper Subansiri | ~3,00,000 (2011 Census) | Jhum, mithun rearing, NTFP collection*

**Ecological & Cultural Context:** The Nyishi are Arunachal Pradesh's most populous tribal group, their name derived from Nyi ('man') and shi ('being'). They trace descent to Nyiha, son of Abo Tanyi, and observe the Nyokum Yullo nature-worship festival.

**Women's Role in Conserving TEK:** TEK in Nyishi women is closely tied to forests, shifting cultivation, household subsistence and the everyday management of wild resources. Women are among the primary collectors and users of forest products, including wild edibles, medicinal plants, fuel, fodder and water-related resources. Their knowledge is not limited to identifying useful species; it includes knowing where particular plants grow, which parts may be used, how they should be collected, the seasons in which they are available, and the customary restrictions that regulate their use. In this sense, women's forest knowledge forms a practical safety net for the household, especially during periods of crop failure, food scarcity or limited access to formal health services.

This knowledge is also embedded in community myths, taboos and customary norms that restrict the felling of ecologically significant trees and



*Image: Traditional farming practices among the Nyishi of East Sikkim*

regulate the use of forest resources. Such cultural restrictions function as informal conservation mechanisms, linking belief, livelihood and biodiversity protection within everyday practice (Singh, 2013). Women help sustain these norms not only by observing them, but also by transmitting them through work routines, food gathering, domestic instruction and community life. The forest is therefore not simply a source of raw material; it is also a knowledge space where women learn, practise and pass on ecological judgement.



*Image: Nyishi women transplanting paddy seedlings*



## The Galo Tribe

*West Siang district (Aalo, Tirbin, Liromoba, Tai, Dumporijo, Likhabali, Basar) | Jhum and settled agriculture, entomophagy*

**Ecological & Cultural Context:** The Galo, descendants of Abo Tani, speak a Western Tani Tibeto-Burman language. Their territory spans 60–5,000 m elevation with approximately 3,000 mm annual rainfall. Mopin, an agricultural festival honouring the goddess Mopin Ane, is their central cultural observance.

**Women's Role in Conserving TEK:** Galo women's TEK is most visible in food preparation, fermentation, forest gathering, medicinal use and oral-cultural transmission. Their knowledge extends across cultivated fields, home gardens, community forests and surrounding ecological zones from which plants, animals and insects are gathered for food, medicine and ritual use. Ethnobotanical documentation from Upper Subansiri records medicinal and poisonous plant use among the Tagin and Galo, including plant-based knowledge linked to healing, fishing and hunting, showing that Galo ecological knowledge includes both curative and subsistence-oriented uses of plants (Wangpan et al., 2019). This knowledge becomes especially visible during Mopin, when women prepare food, brew apong, a traditional rice beer, and organise the ritual feasts through which ecological knowledge is publicly practised and shared. Galo rice wine, locally known as Poka, has been documented as an important socio-cultural beverage prepared with plant-based starter culture, with the starter cake traditionally



*Image: Traditional weaving and domestic life of the Galo tribe*

made by women using rice flour and herbs (Bora et al., 2012). Fermentation therefore requires knowledge of grain quality, starter preparation, plant ingredients, timing, storage and taste. Women transmit this TEK not only through household work, but also through festival practices where younger generations observe, assist and learn. Galo women also help conserve TEK through performance and oral tradition. Their leadership in *Popir*, a traditional dance, and their role in folk songs such as Ja-Jin-Ja and Baryi make them important carriers of community memory. These performances preserve histories, seasonal meanings, ritual associations and cultural values linked to land, food and livelihood.



## The Tagin Tribe

*Upper Subansiri, parts of Kurung Kumey | High-altitude valleys of the Kamla, Sipu and Subansiri rivers, >3,000 m | Jhum, mithun/yak husbandry*

**Ecological & Cultural Context:** The Tagin are a Tani-group people of Abotani descent inhabiting cold, high-altitude terrain with a compressed growing season. Si Donyi, a sun-and-moon worship festival, anchors their agricultural calendar.

**Women's Role in Conserving TEK:** Tagin women's TEK is strongly rooted in high-altitude agriculture, alpine medicinal plants, seed maintenance, food preservation and ritual practice. In a landscape where the growing season is short and ecological conditions are harsh, women's knowledge of timing, storage and plant use is central to household subsistence. They identify medicinal plants found in alpine and sub-alpine habitats, know the seasons in which these plants should be collected, and preserve methods of drying, storing and preparing them for therapeutic use. Research on the Tagin and Galo of Upper Subansiri documented 26 medicinal plants and 10 poisonous plants, with preparation methods including paste, juice, boiled forms, powders, smoke, raw use and fermented liquids (Wangpan et al., 2019). This indicates that Tagin women's plant knowledge is not confined to

naming species; it includes processing, dosage form and practical application. Tagin women also maintain seed varieties suited to cold terrain, irregular growing conditions and short cultivation windows.

Their agricultural TEK includes selecting viable seeds, preserving planting material, recognising seasonal indicators and adjusting food preparation to the availability of crops and wild resources. Such knowledge links agriculture with careful observation of weather, soil, plants and animal behaviour. During Si Donyi, women's roles in food preparation and fermentation connect ecological knowledge with ritual life. The preparation of festival foods and beverages involves knowledge of grain quality, preservation, processing and ceremonial suitability. Oral narratives and seasonal instructions transmitted through families also carry phenological knowledge, including indicators for planting, harvesting and storing food. Through these practices, Tagin women sustain an ecological calendar that combines agriculture, ritual and everyday subsistence.



*Image: Traditional attire and community life of the Tagin tribe*

## The Mishmi Tribe (Idu, Digaru, Miju sub-groups)

*Upper/Lower Dibang Valley, Lohit, Anjaw districts | Terrace/wet rice cultivation, forest-product trade*

**Ecological & Cultural Context:** The Mishmi comprise three sub-groups: Idu or Chulikata, Digaru or Taraon, and Miju or Kaman. They share Tibeto-Burman roots but have distinct dialects. Animism, shamanism and Reh, an Idu ritual festival, characterise their spiritual life; historically, they traded musk, medicinal plants and skins into Tibetan networks.

**Women's Role in Conserving TEK:** Among the Mishmi, women's TEK is expressed through weaving, forest use, medicinal knowledge, ritual assistance and oral transmission. Idu, Digaru and Miju women are skilled weavers whose textiles carry knowledge of fibre, colour, pattern, clan identity and cosmological meaning. These handloom traditions are not only artistic practices; they are material archives through which ecological and cultural knowledge is preserved in visible form. Recent documentation of Idu Mishmi textile practice notes that textile production is done manually using simple bamboo and wooden tools, showing how craft knowledge is closely connected with local material use (Linggi et al., 2023). Mishmi women also hold important knowledge of forest foods, medicinal plants and ritual resources. Their familiarity with plant use, preparation and seasonal collection helps sustain household health and food security while maintaining the



*Image: Traditional weaving and textile*

community's connection with forest-based livelihoods. Among the Digaru Mishmi, published ethnobotanical work has documented wild edible plant knowledge as part of food, nutrition and local healthcare practice (Eko et al., 2020). Elderly women are particularly significant as herbalists, storytellers, shamanic assistants and community mediators. Through these roles, they transmit origin narratives, healing knowledge, ritual procedures and ecological memory across generations. The three Mishmi sub-groups exhibit this wider pattern. Among the Idu Mishmi, women's TEK is especially visible in handloom weaving, food preparation, ritual participation and the transmission of medicinal-plant knowledge; contemporary initiatives such as Lisha Umpo's documentation of more than 52 indigenous medicinal plant species from Dibang Valley also show how women's ecological knowledge is being carried into newer forms of cultural and conservation work (India Today NE, 2026; The Arunachal Times, 2026). Among the Taraon or Digaru Mishmi, women's weaving, plant-dye knowledge and ornamentation preserve both ecological and symbolic knowledge; textile motifs associated with Taraon and Kaman Mishmi traditions include forms interpreted as frogs, human figures, dao blades, eyes, fish scales, clouds, rivers and rainbows, indicating how landscape, species and cultural memory enter material design (IGNCA, n.d.). Among the Kaman or Miju Mishmi, women's refined use of colour, natural dyes and geometric



*Image: Traditional weaving and textile production among the Idu Mishmi*



patterns similarly makes weaving a repository of ecological observation and cultural identity, while their roles in shifting cultivation and food preparation connect textile knowledge with the

broader Anjaw forest ecosystem (Kri & Rani, 2025). Mishmi TEK is therefore carried both through practical activity and through cultural interpretation.

## The Monpa Tribe

*Tawang and West Kameng districts | 2,000–4,000+ m | Alpine agriculture, animal husbandry, carpet weaving, Thangka painting*

**Ecological & Cultural Context:** The Monpa were progressively absorbed into Gelugpa Tibetan Buddhism following Merak Lama's teachings, with Tawang Monastery as their central institution. Livelihoods combine barley, buckwheat and potato cultivation with yak and cattle herding; the pastoral Brokpa sub-group practises transhumance, or seasonal movement with livestock.

**Women's Role in Conserving TEK:** For Monpa women, TEK is closely associated with alpine plant knowledge, pastoral life, household food systems, weaving, papermaking and Buddhist cultural practice. Elderly women are especially important in remembering, adapting and transmitting plant and cultural knowledge from one generation to another (Pandey et al., 2017). Ethnopharmacological research from the Zemithang region of Arunachal Pradesh documents Monpa medicinal-plant use for gastrointestinal, dermatological, respiratory, skeletal-muscular and other ailments, showing the breadth of plant-based healthcare knowledge in Monpa society (Chakraborty et al., 2017). Women's knowledge includes the use of plants for food, medicine, ritual and household needs, as well as the seasonal conditions under which these resources are collected and prepared. Monpa women's participation in community knowledge gardens in West Kameng and Tawang further illustrates their role in plant conservation and traditional land-use management. In these spaces, women

contribute to the identification, protection and use of culturally significant plant species within local ecological systems (Singh et al., 2021b). Their knowledge is therefore not confined to cultivated fields; it extends to forests, pastures, household gardens and ritual landscapes. Monpa women also preserve TEK through carpet weaving, fibre work and the making of sukso, a traditional tree-based paper. Among pastoral groups, women's involvement in yak and cattle management gives them detailed knowledge of alpine pasture conditions, fodder availability, livestock behaviour and seasonal movement. Through agriculture, animal care, craft, plant conservation and Buddhist domestic practice, Monpa women sustain a layered ecological knowledge system adapted to high-altitude Himalayan life.



*Image: Traditional weaving and daily life of the Monpa community*

## The Sherdukpen Tribe

*West Kameng district, especially Rupa and Shergaon | ~5,000 | Settled agriculture, livestock, trade*

**Ecological & Cultural Context:** The Sherdukpen trace ancestry to Asu Gyaptong, a claimed descendant of Tibetan king Songtsan Gampo. Society divides into Thong and Chao classes; Mahayana Buddhism blends with animism.

**Women's Role in Conserving TEK:** Sherdukpen women's TEK is reflected in weaving, medicinal-plant knowledge, wild-food use, household healthcare and the management of cultural continuity across ecological zones. Their textiles draw on Buddhist iconography and local material knowledge. Weaving involves an understanding of fibres, colours, motifs and the cultural meanings attached to textile production. Women also maintain knowledge of medicinal plants, edible fungi and wild vegetables found in the temperate forests of West Kameng, all

intertwined with their traditional belief system (Taba & Taniang, 2023). This knowledge supports household health and nutrition, especially where local remedies and forest foods remain part of everyday life. Women know about the seasonal availability of useful species, methods of preparation and the contexts in which particular plants or fungi are used. Historically, during the seasonal migration of Sherdukpen communities to the Assam plains for several months each year, women played an important role in maintaining household organisation, food preparation, resource use and cultural continuity across both highland and lowland environments. Their TEK therefore developed through movement between ecological zones, requiring knowledge of different crops, wild resources, climatic conditions and social practices.



*Image: Sherdukpen women processing grains using a wooden mortar and pestle*



## The Aka (Hrusso) Tribe

*West Kameng and East Kameng districts | Jhum cultivation, trade in cloth and metalware*

**Ecological & Cultural Context:** The Aka or Hrusso, with the Miji or Sajolang treated as a sub-tribe by some classifications, speak a linguistically isolated Tibeto-Burman language. They were historically noted traders into Ahom networks and practise face-painting with black marks.

**Women's Role in Conserving TEK:** Aka women's TEK is centred on forest use, wild edible plants, medicinal resources, household subsistence and oral instruction. They identify useful species in the mixed broadleaf forests of West Kameng and understand their seasonal availability, preparation and everyday application. Their ecological knowledge supports food, medicine and domestic resource use, while also connecting household life to the surrounding forest ecosystem. A recent study from East Kameng documented wild edible plants consumed by the Aka community, based on

interviews with 120 informants from six Aka-inhabited villages (Siram & Tag, 2024). Such plant knowledge is closely tied to women's everyday work of collection, processing and food preparation. Women transmit this knowledge through daily practice rather than formal teaching alone. Younger members learn by accompanying elders during collection, observing plant identification, participating in preparation and listening to instructions regarding appropriate use. In this way, women maintain an intergenerational chain of ecological learning that is closely tied to ordinary work. Aka women's forest-resource knowledge is also linked to customary practices that regulate access to ecological resources. Indigenous knowledge systems, beliefs and sacred groves have been documented as important mechanisms in Aka forest-resource conservation (Nimachow, 2011).



*Image: Traditional post-harvest grain processing using a wooden mortar and pestle by the Hrusso (Aka)*

## The Miji (Sajolang) Tribe

*Lower West Kameng, parts of East Kameng | Shifting cultivation, foraging, fishing*

**Ecological & Cultural Context:** The Miji or Sajolang occupy a transitional zone between Buddhist Himalayan cultures and animistic Tani peoples. Animism and agricultural-season rituals structure community life.

**Women's Role in Conserving TEK:** Miji women's TEK is closely connected to foraging, medicinal-plant use, seed selection, shifting cultivation and ritual life. Women identify edible and medicinal plants, understand their seasonal availability, and know the preparation methods required for food, healing and household use. This knowledge is particularly important in a landscape where cultivated crops, wild resources and fishing together support subsistence. A cross-cultural ethnomedicinal study among the Monpa, Miji, Aka and Bugun recorded 59 medicinal plant species across 52 genera and 43 families, with women included among the

informants who transmitted knowledge on plant use and preparation (Siram et al., 2023). Women also contribute to the timing and management of cultivation. Their knowledge of seeds, soil conditions, seasonal signs and food preparation helps organise agricultural work in relation to ecological cycles. In shifting cultivation systems, such knowledge is essential for deciding when to clear, plant, weed, harvest and store.

The transmission of Miji women's TEK occurs through daily apprenticeship and ritual participation. Girls and younger women learn through accompanying elders in fields, forests and household work, while agricultural-season rituals reinforce shared understandings of timing, fertility, food and ecological order. Through foraging, cultivation, healing practices and ritual preparation, Miji women maintain a practical ecological knowledge system rooted in both livelihood and belief.



*Image: Traditional dance and music of the Sajolang (Miji) community*



## The Bugun (Khowa) Tribe

*Left bank of Tenga River, West Kameng district | ~2,232 (2011 Census) | Shifting cultivation, animal husbandry*

**Ecological & Cultural Context:** The Bugun gained global scientific attention through the 2006 discovery of the critically endangered Bugun Liocichla, a bird species whose habitat overlaps Bugun settlement areas. The community upholds notable gender parity, with women participating in the traditional village council (Nimiyang), and celebrates Pham-Kho Sowai, a community festival.

**Women's Role in Conserving TEK:** Bugun women's TEK is closely linked to forest plants, household food systems, fibre use, medicinal knowledge and community conservation. Women know the plants of the Singchung forest ecosystem that are used for food, medicine, fibre and domestic needs. Their knowledge includes species identification, habitat location, collection practices and preparation methods, making them important everyday managers of forest resources. The cross-cultural medicinal-plant study involving the Bugun, Monpa, Aka and Miji shows that Bugun knowledge of medicinal plants forms part of a wider West Kameng ethnomedical system while retaining community-specific practices (Siram et al., 2023). Women's participation in the Nimiyang council gives their ecological knowledge a place within community decision-making. This is particularly

significant in the context of Bugun-led conservation efforts around the Bugun Liocichla and its habitat. Women's knowledge of species, forest patches and household resource dependence contributes to a broader understanding of the landscape in which conservation planning takes place. Bugun women also transmit species-habitat knowledge through household work and child socialisation. Children learn about plants, forest use and appropriate collection not only through instruction, but through participation in gathering and food preparation. In this way, women act as both domestic knowledge holders and community-level contributors to conservation practice.



*Image: Traditional grain processing and food preparation using indigenous tools*

## The Wancho Tribe

Longding district | ~70,000 | Jhum cultivation, hunting, fishing, pig rearing

**Ecological & Cultural Context:** The Wancho, of the Naga cultural sphere, historically practised headhunting, documented until 1991, and organise society through morung, or youth dormitory, institutions. Oriah, an agricultural festival associated with jhum sowing, is a key community celebration.

**Women's Role in Conserving TEK:** Wancho women's TEK is closely associated with forest-derived foods, animal-based knowledge, plant use, agrobiodiversity, ritual preparation, weaving, bead-work and oral tradition. Wancho traditional knowledge includes numerous animal species of cultural value, and women play an important role in preparing forest-derived foods, including edible insects, birds and mammals used within household and ritual contexts (Jugli et al., 2020). Their knowledge includes household plant

processing, food preparation, wild-plant gathering, home-garden management, jhum cultivation, seed selection and conservation of plant genetic resources (Wangpan, 2026). This confirms that Wancho women are not merely users of ecological knowledge; they are organisers of its daily continuity. As household storytellers and ritual preparers, they also transmit memories, norms and practices associated with food, forest life and community identity. Their weaving and bead-work for ceremonial costumes further preserve ecological knowledge of plant dyes, fibres and materials. Textile and ornament production require knowledge of colour, texture, plant sources, processing and symbolic meaning. Through food preparation, animal knowledge, plant use, oral tradition and ceremonial craft, Wancho women maintain a TEK system that connects subsistence, ritual and cultural identity.



Image: Daily life featuring grain processing and handicraft production



## The Nocte Tribe

*Central Tirap district | Shifting cultivation, hunting, fishing*

**Ecological & Cultural Context:** The Nocte, of Naga linguistic stock, blend animism with Vaishnavite Hindu influences from long contact with Assam. Chalo-Loku, a harvest festival, is their main observance.

**Women's Role in Conserving TEK:** Among the Nocte, women's TEK is expressed through medicinal-plant knowledge, wild-food gathering, textile dyeing, weaving and harvest-festival food preparation. Women identify plants used in household remedies and know the preparation of species-specific medicines for everyday health needs (Chakravorty et al., 2013). They gather wild foods and maintain knowledge of seasonal availability, edibility and processing. This foraging knowledge complements shifting cultivation and contributes to household

nutrition. Furthermore, their use of forest-based dyes in textile production links ecological knowledge with craft, as dyeing requires familiarity with plant sources, extraction methods, colour stability and appropriate fibre use. During Chalo-Loku festival, women's preparation of communal food brings together agricultural produce, ritual timing and shared ecological knowledge. Kow leaves are used for preparing dishes and cups during this festival, along with firewood, rice and rice beer, showing how festival preparation draws directly on plant and forest materials (Tirap District Administration, n.d.). The weaving of status-bearing shawls further positions women as custodians of cultural knowledge, because these textiles encode clan affiliation, social identity and cosmological meanings.



*Image: Traditional rice pounding by Nocte women using a wooden mortar and pestle, illustrating an indigenous household food-processing practice*

## The Tangsa Tribe

*Changlang district, Indo-Myanmar frontier | Multiple sub-groups including Lungchang, Moklong, Yugli, etc. | ~80% agricultural*

**Ecological & Cultural Context:** The Tangsa or Tangshang comprise many dialect sub-groups along the Myanmar frontier; animism centred on the supreme being Rangfrah persists alongside inroads from Christianity and Buddhism. Moh-Mol, an agricultural and ritual festival, features chanting and divination.

**Women's Role in Conserving TEK:** Tangsa women's TEK is linked to agriculture, animal-based medicine, ethno-entomological knowledge, ritual practice and oral transmission. Tangsa traditional knowledge includes many animal species used not only as food but also in healing and cultural practice (Jugli et al., 2020). Women participate in identifying, preparing and applying such resources for household health needs, including digestive complaints, pain, childbirth-related care and other everyday conditions. Tangsa women also hold and transmit knowledge of edible insects and other forest resources. Ethno-entomological knowledge among tribes of eastern Arunachal Pradesh has been shown to rely strongly on oral transmission, in which women's household roles are particularly important (Chakravorty et al., 2013). Through collecting, cooking, explaining and demonstrating, women teach younger generations how to recognise useful species, distinguish safe from unsafe resources, and prepare them appropriately. Women's

participation in ritual contexts such as Moh-Mol further links TEK with ceremonial life. Food preparation, healing practices and the use of culturally meaningful species are embedded in ritual time, agricultural cycles and community identity.



*Image: Tangsa women engaged in the traditional processing of rice by pounding it in a wooden mortar, while another member winnows the grain using a bamboo tray*

## The Singpho Tribe

*Lobit and Changlang districts | Tengapani and Nao-Dihing river valleys | Wet rice cultivation, tea heritage*

**Ecological & Cultural Context:** The Singpho, Kachin in Myanmar and Jingpo in China, possess one of Arunachal's few indigenous scripts and

practise Theravada Buddhism. They are historically credited with introducing indigenous



tea-processing knowledge that catalysed the Assam tea industry.

**Women’s Role in Conserving TEK:** Singpho women’s TEK is strongly expressed through weaving, natural dyeing, indigenous tea processing, wet-rice agriculture and Buddhist household ritual. Singpho textiles are traditionally made on backstrap looms and include multicoloured garments with geometrical and floral patterns, linking women’s weaving knowledge to design memory, material skill and community identity (Arunachal Living Heritage, n.d.; Singh, 2019). Textile production therefore connects women’s craft to forest-resource knowledge, as the selection and processing of plant materials are essential to the quality and

meaning of woven products. Their role in indigenous tea processing is particularly significant. Women’s knowledge includes sun-drying, dew-curing, bamboo-cylinder fermentation and storage methods that give Singpho tea its distinctive character. As practitioners of Theravada Buddhist household ritual, Singpho women also help maintain the devotional and seasonal calendar of the community. Their ritual responsibilities connect domestic space with agricultural timing, food preparation and cultural continuity. Singpho women therefore sustain an ecological knowledge system that joins forest resources, agriculture, trade and spiritual life.



*Image: Singpho Community: A traditional rural scene portraying everyday livelihood activities, including land preparation, water collection, and cattle management*

## The Tai Khampti Tribe

*Namsai and Lohit districts | Tai-Shan origin, ~14,000 (2011 Census) | Wet rice cultivation, trade, Theravada Buddhism*

**Ecological & Cultural Context:** The Tai Khampti is the only tribe in Arunachal Pradesh that has its own script, Lik Tai, derived from Shan writing, with scriptural libraries, the largest at Chowkham, serving as unique cultural repositories. Being migrants from Myanmar's Shan province via Assam, they maintain pan-international ties to cognate Tai groups in Thailand, China, and Myanmar. Sangken, a Buddhist water festival similar to Songkran, is their principal observance; livelihoods rest on wet rice cultivation, historic buffalo and elephant domestication, fishing, and gold and silk weaving.

**Women's Role in Conserving TEK:** Tai Khampti women's TEK is especially visible in silk weaving, gold-thread embroidery, natural dyeing, agricultural labour, small-scale trade and Buddhist household ritual. Silk weaving is not merely a craft activity; it requires ecological knowledge of silkworm rearing, mulberry cultivation, fibre preparation, thread quality and seasonal conditions. Gold-thread embroidery and

textile production also demand knowledge of design, material handling, colour, durability and cultural symbolism. Tai Khampti textiles have been listed among Arunachal Pradesh handloom products with Geographical Indication registration, confirming the wider recognition of this textile tradition as a distinctive cultural product (DPIIT, 2026). Tai Khampti women are also custodians of natural-dye knowledge derived from forest plants. The preparation of dyes involves identifying suitable species, collecting plant parts at appropriate times, extracting colour and applying it to fibre in ways that preserve texture and meaning. Their sustained involvement in agricultural labour, weaving and small-scale trade has also been noted in relation to women's entrepreneurship in Namsai district (Chiring, 2026). As managers of Buddhist household ritual and the liturgical calendar, women further organise domestic and community life around seasonal ceremonies associated with the monastery.



*Image: Tai Khampti Community: A traditional rural scene portraying paddy processing and everyday household activities, reflecting the community's agrarian lifestyle and cultural heritage*



## The Memba and Khamba Tribes

*Mechuka valley, Shi-Yomi district | 1,800–4,000 m, near the Line of Actual Control | High-altitude agriculture, yak/cattle herding*



*Image: A traditional village scene portraying music, hospitality, and everyday social life, reflecting the community's rich cultural traditions*

**Ecological & Cultural Context:** The Memba and Khamba are closely related Tibeto-Burman communities of the Mechuka valley practising Mahayana Tibetan Buddhism, with deep cultural ties to Tibetan civilisation preserved by geographic remoteness. Livelihoods combine barley, buckwheat, potato and mustard cultivation with yak/cattle herding and the collection of high-value alpine medicinal plants such as *Nardostachys jatamansi* and *Aconitum* species.

**Women's Role in Conserving TEK:** Memba and Khamba women's TEK is rooted in alpine ethnobotany, high-altitude food systems, animal husbandry, medicinal-plant use, Buddhist ritual and domestic cultural practice. Women know the seasonality, microhabitats and preparation methods of medicinal plants found in cold mountain environments. Their knowledge includes where particular species grow, when they should be collected, how they are dried or processed, and how they are used in household healing. Women's roles in agriculture and herding also require close familiarity with high-altitude ecological conditions. The cultivation of barley, buckwheat, potato and mustard, together with yak and cattle management, depends on knowledge of weather, pasture quality, fodder availability, food storage and preservation (ToI, 2026). For women, this links dairy handling, fibre use, food preparation and household provisioning with alpine TEK. Moreover, their management of domestic altar spaces and Buddhist ritual observance adds a spiritual dimension to TEK. Offerings, sacred calendars, religious textiles and household ritual practices connect ecological resources with moral and cosmological meanings.



*Image: A traditional rural scene depicting handicraft production and grain winnowing, reflecting the community's artisanal skills and agrarian lifestyle*

## The Yobin (Lisu) Tribe

*Vijoy Nagar, Changlang district, India-Myanmar-China tri-junction | Shifting cultivation, hunting, gathering*

**Ecological & Cultural Context:** The Yobin or Lisu represent the westernmost extension of the Lisu people, isolated near the Namdapha Tiger Reserve. Limited contact with mainstream India has preserved strong cultural distinctiveness.

**Women's Role in Conserving TEK:** Yobin women's TEK is closely connected to gathering, shifting cultivation, forest-food preparation, medicinal-plant use and intergenerational transmission. In the isolated landscape of Vijoy Nagar, women's knowledge of species, habitats and seasonal availability supports everyday household subsistence. They identify edible plants, medicinal resources and useful forest products, and know how these should be collected, processed and prepared (Sarmah, 2010). Yobin women also transmit ecological

knowledge through agricultural work and domestic practice. Younger generations learn by participating in gathering, cultivation, cooking and medicine preparation alongside older women. This form of learning is grounded in repeated contact with the landscape and in direct observation of plants, soils, weather and forest habitats. Given the remoteness of the community, women's TEK also functions as an important form of practical environmental awareness. Through their daily work, women observe changes in species availability, crop performance, forest conditions and seasonal timing. Their knowledge therefore helps organise household adaptation within a setting where formal services and external support are limited.



*Image: Traditional Yobin (Lisu) Life – Showcasing daily household activities and traditional dress*



## The Puroik (Sulung) Tribe

*Kurung Kumey, Kra Daadi, East Kameng districts | Hunter-gatherer/forager subsistence*

**Ecological & Cultural Context:** The Puroik, formerly known by the derogatory term Sulung, are among the most socially marginalised communities in the state, historically bound in servitude to neighbouring Nyishi communities. Their dietary system relies extensively on wild plants, insects and animals.

**Women's Role in Conserving TEK:** Puroik women's TEK is especially significant because of the community's strong reliance on forest-based subsistence. They possess detailed knowledge of edible wild plants, medicinal species, insects and other forest resources. Their knowledge includes identification, habitat, seasonality, collection methods, processing and preparation, allowing households to draw on a wide range of local biodiversity for food and health needs. Women's foraging knowledge is also closely connected to household nutrition. They know which plants can

be eaten raw, which require processing, which are suitable during particular seasons, and which may be used during scarcity. Their medicinal knowledge similarly involves recognising species, preparing remedies and applying them within domestic healthcare practices. Research on the Puroik of Kurung Kumey describes hunting and gathering as a major traditional livelihood, with Indigenous knowledge and techniques used to hunt animals and gather foodstuffs from dense forests (Ramya, 2017). This reinforces the importance of women's foraging and processing knowledge within the broader subsistence system. This TEK is transmitted through participation in everyday subsistence. Children and younger women learn by accompanying elders during gathering, observing plant selection, and assisting in food and medicine preparation.



*Image: A traditional rural scene portraying hunting and grain processing, reflecting the community's forest-based livelihood and household practices*

## The Deori Tribe

*Dibang Valley and Lohit districts | Among the earliest-documented Arunachal tribes | Settled agriculture, fishing*

**Ecological & Cultural Context:** The Deori are considered descendants of the priestly class of the Chutia people, predating many other tribes in the region, c. 1600–1900 CE. Their Chutia-inherited ritual tradition combines Hindu influence with animism.

**Women's Role in Conserving TEK:** Deori women's TEK is associated with food preparation, medicinal-plant use, riverine resources, ritual practice, domestic healing and textile work. They maintain knowledge of plants used for food and medicine across their ecological zones, contributing to household nutrition and everyday healthcare. Their knowledge includes how ingredients are collected, prepared, combined and used within domestic and ritual contexts (Deori et al., 2007).

Women help preserve Chutia-derived ritual traditions through sacred chants, festival food protocols and healing practices maintained within the household sphere. These practices connect ecological resources with religious identity, as ritual foods and healing materials often require specific knowledge of plants, seasons, preparation and purity rules. Recent work on Deori gastronomic culture describes *suje or mod*, a rice beer made by women through rice fermentation and mixed with medicinal plants and herbs (Kashyap, 2025). Furthermore, in settled agricultural and fishing-based livelihoods, women's work links field produce, river resources and household food systems. Their role in processing, cooking, preserving and ritualising food helps transmit ecological knowledge as part of cultural practice.

## The Chakma Tribe

*Changlang, especially Diyun Circle, Lohit, Papum Pare | Post-Partition migrants | Wet rice cultivation, handloom weaving*

**Ecological & Cultural Context:** The Chakma migrated largely during and after Partition and the formation of East Pakistan; their Indo-Aryan Bengali-related dialect and Theravada Buddhist practice distinguish them from most Arunachal tribes.

**Women's Role in Conserving TEK:** Chakma women's TEK is expressed through handloom weaving, lowland plant knowledge, wet-rice cultivation, dye use, food preparation and Buddhist household devotion. They are skilled weavers of distinctive cotton textiles, and their craft knowledge includes fibre handling, pattern memory, colour use and the selection of plant-based dyes. Through weaving, women preserve both ecological knowledge and cultural identity. Women also know which species are useful, where they are found, how they are processed,

and how they are incorporated into household health, nutrition and craft. This makes them important conduits of plant-based TEK within a community whose ecological setting differs from many upland Arunachal tribes. Ethnobotanical research among Chakma communities in the wider region has recorded extensive medicinal-plant knowledge, with elderly men and women contributing to the transmission of herbal healing practices (Rahmatullah et al., 2012). Chakma women also contribute to wet-rice cultivation and household food systems. Their agricultural and domestic work involves knowledge of crop timing, grain processing, storage, cooking and ritual food preparation. Also, women maintain the devotional calendar within the household, linking religious observance with seasonal food, offerings and domestic organisation.



## The Tutsa Tribe

*Tirap and Changlang districts | ~12,000 | Jhum cultivation; chieftainship society*

**Ecological & Cultural Context:** The Tutsa, also known as Hatut, trace their origin to Rongkon Sansik in Myanmar and are said to have migrated through the Hokmen Hoksan route across the Patkai hills before settling at Tut or Tutnyu village in the Barap river valley, from which their name, meaning “sons of Tut,” is derived. Their hill-top villages consist of clustered pile-houses, locally known as Nok, and are governed by the Ngo Ngawang, a village council under a chieftain-commoner structure. The Pang, a dormitory institution, has historically been important in social learning. The Tutsa traditionally follow animist beliefs, while many have now converted to Christianity. Ponglu, their agricultural festival, is observed on 11 April.

**Women’s Role in Conserving TEK:** Tutsa women’s TEK is rooted in jhum cultivation, seed handling, food preparation, household resource

management and material culture. As cultivators of paddy, millet and maize, women hold practical knowledge of crop timing, soil conditions, seed selection, weeding, harvesting and storage. Their use of simple traditional tools reflects a cultivation system in which ecological judgement is embedded in ordinary agricultural labour. Their role in agricultural work also gives them an important place in transmitting crop knowledge to younger generations through participation in field labour and domestic food preparation. Furthermore, Tutsa women’s ornamentation, including bead necklaces and ear ornaments, also indicates a material culture in which ecological knowledge is carried through craft, adornment and social identity (Changlang District Administration, n.d.).



*Image: Tutsa Community: A traditional village scene portraying music, social interaction, and hunting, reflecting the community's rich cultural heritage*

## The Hill Miri (Nyishi of Kamle)

Kamle district | ~11,017 (1991 Census) | Dry and permanent cultivation

**Ecological & Cultural Context:** Formerly classified as a distinct tribe but now closely affiliated with the Nyishi, the Hill Miri of Kamle district maintain the Nimasa, an inter-community relationship norm, and the Gindu, a council of elders responsible for village governance. They worship Donyi-Polo, the sun-moon faith tradition, and celebrate Boori Boot Yullo, a spring festival, as their principal community festival. Their dialect shares similarities with Galo and Tagin.

**Women's Role in Conserving TEK:** Hill Miri women's TEK is especially visible in weaving, household food systems, forest-based material knowledge and cultivation. As expert weavers, women work with fibres, dyes, textures and patterns that connect domestic production with the surrounding forest and cultivated landscape. Weaving is therefore not only a craft skill; it is also

a knowledge system involving plant materials, colour memory, pattern transmission and cultural identity. The historic crinoline of cane rings worn by women in place of a blouse reflects another dimension of forest-sourced material culture. Its making and use require familiarity with cane, flexibility, durability and body-based design. Such practices show how women's embodied knowledge of local materials becomes part of dress, identity and intergenerational learning. Women's roles in dry and permanent cultivation further connect them to crop selection, food preparation, seed handling and household nutrition. The official Kamle district description of Boori Boot Yullo presents it as a spring-welcoming festival marked by rituals and dances for social harmony, health and collective well-being, making women's festival preparation part of a wider seasonal and ritual knowledge cycle (Kamle District Administration, n.d.).



Image: A glimpse into traditional village life, highlighting hunting, forest-based subsistence, and mutual care within the community



## The Memba Tribe (Mechukha)

*Shi-Yomi and Upper Siang districts, especially Mechukha and Gelling | ~1,169 (1991 Census) | Dry cultivation, animal husbandry*

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*Image: A traditional rural scene depicting handicraft production and grain winnowing, reflecting the community's artisanal skills and agrarian lifestyle*

**Ecological & Cultural Context:** The Memba, also part of the broader Memba-Khamba cultural complex, speak Tsangla, a Bodic-Tibeto-Burman language, and use the Hikor script. Society is divided into chiefs and commoners, and polyandry has traditionally been practised. Livelihoods centre on millet, maize, barley and cotton cultivation alongside animal rearing. Milk and butter tea are culinary specialties. Sonam

Losar, the New Year festival, marks an important point in the ritual calendar.

**Women's Role in Conserving TEK:** Memba women's TEK is closely tied to high-altitude food systems, dairy processing, animal husbandry, household preservation techniques, weaving and Buddhist domestic practice. Their knowledge of milk, milk products and butter tea requires an understanding of yak and cattle care, milking, fermentation, fat separation, storage and the dietary needs of cold mountain environments. In this sense, dairy work is not only a domestic activity; it is a high-altitude ecological skill. Women's agricultural knowledge is equally important. The cultivation of millet, maize, barley and cotton in a cold mountain environment requires careful attention to short growing seasons, seed quality, storage, food preservation and household use. Their work connects field production with nutrition, ritual food and seasonal adaptation. Memba women also help maintain Buddhist household practice through offerings, domestic ritual arrangements and festival food preparation. Their TEK therefore also joins material subsistence with spiritual life.

## The Khamba Tribe (Tuting)

*Upper Siang district, especially the Tuting area | ~1,333 (1991 Census) | Dry cultivation, carpet weaving*

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**Ecological & Cultural Context:** The Khamba of the Tuting area practise both polygamy and polyandry, follow Mahayana Buddhism, and speak Khamba Khaddi, a Tibetan dialectal variant, using the Hingna script. Carpet weaving, mask-making and animal husbandry supplement agriculture. Losar, the Tibetan Buddhist New Year, is celebrated twice yearly.

**Women's Role in Conserving TEK:** Khamba women's TEK is expressed through carpet weaving, wool processing, dye knowledge, animal husbandry, high-altitude food systems and Buddhist ritual practice. Carpet weaving requires knowledge of yak and sheep fibre, wool cleaning, spinning, colour selection, pattern memory and durability. Natural dye use links textile production directly to plant knowledge and the

alpine ecology in which the community lives. Women's participation in animal husbandry also gives them practical knowledge of fodder, seasonal pasture, wool quality, milk use and household provisioning. This knowledge complements dry cultivation, where women's work includes food preparation, grain storage and adaptation to a short growing season. Buddhist ritual life further shapes women's TEK. Through festival preparation, domestic offerings, ritual textiles and household altar care, women help connect ecological resources with spiritual meaning.



*Image: A traditional village scene portraying music, hospitality, and everyday social life, reflecting the community's rich cultural traditions*

## The Mishing (Mising) Tribe

East Siang and Lohit districts; also widely settled in Assam | ~13,591 in Arunachal (2001 Census) | Permanent cultivation, fishing, weaving



*Image: Museum diorama depicting The Mishing (Mising) Tribe community members*



**Ecological & Cultural Context:** The Mishing, also known as Mising or Miri, share close ethnic affinities with the Adi and belong to the Tani linguistic family. In Arunachal Pradesh, they are scattered along the foothills, while the larger population is settled in Assam's Brahmaputra floodplain. They worship Donyi-Polo and celebrate Ali Aye Legang, a spring sowing festival, in February.

**Women's Role in Conserving TEK:** Mishing women's TEK is especially visible in weaving, natural dye knowledge, household food systems, flood adaptation, medicinal-plant use and economic production. Weaving is a major women-led knowledge system. Women's weaving knowledge includes the skill of combining colours and floral designs on handmade looms, and weaving itself is described as both a home craft and a marker of affection, identity and artistic skill (Doley, 2014). This makes textile work a cultural archive rather than a simple household craft. Women's knowledge of natural dyes also connects weaving to plant selection, dye extraction and colour fixing. Girls begin learning before adolescence, and the

transmission of weaving skills from mothers and elder women carries knowledge of fibre, colour, pattern, garment form and social meaning. Garments such as ege, ri:bi and gasor, and patterns such as ghai-yamik, encode clan, aesthetic and cosmological meanings through cloth. Mishing women also hold important ecological knowledge around riverine life. In Brahmaputra floodplain settlements, traditional flood adaptation includes understanding water behaviour, constructing stilt houses, storing food and maintaining emergency boats such as the Ollung. Women's household-management role is central to these practices, because flood resilience depends on food storage, family mobility, seed protection and everyday preparedness. Mishing women have also been described as possessing knowledge of indigenous plant use, seed preservation and natural-resource management, placing them at the centre of household-level ecological care (Kardong, 2017). Ethnomedicinal surveys near Dibru-Saikhowa have documented 60 plant species used by Mishing communities to treat 17 ailments, reflecting the integration of ecological and health knowledge within community life.



## Climate Vulnerability, TEK Erosion and Women's Knowledge Systems

Climate vulnerability affects traditional ecological knowledge by disturbing the ecological conditions under which such knowledge is used, renewed and transmitted. TEK is not preserved only as memory; it is sustained through repeated practice in fields, forests, rivers, homes, pastures, ritual spaces and craft traditions. When rainfall becomes erratic, springs dry, fallow cycles shorten, floods intensify, species shift or alpine pastures degrade, the impact is therefore not limited to material loss. It also weakens the everyday processes through which women observe ecological change, select seeds, gather forest foods, process medicinal plants, preserve food, manage livestock, prepare ritual materials and teach younger generations.

This is especially important in Arunachal Pradesh because women's TEK is distributed across several climate-sensitive systems. In jhum-based communities, climate stress affects the timing of clearing, sowing, weeding, harvesting, seed storage and fallow recovery. In wet-rice and rice-fish systems, it alters water flow, field ecology and the stability of cultivation cycles. In forest-dependent communities, it changes the availability of wild edibles, medicinal plants, fibres, dyes and other non-timber forest products. In high-altitude communities, it affects pasture quality, medicinal-plant habitats, snowmelt-fed water, livestock care, dairy processing and wool-based material culture. These are not separate "women's activities" in a narrow domestic sense; they are knowledge systems through which households adapt to ecological variability.

The gendered nature of this vulnerability is significant. Women often notice environmental change through domains that are central to daily subsistence but may be overlooked in formal climate assessments. Among the Adi, for example, women's perception of climate variability has been linked to forest-food collection, harvesting and food storage, while men's observations were more strongly associated with hunting (Singh et al., 2017). This does not mean that women are inherently closer to nature; rather, it shows that gendered labour produces gendered environmental knowledge. Because women interact regularly with seeds,

stored foods, gathered species, household water, fuel, fodder, medicinal plants and ritual ingredients, they often detect ecological shifts through changes in availability, quality, timing and effort.

Climate stress also changes the labour required to maintain TEK. A dried spring may mean longer walks for water; a disturbed forest may mean more time spent locating useful plants; an unstable monsoon may require repeated adjustment of sowing, transplanting or harvesting decisions; and a flood may require additional work in storing food, protecting seeds, moving livestock and maintaining household safety. Such burdens matter because TEK transmission depends on time, access and practice. If women have less secure access to forests, fields, water bodies or pasturelands, and if younger generations participate less in these activities, knowledge may remain known in name but decline in practical depth.

The erosion of TEK can aggravate climate vulnerability in several ways. Loss of seed knowledge can reduce crop diversity and make households more dependent on fewer, less locally adapted varieties. Decline in wild-food knowledge can weaken dietary diversity and reduce fallback options during crop failure. Loss of medicinal-plant practice can make remote households more dependent on distant or unaffordable healthcare. Weakening of fermentation, food preservation, weaving, dyeing, dairy-processing or fibre knowledge can reduce women's livelihood options during periods of agricultural stress. Similarly, when customary norms around forest use, water sources, sacred sites or species restrictions weaken, local resource governance may become less resilient.

This has wider ecological implications. Indigenous and local knowledge systems often support biodiversity conservation, agrobiodiversity, low-waste food systems, sustainable harvesting and locally adapted resource management. IPBES has noted that biodiversity decline is often slower in areas traditionally owned, managed, used or occupied by Indigenous Peoples and local communities,



although these areas too are under increasing pressure (IPBES, 2019). FAO's work on Indigenous Peoples' food systems similarly highlights their dietary diversity, seasonal adaptation, ecological efficiency and low-waste characteristics, while warning that climate change, market pressures and knowledge loss threaten their continuity (FAO & Alliance of Bioversity International and CIAT, 2021). Therefore, the erosion of women's TEK does not only weaken cultural heritage; it can also reduce the local practices that help sustain forests, crop diversity, soil health, water regulation and climate-resilient food systems.

The relationship between TEK erosion and climate change is therefore circular. Climate change weakens the ecological base of knowledge by altering species, seasons, water flows and livelihood systems. In turn, the loss of TEK can reduce adaptive capacity, encourage dependence on external inputs, narrow food systems, weaken customary conservation practices and reduce the community-level knowledge needed for sustainable resource use. This can intensify pressure on forests, soils, water and biodiversity, thereby aggravating ecological vulnerability and indirectly contributing to the conditions that make climate impacts more severe.

For Arunachal Pradesh, women's TEK should therefore be understood as part of climate-resilience infrastructure. It stores ecological memory, supports seasonal decision-making, maintains food and medicinal diversity, sustains household preparedness, and preserves locally adapted ways of using biodiversity. However, it should not be romanticised as an unlimited coping resource. Indigenous women's knowledge can strengthen adaptation only when women retain access to forests, fields, water sources, seeds, livestock systems, craft materials and community institutions. It also requires support through early warning systems, gender-sensitive agricultural extension, community seed conservation, documentation led by knowledge holders, protection of customary resource rights, and inclusion of women in biodiversity and climate-governance decisions.

A strong climate response in Arunachal Pradesh would therefore combine women's TEK with scientific climate information, public investment and institutional recognition. TEK cannot replace formal adaptation planning, but adaptation planning is incomplete without it. When women's knowledge is protected, practised and respected, it strengthens both cultural continuity and ecological resilience.

## Conclusion

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Women's traditional ecological knowledge in Arunachal Pradesh is not a marginal or supplementary body of information, but a living foundation of community resilience, cultural continuity and biodiversity stewardship. Across diverse ecological zones and tribal societies, women sustain knowledge through work, care, memory, ritual, craft and everyday environmental practice. Their contributions show that TEK is neither static nor confined to the past; it remains adaptive, practical and deeply relevant to contemporary challenges of climate change, livelihood insecurity and ecological degradation. Recognising women as knowledge holders is therefore essential not only for cultural preservation, but also for building more grounded, gender-responsive and ecologically sensitive approaches to conservation and climate resilience in the Eastern Himalaya.



## References

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- Arunachal Living Heritage. (n.d.). *Singpho: Textile*. Retrieved July 5, 2026, from <https://arunachallivingheritage.com/singpho-textile>
- Athreya, R. (2006). A new species of *Liocichla* (Aves: Timaliidae) from Eaglenest Wildlife Sanctuary, Arunachal Pradesh, India. *Indian Birds*, 2(4), 82–94.
- Bora, S. S., Lahan, J. P., Borooah, M., & Sarmah, R. (2012). Poka A traditional rice wine of the Galo tribe of Arunachal Pradesh, India. *International Journal of Agriculture Sciences*, 4(6), 268–271. <https://doi.org/10.9735/0975-3710.4.6.268-271>
- Chakma Autonomous District Council. (n.d.). *Culture & tradition*. Retrieved July 5, 2026, from <https://www.cadc.gov.in/culture-tradition/>
- Chakraborty, T., Saha, S., & Bisht, N. S. (2017). First report on the ethnopharmacological uses of medicinal plants by Monpa tribe from the Zemithang region of Arunachal Pradesh, Eastern Himalayas, India. *Plants*, 6(1), Article 13. <https://doi.org/10.3390/plants6010013>
- Chakravorty, J., Ghosh, S., & Meyer-Rochow, V. B. (2011). Practices of entomophagy and entomotherapy by members of the Nyishi and Galo tribes, Arunachal Pradesh. *Journal of Ethnobiology and Ethnomedicine*, 7(5), 1–14.
- Chakravorty, J., Ghosh, S., & Meyer-Rochow, V. B. (2013). Comparative survey of entomophagy and entomotherapeutic practices in six tribes of Eastern Arunachal Pradesh, India. *Journal of Ethnobiology and Ethnomedicine*, 9(50), 1–19. From <https://doi.org/10.1186/1746-4269-9-50>
- Changlang District Administration. (n.d.). *Textile and handicrafts*. Government of Arunachal Pradesh. Retrieved July 5, 2026, from <https://changlang.nic.in/handicraft/>
- Chiring, C. A. (2026). A study on the emerging entrepreneur in indigenous start-ups among Tai-Khamti women of Namsai district. *International Journal of Humanities and Social Science Research*, 12(1).
- Deccan Herald. (2026, May 11). Scientists raise glacial lake outburst alarm to Khangri glacier in Arunachal Pradesh's Tawang.
- Deori, C., Begum, S. S., & Mao, A. A. (2007). Ethnobotany of Sujen—A local rice beer of Deori tribe of Assam. *Indian Journal of Traditional Knowledge*, 6(1), 121–125.
- Department for Promotion of Industry and Internal Trade. (2026). *Registered geographical indications of India: Arunachal Pradesh* [PDF]. Government of India. <https://www.dpiit.gov.in/static/uploads/2026/03/3dee535ef7ed198fd79d7745fe1205da.pdf>
- Doley, H. (2017). Forest resource depletion and its impact on the Mising women of Assam. *International Journal of Advanced Research and Development*, 2(6), 542–546. <https://www.multireviewjournal.com/assets/archives/2017/vol2issue6/2-6-213-132.pdf>
- Doley, P. (2014). The weaving culture among the Misings of Assam, India. *International Journal of Multidisciplinary Research and Development*, 1(6), 88–91. <https://www.allsubjectjournal.com/assets/archives/2014/vol1issue6/9.1-774.pdf>



- Eko, R., Ngomle, S., Kanwat, M., Kalita, H., & Moyon, N. N. (2020). Eating from the wild: An insight into the indigenous wild edible plants consumed by the Digaru Mishmi tribe of Arunachal Pradesh. *Indian Journal of Traditional Knowledge*, 19(2), 360–369. <https://doi.org/10.56042/ijtk.v19i2.35363>
- Esha, R. T., Chowdhury, M. R., Adhikary, S., Haque, K. M. A., Acharjee, M., Nurunnabi, M., Khatun, Z., Lee, Y.-K., & Rahmatullah, M. (2012). Medicinal plants used by tribal medicinal practitioners of three clans of the Chakma tribe residing in Rangamati district, Bangladesh. *American-Eurasian Journal of Sustainable Agriculture*, 6(2), 74–84. <https://www.aensiweb.net/AENSIWEB/aejsa/aejsa/2012/74-84.pdf>
- Food and Agriculture Organization of the United Nations, & Alliance of Bioversity International and CIAT. (2021). *Indigenous Peoples' food systems: Insights on sustainability and resilience from the front line of climate change*. FAO. <https://doi.org/10.4060/cb5131en>
- Government of Arunachal Pradesh. (2011). State Action Plan on Climate Change. Department of Environment and Forests.
- India Today NE. (2026, February 3). *Arunachal: Idu Mishmi youth takes Dibang Valley's medicinal wisdom to national stage*. <https://www.indiatodayne.in/arunachal-pradesh/story/arunachal-idu-mishmi-youth-takes-dibang-valleys-medicinal-wisdom-to-national-stage-1340870-2026-02-03>
- India Water Portal. (2025, August 22). *Fish, fields and feminism: How Apatani women sustain Ziro's aquaculture in Arunachal Pradesh*. <https://www.indiawaterportal.org/articles/fish-fields-and-feminism-how-apatani-women-sustain-ziros-aquaculture-arunachal-pradesh>
- Indian National Trust for Art and Cultural Heritage. (n.d.). *A woman from the Nocte community demonstrates traditional weaving methods during the INTACH-AITS workshop* [Archive record]. INTACH Archive. Retrieved July 5, 2026, from <https://icharchive.intach.org/Detail/objects/4825>
- Indira Gandhi National Centre for the Arts. (n.d.). *Textiles of Arunachal Pradesh*. Retrieved July 5, 2026, from <https://ignca.gov.in/divisionss/janapada-sampada/northeastern-regional-centre/textiles-of-arunachal-pradesh/>
- IPBES. (2019). *Summary for policymakers of the global assessment report on biodiversity and ecosystem services*. IPBES Secretariat. <https://doi.org/10.5281/zenodo.3553579>
- IPCC. (2022). Summary for policymakers. In H.-O. Pörtner, D. C. Roberts, M. Tignor, E. S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, & B. Rama (Eds.), *Climate change 2022: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 3–33). Cambridge University Press. <https://doi.org/10.1017/9781009325844.001>
- Jugli, S., Chakravorty, J., & Meyer-Rochow, V. B. (2020). Tangsa and Wancho of North-East India use animals not only as food and medicine but also as additional cultural attributes. *Foods*, 9(4), Article 528. <https://doi.org/10.3390/foods9040528>
- Jugli, S., Chakravorty, J., & Meyer-Rochow, V. B. (2020). Zootherapeutic uses of animals and their parts: An important element of the traditional knowledge of the Tangsa and Wancho of eastern Arunachal Pradesh, North-East India. *Environment, Development and Sustainability*, 22(5), 4699–4734.

- Kamle District Administration. (n.d.). *Boori Boot Yullo*. Government of Arunachal Pradesh. Retrieved July 5, 2026, from <https://kamle.nic.in/festival/boori-boot-yullo/>
- Kashyap, A. (2025). The gastronomic culture of the Deori community residing in Assam. *International Journal for Multidisciplinary Research*, 7(3). <https://doi.org/10.36948/ijfmr.2025.v07i03.43634>
- Linggi, F., Mihu, R., & Miwu, R. (2023). Products and technique of textile in Idu Mishmi tribe. *International Journal for Multidisciplinary Research*, 5(5). <https://doi.org/10.36948/ijfmr.2023.v05i05.7112>
- Lower Dibang Valley District Administration. (n.d.). *Idu Mishmi*. Government of Arunachal Pradesh. Retrieved July 5, 2026, from <https://roing.nic.in/culture-heritage/idu-mishmi/>
- Mishra, S., Singh, R. K., & Singh, A. (2009). Dynamics of traditional foods and livelihood of Adi women in varying socio-ecological systems of Arunachal Pradesh. (pp. 203–222). Gower Publishing.
- Mongabay India. (2024, September 23). Idu Mishmi protect ancestral land through community conservation.
- Myers, N., Mittermeier, R. A., Mittermeier, C. A., da Fonseca, G. A. B., & Kent, J. (2000). Biodiversity hotspots for conservation priorities. *Nature*, 403, 853–858.
- Namsa, N. D., Mandal, M., Tangjang, S., & Mandal, S. C. (2011). Ethnobotany of the Monpa ethnic group at Arunachal Pradesh, India. *Journal of Ethnobiology and Ethnomedicine*, 7, Article 31. <https://doi.org/10.1186/1746-4269-7-31>
- Nimachow, G. (2003). Towards the sustainability of forest resources: A case study of Akas of Arunachal Pradesh. *Indian Journal of Traditional Knowledge*, 6(2), 28–34.
- Nimachow, G., Joshi, R. C., & Dai, O. (2011). Role of indigenous knowledge system in conservation of forest resources: A case study of the Aka tribes of Arunachal Pradesh. *Indian Journal of Traditional Knowledge*, 10(2), 276–280
- Pandey, N. K., Chhonkar, D. S., Singh, D. K., & Khumu, S. T. (2017). Analysis of indigenous food items of Monpa tribal community in Tawang district of Arunachal Pradesh, India. *International Journal of Current Microbiology and Applied Sciences*, 6(9), 633–640.
- Ramya, T. (2014). Depletion of natural resources and their impacts on tribal women: a study in Kurung Kumey district of Arunachal Pradesh. Indian Geological Congress. <https://doi.org/10.13140/2.1.1487.5200>
- Ravindranath, N. H., et al. (2011). Climate change vulnerability profiles for North East India. *Current Science*, 101(3), 384–394.
- Registrar General of India. (2011). Census of India 2011: Scheduled Tribes. Government of India.
- Registrar General of India. (2011). Scheduled Castes and Scheduled Tribes Lists (Modification) Order. Government of India.
- Rehman, S., Azhoni, A., & Chabbi, P. H. (2022). Livelihood vulnerability assessment and climate change perception analysis in Arunachal Pradesh, India. *GeoJournal*, 88, 1427–1447, <https://doi.org/10.1007/s10708-022-10703-7>.



- Rido, L., Khangam, P., Tangiang, S., & Wangpan, T. (2024). Wild edible plants consumed by the Aka tribe in East Kameng district of Arunachal Pradesh, India. *Journal of Bioresources*, 12(1), 7–14. <https://doi.org/10.5281/zenodo.14800429>
- Singh, N. (2013). Environment Change and Development: A Perspective on the Role of Women in India with Special reference to nyishi women of Arunachal Pradesh. *International Journal of Humanities and Social Science Invention*, 2–2(6), 01–07. [https://www.ijhssi.org/papers/v2\(6\)/Version-3/A02630107.pdf](https://www.ijhssi.org/papers/v2(6)/Version-3/A02630107.pdf)
- Singh, R. K., Bhardwaj, R., Singh, A., Payum, T., Rai, A. K., Singh, A., Wangchu, L., & Upadhyay, S. (2021). Mainstreaming local food species for nutritional and livelihood security: Insights from traditional food systems of the Adi community. *Frontiers in Nutrition*, 8, 590978.
- Singh, R. K., Bhowmik, S. N., & Pandey, C. B. (2011). Biocultural diversity, climate change and livelihood security of the Adi community. *Indian Journal of Traditional Knowledge*, 10(1), 39–56.
- Singh, R. K., Hussain, S. M., Riba, T., Singh, A., Padung, E., Rallen, O., Lego, Y. J., & Bhardwaj, A. K. (2021). Grassroots approaches for sustaining biocultural diversity and livelihood security: Insights from Indian Eastern Himalaya. *Environmental Management*, 68(1), 30–51.
- Singh, R. K., Kumar, A., Singh, A., & Singhal, P. (2020). Evidence that cultural food practices of Adi women in Arunachal Pradesh, India, improve social-ecological resilience. *Ecological Processes*, 9(1), 29.
- Singh, R. K., Pretty, J. N., & Pilgrim, S. (2010). Traditional knowledge and biocultural diversity: Learning from tribal communities for sustainable development in Northeast India. *Journal of Environmental Planning and Management*, 53(4), 511–533.
- Singh, R. K., Rallen, O., Padung, E., & Bhardwaj, A. K. (2013). Elderly Adi women of Arunachal Pradesh: 'Living encyclopedias' and cultural refugia in biodiversity conservation of the Eastern Himalaya, India. *Environmental Management*, 52(3), 712–735, <https://doi.org/10.1007/s00267-013-0113-x>.
- Singh, R. K., Zander, K. K., Kumar, S., Singh, A., Sheoran, P., Kumar, A., Hussain, S., Riba, T., Rallen, O., Lego, Y., Padung, E., & Garnett, S. T. (2017). Perceptions of climate variability and livelihood adaptations relating to gender and wealth among the Adi community of the Eastern Indian Himalayas. *Applied Geography*, 86, 41–52. <https://doi.org/10.1016/j.apgeog.2017.06.018>
- Siram, J., Hedge, N., Singh, R., & Sahoo, U. K. (2023). Cross-cultural studies of important ethno-medicinal plants among four ethnic groups of Arunachal Pradesh, Northeast India. *Ethnobotany Research and Applications*, 25, 1–23. <https://doi.org/10.32859/era.25.12.1-23>
- Taba, B., & Taniang, M. (2023). Healing nature's way: Ethnomedicinal plants and belief systems of the Sherdukpen tribe in West Kameng, Arunachal Pradesh. *International Journal of Novel Trends and Innovation*, 1(10). <https://rjpn.org/ijnti/viewpaperforall.php?paper=IJNTI2310001>
- Tesia, D. (2025). Shifting cultivation of Arunachal Pradesh: Its problems and solutions. *International Journal of Research and Innovation in Social Science*, 2230–2236. <https://doi.org/10.47772/ijriss.2025.909000192>
- The Arunachal Times. (2026, February 13). Coexistence.
- The Arunachal Times. (2026, February 4). *Lisha Umpo brings Dibang Valley's medicinal wisdom to national stage*. <https://arunachaltimes.in/index.php/2026/02/04/lisha-umpo-brings-dibang-valleys-medicinal-wisdom-to-national-stage/>
- The Times of India. (2026, April 4). *Yaks reintroduced in Arunachal's Mechuka to strengthen tribal livelihoods*. <https://timesofindia.indiatimes.com/city/guwahati/yaks-reintroduced-in-arunachals-mechuka-to-strengthen-tribal-livelihoods/articleshow/130024222.cms>

Tirap District Administration. (n.d.). *Chalo Loku (Nocte)*. Government of Arunachal Pradesh. Retrieved July 5, 2026, from <https://tirap.nic.in/tourism/festivals/chalo-loku-nocte/>

UNESCO. (2014). Apatani Cultural Landscape. UNESCO World Heritage Centre.

Wangpan, T., Tangjang, S., & Chetry, L. B. (2026). Women's integral role in traditional knowledge systems (TKS): Insights from the Wancho community of Arunachal Pradesh, India. *Nova Geodesia*, 6(1), Article 502. <https://doi.org/10.55779/ng61502>

Wangpan, T., Tasar, J., Taka, T., Giba, J., Tesia, P., & Tangjang, S. (2019). Traditional use of plants as medicine and poison by Tagin and Galo tribe of Arunachal Pradesh. *Journal of Applied Pharmaceutical Science*, 9(9), 98–104. <https://doi.org/10.7324/JAPS.2019.90914>

Yamang, K., & Singh, N. C. (2021). Women, IKS and sustainable development: A perspective on the Apatani tribal women of Ziro Valley, Arunachal Pradesh. *International Journal of Recent Advances in Multidisciplinary Topics*, 2(8), 110–115.







# Traditional Ecological Knowledge and Gendered Stewardship among the Indigenous Communities of Jharkhand

Progyan Foundation for Research and Innovation (PFRI), Kolkata, India

Authors: Dr. Malancha Dey, [office@progyanfoundation.org](mailto:office@progyanfoundation.org), Dr. Chandreyi Sengupta, [research@progyanfoundation.org](mailto:research@progyanfoundation.org) & Mr. Somnath Samanta, [research@progyanfoundation.org](mailto:research@progyanfoundation.org)



## Abstract

Jharkhand's Scheduled Tribes constitute 26.2% of the state's population (Census of India, 2011) and have long exercised customary stewardship across an exceptionally biodiversity-rich forest landscape (Singhal et al., 2021). Forest cover accounts for 29.81% of Jharkhand's geographical area, compared with 21.76% nationally (Forest Survey of India, 2023). This work synthesises a structured review of published ethnobotanical and policy literature on the Santhal, Oraon, Munda, Ho, and Kharia communities, together with primary field evidence from 18 Focus Group Discussions by the Progyan Foundation for Research and Innovation (PFRI), two each from selected nine Santhal-dominated villages of the Mohanpur Community Development Block, Deoghar district, to assess the scientific basis, gendered structure, and contemporary erosion of Traditional Ecological Knowledge (TEK) across Jharkhand. Findings indicate that women are principal, though institutionally under-recognised, custodians in several domains of agrobiodiversity management, non-timber forest produce (NTFP) craft, and

household food and ethnomedicinal knowledge, while sacred-site stewardship remains embedded in customary community practice. Locally reported paddy types (Jarhan, Lohna, Sathi, Bhadoi) and minor millets (Marua, Kodo) have markedly declined or been abandoned over the past three to five decades as high-yielding varieties became more prominent, while sacred sites and groves such as Jaher Than and Sarna continue to be maintained through customary protection. The paper situates these findings within India's Forest Rights Act (2006), the Provisions of the Panchayats (Extension to the Scheduled Areas) Act (1996), and the Biological Diversity Act (2002), and proposes a seven-point, gender-responsive sustainability framework centred on secure rights for women-led NTFP livelihoods, community seed-bank recovery, and formal recognition of eligible sacred groves as Biodiversity Heritage Sites.

**Keywords:** Traditional Ecological Knowledge; Jharkhand; Santhal; Oraon; Munda; sacred groves; agrobiodiversity; gender; Forest Rights Act

## Introduction

Jharkhand was formed out of the southern districts of Bihar in November 2000 and occupies the mineral- and forest-rich Chota Nagpur Plateau (Government of Jharkhand, n.d.). At the time of the 2011 Census, the state had 32 notified Scheduled Tribe entries and approximately 8.6 million Scheduled Tribe residents, equivalent to 26.2% of its population (Census of India, 2011). The constitutional list for Jharkhand was amended in 2022, adding Puran and incorporating

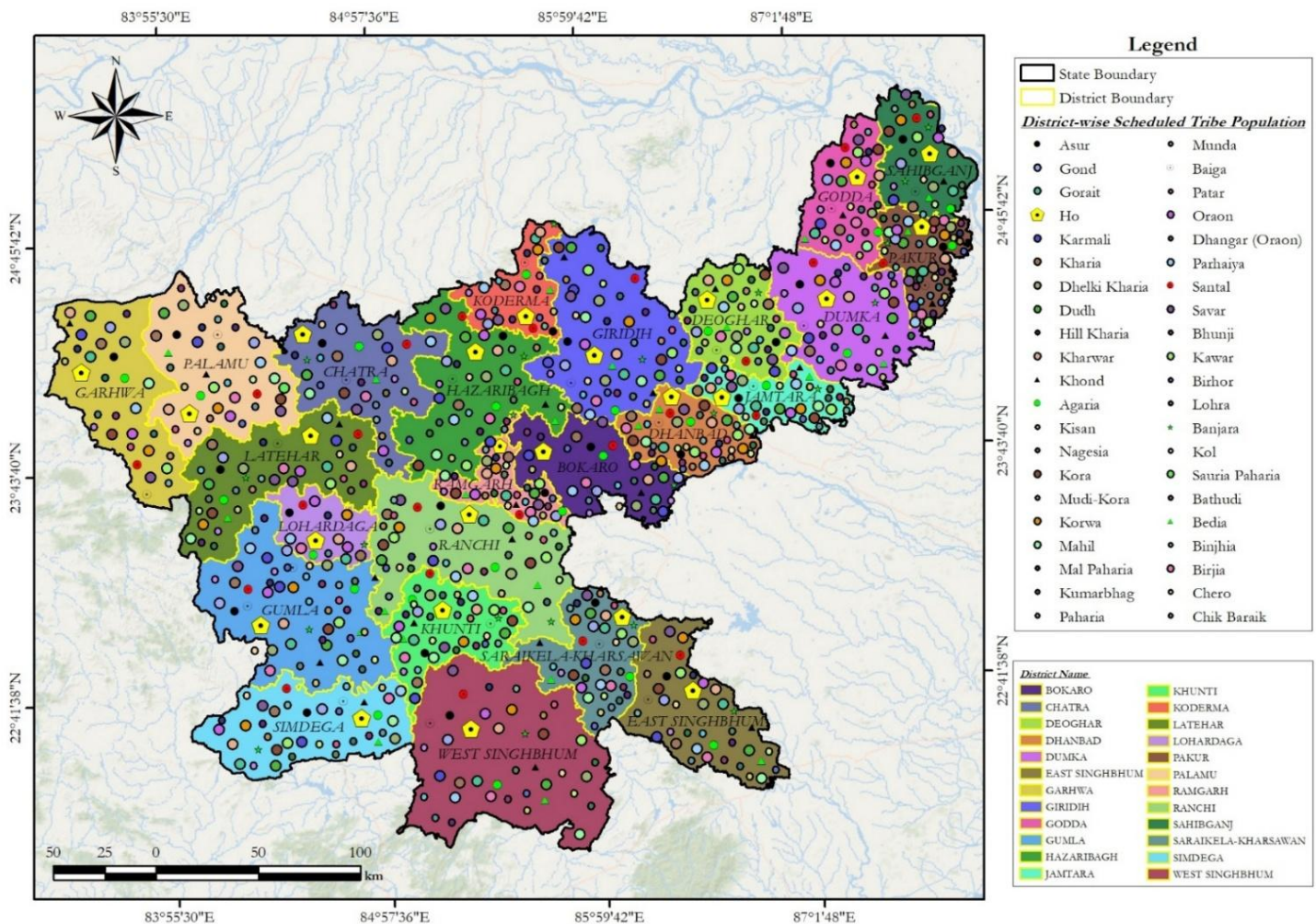
several additional communities or synonyms within existing Scheduled Tribe entries (Government of India, 2022). Forest cover extends across 23,765.78 km<sup>2</sup>, equivalent to 29.81% of Jharkhand's geographical area, substantially above the national forest-cover proportion of 21.76% (Forest Survey of India, 2023). Jharkhand's biodiversity richness reflects its varied physical geography and climate alongside long-standing tribal practices associated with sacred trees,



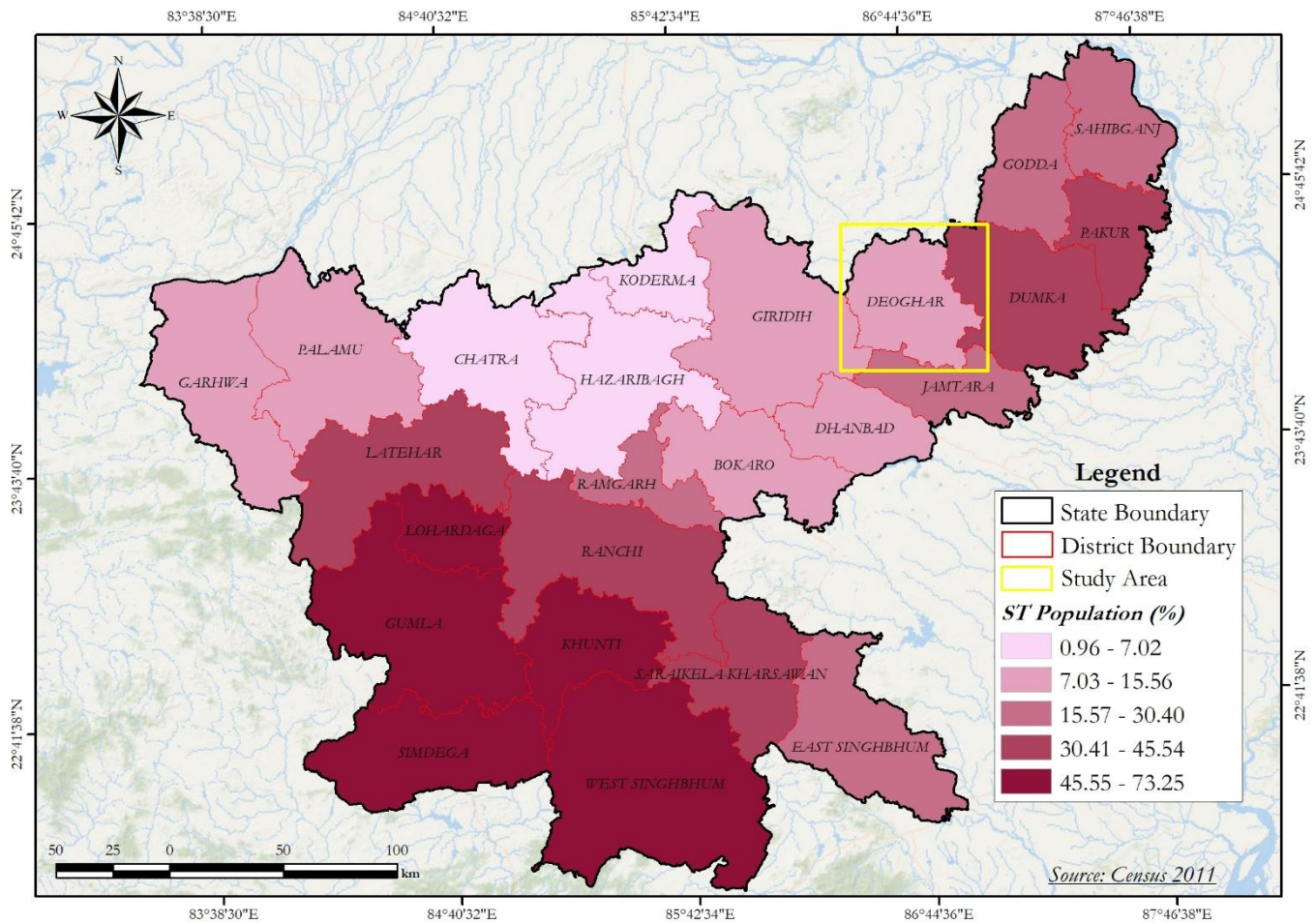
groves, totemic traditions, and customary limits on resource use (Singhal et al., 2021).

These relationships with different elements of the landscape have generated and maintained extensive bodies of community-based ecological knowledge, better known as Traditional Ecological Knowledge (TEK). It is the accumulated ecological knowledge, observations, and practices developed through sustained interaction with particular landscapes and transmitted largely through lived experience and oral tradition. It is recognised within Article 8(j) of the Convention on Biological Diversity (CBD). The provision places biodiversity-related traditional knowledge within the international conservation framework and links wider use of that knowledge to participation by the communities that hold it and to

fair benefit sharing (Convention on Biological Diversity, 1992). Within Jharkhand's tribal societies, this knowledge base spans agrobiodiversity management, sacred-forest stewardship, ethnomedicine, and craft-based non-timber forest produce (NTFP) use. Research among Santhal and Oraon women documents substantial knowledge and consumption of locally used foods (Ghosh-Jerath et al., 2016, 2018), even where practical responsibilities do not necessarily translate into equal formal authority over resources and decisions. The present paper examines this gendered structure of TEK across Jharkhand's principal tribal groups through a structured review of comparative literature on the Santhal, Oraon, Munda, Ho, and Kharia. Primary field evidence on the Santhal is presented as a case study.



Map: Distribution Of Indigenous Tribe Across Jharkhand, India



Map: Proportion of Schedule Tribe Population Across Jharkhand, India

## Study Area and Methodology

A structured review of peer-reviewed and institutional literature on the Santhal, Oraon, Munda, Ho, and Kharia communities of Jharkhand was undertaken, drawing on ethnobotanical, nutritional, ecological, and policy-research sources. The review examined tribe-specific patterns of Traditional Ecological Knowledge (TEK), its gendered dimensions, and the extent of available empirical evidence.

Within this comparative framework, the Santhal community of Deoghar district was examined through a primary-field case study. PFRI collected primary qualitative data through 18 Focus Group discussions (FGD) across nine villages Araji Telbhanga, Nagda,

Bhagwanpur, Kharyadi, Raktarona, Baramasiya, Kadrakura, Postwari, and Ghospur spanning five Gram Panchayats within Mohanpur Community Development Block, Deoghar district, Jharkhand. All nine villages are principally inhabited by the Santhal community. 2 FGDs were held in each selected village, one each with village elders and women groups in each village to gather qualitative baseline data on the TEK preservation practices of the Santhal community.

The present analysis is therefore, primarily a review-based work of the principal tribes inhabiting Jharkhand with the Santhals as a specific case stud



## Tribal Demographic and Ecological Context

Jharkhand's Scheduled Tribes are ethnolinguistically diverse, spanning Austroasiatic Munda-branch groups including the Santhal, Munda, Ho, and Kharia, and Dravidian-language groups, represented here by Oraon (Kurukh) (Anderson, 2008; Krishnamurti, 2003). The Santhal are numerically dominant, accounting for nearly 32% of the state's Scheduled Tribe population, with the Oraon next, followed by

Munda, then Ho, each contributing more than 10%. Smaller groups including the Kharwar, Lohra, Bhumij, and Kharia each account for under 3%. Nine communities applicable to Jharkhand are classified as Particularly Vulnerable Tribal Groups (PVTGs): Asur, Birhor, Birjia, Hill Kharia, Korwa, Mal Paharia, Parhaiya, Sauria Paharia, and Savara (Ministry of Tribal Affairs, n.d.).

| Community                    | Population and share of state ST population (2011 Census) | Language Family       |
|------------------------------|-----------------------------------------------------------|-----------------------|
| Santhal (Census: Santal)     | 2,754,723 (31.86%)                                        | Austroasiatic (Munda) |
| Oraon                        | 1,716,618 (19.86%)                                        | Dravidian             |
| Munda (Census: Munda, Patar) | 1,229,221 (14.22%)                                        | Austroasiatic (Munda) |
| Ho                           | 928,289 (10.74%)                                          | Austroasiatic (Munda) |
| Kharia                       | 196,135 (2.27%)                                           | Austroasiatic (Munda) |

Table 1. Demographic and linguistic profile of Jharkhand's principal tribal communities. Sources: Census of India (2011); Anderson (2008); Krishnamurti (2003).



## Tribe-wise Traditional Knowledge Systems and the Role of Women: Findings from Review of Published Literature

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### ***Santhal***

Santhal women hold extensive knowledge of, and consume, locally used indigenous foods, underscoring their role as custodians of household food knowledge (Ghosh-Jerath et al., 2016). Gender-disaggregated evidence beyond this domain covering agricultural, craft, and sacred-site knowledge is otherwise limited in the published literature; the field case study in Section 6 addresses this gap through primary data collected in Deoghar district.

### ***Oraon (Kurukh)***

The Oraon are the second-largest Scheduled Tribe community in Jharkhand (Census of India, 2011). Their language, Kurukh, belongs to the Dravidian family and is linguistically distinct from the Munda-family languages spoken by several other large tribal communities in Jharkhand. In Latehar district, Oraon communities use 101 species from 63 genera and 43 families as leafy vegetables. Many of these are used medicinally in local practice (Marandi & Britto, 2015). More than 130 indigenous food items are in use, several with substantial micronutrient value (Ghosh-Jerath et al., 2015). Although Oraon women show extensive awareness of such indigenous foods, they exhibit considerably lower routine consumption. Calcium intake has been found to be significantly higher among women who consume such foods (Ghosh-Jerath et al., 2018). Sal also occupies an important place in Oraon religious life through Sarhul and Sarna observances, linking *Shorea robusta* to a broader sacred-tree and grove tradition shared, in

differing forms, across several communities of Jharkhand (Singhal et al., 2021).

### ***Munda***

The Munda maintain a distinct ethnomedicinal tradition known as Horopathy (Hembrom & Goel, 2005), together with Sarna sacred-site traditions found in varying forms across the Chota Nagpur region (Singhal et al., 2021). Horopathy draws on plant-based remedies and culturally embedded therapeutic practices, reflecting the close relationship between ecological knowledge and health care. However, women's specific roles in seed selection, post-harvest work, forest collection, and household herbal practice remain largely unrecorded for the Munda.

### ***Ho and Kharia***

Ho communities in West Singhbhum consume 42 wild leafy vegetables (Horo & Topno, 2015), and 273 medicinally used plant species are in use in the Saranda Forest Division (Lal & Mishra, 2023) a rich body of forest-based food and medicinal knowledge whose gender distribution remains unrecorded. Equivalent material on the Kharia is sparser still, particularly on women's ecological roles; Hill Kharia is also classified as a Particularly Vulnerable Tribal Group (PVTG). For both communities, the principal gap is not the existence of ecological knowledge itself but the absence of evidence on who within the community holds, transmits, and exercises authority over particular forms of it.

## Scientific Basis: Mechanisms of Biodiversity Conservation through TEK

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### ***Sacred groves as in situ genetic reservoirs***

Sacred groves known locally as Sarna, Jaher Than, or Jaher Ghar can function as relatively undisturbed forest refuges in which customary restrictions help retain vegetation and species diversity that may be diminished in more intensively used surrounding landscapes (Khan et al., 2008; Singhal et al., 2021).

Rules vary by community and site but can restrict tree cutting, removal of particular plant materials, hunting, or other forms of disturbance. These customary controls create a community-enforced conservation system that long predates formal biodiversity legislation. Sal (*Shorea robusta*), Mahua (*Madhuca longifolia*), and other culturally important species carry



overlapping ritual, subsistence, and ecological significance in Jharkhand's tribal landscapes.

### ***On-farm agrobiodiversity via landrace stewardship***

Landraces and other farmer-maintained crop varieties in rainfed, low-input tribal agricultural systems in Jharkhand can contain locally useful genetic variation and provide material for breeding varieties better able to withstand environmental and biological stresses (Food and Agriculture Organization of the United Nations [FAO], 2019). Where such locally maintained crop types are progressively replaced by high-yielding varieties, the range of crop diversity maintained on-farm narrows accordingly. The drought tolerance, pest resistance, yield stability, and genetic distinctness of any specific locally maintained variety cannot be assumed, however, and require germplasm identification and agronomic evaluation before those traits can be confirmed.

### ***Ethnomedicinal and nutritional knowledge***

Ethnomedicinal knowledge is widespread across Jharkhand and is expressed through both specialist

healing traditions and everyday household practice. Across eleven tribal-dominated districts, 98 medicinal plant species are used in 153 herbal preparations for approximately 60 health conditions (Rathi et al., 2019). There is a close relationship between nutrition and medicine among the Oraon, with the community assigning therapeutic value to several indigenous foods (Ghosh-Jerath et al., 2015). Women are strongly represented in domestic food knowledge among both Santhal and Oraon communities (Ghosh-Jerath et al., 2016, 2018), while specialised ethnomedicinal expertise also resides with healers and other recognised knowledge holders.

### ***Craft-based sustainable harvesting***

Sal-leaf utensil and plate-making represents a low-impact form of forest use in which leaves are collected without felling the tree. Its sustainability nonetheless depends on harvest intensity, season, regeneration, access rules, and the condition of the source forest, giving Sal-leaf craft direct relevance to forest-management and livelihood policy.



## FIELD CASE STUDY: THE SANTHAL OF DEOGHAR DISTRICT

This section presents primary field evidence collected by PFRI across the selected nine Santhal-dominated villages, spanning five Gram Panchayats within Mohanpur Community Development Block, Deoghar district, as described in Section 2. The findings below are specific to this surveyed population.

### *Agricultural Change and Gendered Labour*

Across all nine surveyed villages, Santhal residents reported a near-identical historical cropping pattern: paddy types locally known as Jarhan, Lohna, Sathi, and Bhadoi, alongside finger millet (Marua), Kodo millet, and horsegram (Kulthi), were dominant until approximately 30–50 years ago, when they were increasingly displaced by high-yielding variety (HYV) paddy, wheat, and mustard. In every village, comparatively low yield was consistently identified as the principal reason for abandonment. Taken together, these accounts provide a consistent village-level chronology of declining cultivation of locally recognised crop types over the past three to five decades.

Gendered labour and decision-making followed a consistent structure: women were found to participate in agricultural labour on an equal footing with men and were consulted in household decision-making, but formal decision-making authority remained predominantly male across all surveyed villages.

### *NTFP Craft and Household Knowledge*

Sal-leaf (*Shorea robusta*) utensil and plate-making, locally comparable to the wider Indian dona-pattal craft tradition, emerged as a distinctly women-led practice. It was reported as actively practised in Nagda, Raktarona, and Postwari, while residents of Baramasiya specifically attributed its loss to the destruction or decline of nearby Sal forest. In Postwari, women reported travelling long distances towards Katoriya and beyond for Sal-leaf collection, increasing the time and travel burden associated with collection.

Ethnomedicinal and nutritional knowledge, including medicinal uses of mahua (*Madhuca longifolia*) and moringa and the consumption of moringa/drumstick, was reported in Raktarona.

### *Sacred-Site Stewardship and Community Institutions*

Sacred-site and grove stewardship was observed to be preserved across the surveyed areas: Jaher Than and Budhabudhi Than sites were maintained through customary practice, and a government scheme to construct protective boundary walls around these sites was reported as favourably received in Ghospur, showing that formal support could complement customary conservation where it was locally accepted. Women's Self-Help Groups (SHGs) were also reported in Ghospur, with training delivered but, in the community's own assessment, 'future pathways remained insecure', highlighting a governance and market-linkage gap. In several villages—Nagda, Bhagwanpur, Kharyadi, Raktarona, and Baramasiya—knowledge of pre-transition agricultural practices was reported as retained mainly by older and middle-aged generations, indicating an intergenerational transmission gap.

### *Drivers of Change Observed in the Field*

- **Yield economics:** The shift to HYV paddy, wheat, and mustard was attributed across all nine surveyed villages to the comparatively low yield of older local crop types, indicating that yield incentives were an important economic driver of their decline.
- **Infrastructure-mediated mechanisation:** In Kadrakura, traditional winnowing persisted where mechanised threshing had remained inaccessible until road connectivity improved in the preceding year, indicating that infrastructure could influence the pace at which older practices are replaced.
- **Out-migration:** Seasonal male migration to South India and Himachal Pradesh, reported in Postwari, might be restructuring household labour allocation and increasing women's on-farm responsibilities without a corresponding increase in formal decision-making authority.
- **Resource scarcity:** Water scarcity was reported across the majority of surveyed villages, adding pressure to agricultural systems in which locally maintained crop diversity had already declined.
- **Generational discontinuity:** In several villages, knowledge of pre-transition agricultural practice was reported as retained mainly by older and middle-aged generations, indicating an active intergenerational transmission gap rather than a completed transition.
- **Institutional fragility:** Women's SHGs had been formed and trained in Ghospur, but residents reported insecure future livelihood pathways and weak downstream market linkages, limiting the conversion of training into durable income opportunities.



## Policy Landscape and Implementation Gaps

India's legal architecture for tribal forest and land rights rests on three principal instruments. The Provisions of the Panchayats (Extension to the Scheduled Areas) Act, 1996 (PESA) requires governance in Fifth Schedule areas to respect customary institutions and assigns powers concerning minor forest produce and community resources to the appropriate Panchayat or Gram Sabha. The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (FRA) recognises individual and community forest rights, including Community Forest Resource (CFR) rights. Under Section 5, recognised rights holders and village institutions, including Gram Sabhas, are entrusted with protecting forests, biodiversity, habitats, and water sources and with enforcing community decisions governing access to CFRs. The Biological Diversity Act, 2002, as amended in 2023, provides for local Biodiversity Management Committees and enables areas of biodiversity importance to be notified as Biodiversity Heritage Sites. Together, these instruments provide a legal basis for connecting customary knowledge, community rights, and biodiversity governance.

Implementation, however, remains substantially below the Acts' stated ambitions. Drawing on the Ministry of Tribal Affairs' March 2026 progress report, Pani and Minhas (2026) report 47,901 rejected claims in the

Community Forest Rights and Community Forest Resource Rights categories nationwide, with the largest totals in West Bengal, Jammu & Kashmir, Madhya Pradesh, Karnataka, and Chhattisgarh. They interpret this pattern as evidence of continuing weaknesses in claim scrutiny, mapping practices, and the treatment of Gram Sabha recommendations. In Jharkhand, a long-standing gap in PESA implementation has recently been addressed through the Provisions of the Panchayats (Extension to the Scheduled Areas) Jharkhand Rules, 2025, which were officially listed by the Ministry of Panchayati Raj in July 2026 (Ministry of Panchayati Raj, 2026). The principal challenge is therefore effective implementation rather than the absence of state PESA rules.

On gender, the FRA already contains specific safeguards: for married claimants, recognised rights must carry the names of both spouses, while women must hold a minimum one-third share of seats on the Forest Rights Committee elected through the Gram Sabha (Government of India, 2006; Ministry of Tribal Affairs, 2012). Pani and Minhas (2026) recommend going further by adding women's names to every Individual Forest Rights (IFR) title and setting a 50% female representation target for institutions managing CFRs. That 50% threshold is a reform proposal rather than the present statutory minimum. The Van Dhan Vikas Karyakram can support NTFP collection, value



addition, and marketing through tribal groups and SHGs (TRIFED, n.d.). One District One Product (ODOP) support is district-product specific; Deoghar's current listed product is Peda, so Sal-leaf

craft should not be presented as receiving ODOP support in the district (Jharkhand Industrial Infrastructure Development Corporation [JIIDCO], n.d.).

## Recommendations: A Gender-Responsive Sustainability Framework

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- **Tenure security for women-led NTFP enterprises:** Sal-leaf craft and comparable NTFP-based livelihoods could be formally recognised within community forest-resource governance, Gram Sabha-anchored access and rights over minor forest produce under the FRA and PESA could be strengthened, and eligible women-led groups could be connected with Van Dhan support for value addition and marketing.
- **Women's representation in CFR governance:** Existing FRA provisions requiring both spouses' names on recognised rights for married claimants and a minimum one-third share of Forest Rights Committee seats for women could be more consistently enforced, while the recommended 50% female share within institutions managing CFRs could be pursued as a policy target.
- **Landrace recovery and community seed banks:** Institutional linkages with Indian Council of Agricultural Research (ICAR) regional centres and state agricultural universities could help locate, document, and characterise surviving seed material corresponding to Jarhan, Lohna, Sathi, and Bhadoi paddy and Marua/Kodo millets. Where identity and viability are confirmed, community seed multiplication and reintroduction could be paired with agronomic assessment aimed at addressing the yield disadvantage that residents identified as a major reason for abandonment.
- **Structured intergenerational knowledge documentation:** Women elder informants, alongside other recognised knowledge holders, could be prioritised in oral-history and TEK documentation programmes, building on PFRI's existing household-survey infrastructure, to capture agricultural and craft knowledge currently concentrated among older and middle-aged generations before further generational loss occurs.
- **Formal recognition of sacred groves as Biodiversity Heritage Sites:** Jaher Than and Sarna sites could be assessed for possible notification under Section 37 of the Biological Diversity Act where statutory criteria are met, with the process proceeding through the State Biodiversity Board and the relevant local body and Biodiversity Management Committee consulted before a recommendation is placed before the State Government for notification. Any formal recognition would ideally reinforce customary governance, building on the favourable community response to the protective boundary-wall scheme observed in Ghospur.
- **Market linkage for existing SHGs:** Targeted last-mile market access, price information, value-addition support, and product-quality training could help convert already-trained women's SHGs into durable income-generating institutions rather than short-lived capacity-building outcomes.
- **Tribe-differentiated research investment:** Dedicated, gender-disaggregated ethnobotanical and TEK research could be commissioned for communities where evidence on women's roles remains limited, particularly the Kharia and PVTGs, while gender-focused analysis of the better-documented Ho ethnobotanical knowledge base could be extended. This would address the uneven tribe-wise evidence identified in the existing literature.



## Conclusion

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This study contributes to the growing body of scholarship on Traditional Ecological Knowledge by demonstrating that the ecological practices of Jharkhand's tribal communities are not merely cultural traditions but important systems of biodiversity stewardship embedded within local institutions and gender relations. By combining comparative literature with primary field evidence from Santhal villages of Deoghar, the research highlights significant gaps in the documentation of women's ecological knowledge and

the uneven tribe-wise evidence base that currently exists. The findings provide a foundation for future researchers to undertake gender-disaggregated, tribe-specific investigations into agrobiodiversity, sacred-grove conservation, ethnomedicine, and community governance. In doing so, the study offers an empirical and conceptual framework for future interdisciplinary research seeking to connect indigenous knowledge systems, biodiversity conservation, and inclusive policy-making in Jharkhand and other tribal regions of India.

## References

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- Anderson, G. D. S. (Ed.). (2008). *The Munda languages*. Routledge.
- Census of India. (2011). A-11 Appendix: District-wise Scheduled Tribe population (Appendix), Jharkhand - 2011. Office of the Registrar General & Census Commissioner, India.
- Convention on Biological Diversity. (1992). *Convention on Biological Diversity*. United Nations.
- Food and Agriculture Organization of the United Nations. (2019). *Voluntary guidelines for the conservation and sustainable use of farmers' varieties/landraces*. FAO. <https://www.fao.org/3/ca5601en/ca5601en.pdf>
- Forest Survey of India. (2023). *India State of Forest Report 2023*. Ministry of Environment, Forest and Climate Change, Government of India.
- Ghosh-Jerath, S., Singh, A., Kamboj, P., Goldberg, G., & Magsumbol, M. S. (2015). Traditional knowledge and nutritive value of indigenous foods in the Oraon tribal community of Jharkhand: An exploratory cross-sectional study. *Ecology of Food and Nutrition*, 54(5), 493–519. <https://doi.org/10.1080/03670244.2015.1017758>
- Ghosh-Jerath, S., Singh, A., Lyngdoh, T., Magsumbol, M. S., Kamboj, P., & Goldberg, G. (2018). Estimates of indigenous food consumption and their contribution to nutrient intake in Oraon tribal women of Jharkhand, India. *Food and Nutrition Bulletin*, 39(4), 581–594. <https://doi.org/10.1177/0379572118805652>
- Ghosh-Jerath, S., Singh, A., Magsumbol, M. S., Lyngdoh, T., Kamboj, P., & Goldberg, G. (2016). Contribution of indigenous foods towards nutrient intakes and nutritional status of women in the Santhal tribal community of Jharkhand, India. *Public Health Nutrition*, 19(12), 2256–2267. <https://doi.org/10.1017/S1368980016000318>
- Government of India. (1996). *The Provisions of the Panchayats (Extension to the Scheduled Areas) Act, 1996 (Act No. 40 of 1996)*.
- Government of India. (2006). *The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (Act No. 2 of 2007)*.
- Government of India. (2022). *The Constitution (Scheduled Castes and Scheduled Tribes) Orders (Amendment) Act, 2022 (Act No. 8 of 2022)*.
- Government of India. (2023). *The Biological Diversity (Amendment) Act, 2023 (Act No. 10 of 2023)*.
- Government of Jharkhand. (n.d.). *About Jharkhand*. Chief Minister of Jharkhand. <https://cm.jharkhand.gov.in/jharkhand-glance>
- Hembrom, P. P., & Goel, A. K. (2005). Horopathy: Ethnomedicine of Mundas. *Ethnobotany*, 17, 89–95.
- Jharkhand Industrial Infrastructure Development Corporation. (n.d.). *One District One Product (ODOP)*. Government of Jharkhand. <https://www.jiidco.co.in/odop/>

- Khan, M. L., Khumbongmayum, A. D., & Tripathi, R. S. (2008). The sacred groves and their significance in conserving biodiversity: An overview. *International Journal of Ecology and Environmental Sciences*, 34(3), 277–291.
- Krishnamurti, B. (2003). *The Dravidian languages*. Cambridge University Press.
- Lal, H. S., & Mishra, P. K. (2023). Traditional ethics of 'Ho' tribe of Saranda Forest Division, Jharkhand. *Indian Forester*, 149(6), 644–658. <https://doi.org/10.36808/if/2023/v149i6/166536>
- Marandi, R. R., & Britto, S. J. (2015). Medicinal properties of edible weeds of crop fields and wild plants eaten by Oraon tribals of Latehar district, Jharkhand. *International Journal of Life Science and Pharma Research*, 5(2), 9–20.
- Ministry of Panchayati Raj. (2026). PESA rules framed by PESA states. Government of India. <https://panchayat.gov.in/en/document-category/pesa-rules-framed-by-pesa-states/>
- Ministry of Tribal Affairs. (2012). *The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Rules, 2007, as amended in 2012*. Government of India.
- Ministry of Tribal Affairs. (n.d.). State-wise list of Particularly Vulnerable Tribal Groups (PVTGs). Government of India. <https://tribal.nic.in/downloads/PVTG/OperationalGuidelinePMJANMAN.pdf>
- Pani, C. R., & Minhas, S. (2026, June 23). FRA 2006 needs urgent reforms to bridge the gap between promise and delivery. *Down To Earth*.
- Progyan Foundation for Research and Innovation (PFRI). (2026). Field Visit Report, JLBajaj Project, Deoghar District, Jharkhand, 28–31 January 2026 [Unpublished field survey data].
- Rathi, R. S., Bhatt, K. C., Semwal, D. P., Ahlawat, S. P., & Tomar, J. B. (2019). Ethno-medicinal plants used by local folk healers 'Vaidyas' in tribal dominated districts of Jharkhand. *Medicinal Plants - International Journal of Phytomedicines and Related Industries*, 11(1), 46–54. <https://doi.org/10.5958/0975-6892.2019.00003.0>
- Singhal, V., Ghosh, J., & Bhat, S. S. (2021). Role of religious beliefs of tribal communities from Jharkhand (India) in biodiversity conservation. *Journal of Environmental Planning and Management*, 64(13), 2277–2299. <https://doi.org/10.1080/09640568.2020.1861587>
- Tribal Co-operative Marketing Development Federation of India (TRIFED). (n.d.). *Van Dhan Vikas Karyakram: Guidelines*. Ministry of Tribal Affairs, Government of India. <https://trifed.tribal.gov.in/en/pmvdy/guideline-mobile>









# Gendered Traditional Ecological Knowledge and Comparative Climate Vulnerability Among Uttarakhand's Highland and Lowland Indigenous Communities

Progyan Foundation for Research and Innovation (PFRI), Kolkata, India

Dr. Malancha Dey ([office@progyanfoundation.org](mailto:office@progyanfoundation.org)); Dr. Chandreyi Sengupta ([research@progyanfoundation.org](mailto:research@progyanfoundation.org))

## Abstract

This research article examines how Traditional Ecological Knowledge (TEK/ITK) is gendered among Uttarakhand's five officially notified Scheduled Tribes the highland-dwelling Bhotia, Jaunsari and Raji, and the Terai-based Tharu and Buksa and sets their respective climate-vulnerability profiles against one another. Highland communities are distinguished by their participation in the Van Panchayat system of community forest governance and by the 1974 Chipko movement, a women-led model of forest defence. Their principal climate exposure is sudden, ice- and snow-driven hazard, illustrated by the 2013 Kedarnath and 2021 Chamoli disasters. In contrast, Lowland communities, are shaped by wet-rice, forest-foraging livelihoods and face chronic, seasonal hydro-meteorological and health-related stress. Notably, the Tharu carry a

well-documented genetic adaptation a near-fixed frequency of the alpha-thalassaemia allele conferring innate resistance to endemic Terai malaria, a rare case of a documented biological, rather than purely cultural, adaptation within an ITK-holding community. Women are central to both the knowledge systems of both zones, as Bhotia wool-weavers and Van Panchayat leaders in the hills, and as Tharu household-authority figures with elevated customary property rights in the plains. Even so,<sup>3</sup> institutional recognition remains uneven and, for the Buksa and Raji particularly, poorly documented. The article closes with a comparative vulnerability assessment and a differentiated, zone-specific set of recommendations.

**Keywords:** *Traditional Ecological Knowledge; Uttarakhand; Bhotia; Jaunsari; Raji; Tharu; Buksa; climate vulnerability; Van Panchayat; gender*

## Introduction

Uttarakhand's Scheduled Tribes (291,903 persons, or 2.89% of the state's population) (Census of India, 2011), are spread across five officially notified communities occupying two ecologically distinct zones. The Bhotia, Jaunsari and Raji inhabit the Himalayan highlands and mid-hills, where livelihoods and knowledge systems are shaped by transhumance, alpine (bugyal) pasture ecology and the Van Panchayat, a distinctive community forest institution. The Tharu and Buksa inhabit the Terai lowlands of

Udham Singh Nagar, Nainital and Dehradun districts, where livelihoods centre on wet-rice cultivation and forest-foraging within a historically malaria-infested floodplain ecology. Of the state total, the five named communities together account for close to 94% (some 273,839 persons); the remaining 6% (18,064 persons) is recorded by the Census under a residual 'generic tribes' category those self-identifying as Adivasi, Vanvasi or Girijan without a specific tribal label.



## Tribal Profile

| Tribe    | Population (2011) | Core profile                                                                                                                                                                                                                                                         |
|----------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bhotia   | 39,106 (13.39%)   | Highland zone. Straddles the Indo-Tibetan border tract (Uttarkashi, Chamoli, Pithoragarh, Bageshwar, Almora); comprises the Marcha, Tolcha, Johari and Jad sub-groups; follows a seasonal circuit between low-lying winter bases and high bugyal pastures in summer. |
| Jaunsari | 88,664 (30.37%)   | Highland zone. The largest of the five notified STs; centred on Jaunsar-Bawar in upper Dehradun, with a presence in Uttarkashi and Tehri Garhwal; governed by the customary Khat council; fraternal polyandry was historically practised here.                       |
| Raji     | 690 (0.24%)       | Highland zone. Notified as a Particularly Vulnerable Tribal Group (PVTG) in 1975; also called Van Rawat or Van Raji ('people of the forest'); strongly forest-reliant; the least-recorded of the three hill communities in the ITK literature.                       |
| Tharu    | 91,342 (31.29%)   | Terai (lowland) zone. The largest ST by headcount; settled mainly in Udham Singh Nagar, Nainital and Khatima; sustains itself through paddy cultivation and forest gathering; women hold property entitlements well beyond caste-Hindu custom.                       |
| Buksa    | 54,037 (18.51%)   | Terai (lowland) zone. Concentrated in the Ramnagar-Bajpur-Kashipur belt of Nainital and in Dehradun; officially notified, like the Raji, as a PVTG; forest-dependent; among the least-studied of the five in gender-focused ITK research.                            |

Table 1. Profile of Uttarakhand's five notified Scheduled Tribes by ecological zone. Sources: Census of India (2011); Ministry of Tribal Affairs, state-wise list of Particularly Vulnerable Tribal Groups; Vajiram & Ravi (2026)



## Women and Tribe-wise ITK Practice

### Highland communities

Among the Bhotia, seasonal transhumance produces a clear gendered division of labour: men

manage livestock during migration, while women are the principal spinners and weavers of the community's wool economy. Jad Bhotiya women of Dunda and Bagori (Uttarkashi) hand-spin Harsil Cross wool on the

traditional Bageshwari charkha for blankets, tweed and carpets, and are additionally documented as primary holders of indigenous prenatal and postnatal care knowledge in Kumaun (Joshi & Pande, 2016). Among the Jaunsari, livelihoods centre on agriculture, animal husbandry and forest-based activity under the customary Khat governance system but women's substantial labour contribution has not historically translated into formal decision-making authority (Bahuguna, 2022). The Raji remain the least-documented of the three, with a near-absence of gender-disaggregated ITK literature.

A structural force cuts across all three highland communities and conditions the gendered division of labour described above: sustained male outmigration, locally termed *palayan*, toward towns and cities has left large numbers of hill villages predominantly female. State surveys count well over a thousand such 'ghost villages' in Uttarakhand, and the state government's own Rural Development and Migration Commission, formed in 2017, exists specifically to track and address the pattern. Read alongside this trend, women's expanding role in forest and farm management looks less like a purely inherited

cultural arrangement and more like one shaped in part by the absence of working-age men.

### *Lowland (Terai) communities*

The Tharu, Uttarakhand's largest Scheduled Tribe by population, are wet-rice cultivators with intricate, monsoon-adapted irrigation and planting-schedule knowledge. This is supplemented by forest foraging for wild yams, roots, fruits, honey and medicinal herbs. Much of the ethnographic literature describes Tharu society as matriarchal, with women holding significant authority in household and family matters and full rights to run the household independently; other sources describe a patrilineal structure in which women nonetheless hold property rights substantially exceeding those recognised in caste-Hindu custom the literature is not fully reconciled on this point, and both characterisations are reported here rather than adjudicated between. Tharu women are skilled weavers of dhurries and grass baskets, a craft-based knowledge practice directly analogous to Bhotia wool-weaving in the highlands. The Buksa, by contrast, are markedly under-documented, with little gender-disaggregated ITK literature.

## Van Panchayats and the Chipko Movement: A Highland-Specific Institutional Case

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Uttarakhand's highland ITK system is distinguished by a formal, colonial-origin community forest institution: the Van Panchayat, established under the Forest Panchayat Rules of 1931 following sustained hill-community resistance to state forest appropriation. Around 12,000 Van Panchayats are estimated to operate across the state today. Its most globally significant expression of women's agency is the Chipko movement: in late March 1974, at Reni village (Chamoli district), Gaura Devi, head of the village Mahila Mangal Dal, rallied close to two dozen local women who ringed the marked trees with their arms and refused to move, stopping the felling that day and helping to catalyse a wider women-centred forest-conservation movement across the region. Women continue to hold formal Van Panchayat leadership today (e.g., Champa Devi, sarpanch of the Chokhuta Van

Panchayat, Nainital). No directly equivalent community forest-governance institution of comparable scale and antiquity is documented for the Terai lowlands, where forest governance has historically been more centralised under state Forest Department administration.

This asymmetry has a concrete legal remedy that deserves attention alongside the institutional contrast itself: the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, that allows individual and community forest-rights claims, independent of any pre-existing local forest-council tradition. For the Tharu and Buksa, who have no Van Panchayat-style body to build on, the Forest Rights Act rather than an attempt to graft a hill-style institution onto the plains may be the more immediately usable legal channel.



## Comparative Climate Vulnerability: Highlanders versus Lowlanders

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The two ecological zones expose their tribal populations to qualitatively different climate-hazard regimes, with direct consequences for how ITK functions as an adaptive resource.

### *Highland exposure: abrupt, cryosphere-driven hazard*

Himalayan highland communities face acute, low-frequency but high-magnitude disaster risk driven by glacier retreat and glacial lake expansion. For instance, the June 2013 Kedarnath disaster, triggered when rainfall roughly 375% above the seasonal norm caused the moraine dam of Chorabari Lake to fail, sent an estimated 262 million litres surging down the valley within minutes, killed more than 6,000 people, and remains among the deadliest Glacial Lake Outburst Flood (GLOF) events recorded in the Himalaya. The February 2021 Chamoli disaster, a glacier/rock-ice avalanche into the Rishiganga valley, caused further large-scale loss of life and destroyed hydropower infrastructure. Recent analysis finds that upward of one-tenth of the Himalaya's glacial lakes have enlarged within the past ten years as a consequence of human-driven warming (Eos.org, 2025), and national disaster-management authorities identify Uttarakhand as among the most GLOF-exposed states in India. For the Bhotia specifically, glacier retreat and shifting snowlines also directly threaten the bugyal pasture phenology that transhumance depends on, compounding disaster risk with slower-moving livelihood disruption.

Notably, the National Glacial Lake Outburst Flood Risk Mitigation Programme, covering several Himalayan states including Uttarakhand, focuses on lake monitoring, early-warning infrastructure and downstream risk reduction.

### *Lowland exposure: chronic, seasonal hydro-meteorological and epidemiological stress*

Terai lowland communities face a materially different hazard profile: recurrent monsoon-driven river flooding, forest encroachment and

human-wildlife conflict (including elephant-corridor overlap with settlements), and a historical epidemiological burden of endemic malaria that made much of the Terai effectively uninhabitable to non-Tharu populations prior to mid-20th-century eradication campaigns. Distinctively, the Tharu carry a well-documented genetic adaptation to this disease burden: multiple peer-reviewed studies report a near-fixed alpha-thalassaemia allele frequency in Tharu populations, associated with malaria morbidity on the order of seven times lower than in sympatric non-Tharu populations occupying the same malarious environment (Terrenato et al., 1988; Modiano et al., 1991). A related, independent genome-wide survey of Tharu populations drawn from both Nepal and the Indian states of Uttarakhand and Uttar Pradesh has since confirmed that these communities share a distinct dual East-Asian and South-Asian ancestry (Chaubey et al., 2014), lending further weight to the Tharu's status as a genetically distinctive population. Taken together, this represents a rare, scientifically verified case in which an indigenous community's environmental adaptation operates at the biological rather than purely cultural or technological level.

This protective trait is nonetheless specific to malaria and should not be read as blanket biological insurance: a warming climate is widely expected to shift the range and seasonality of other mosquito-borne diseases in the Terai dengue and Japanese encephalitis among them against which the alpha-thalassaemia trait confers no known benefit.

### *Comparative implications*

The contrast is instructive for policy design. Highland vulnerability is characterised by sudden-onset, infrastructure-destroying catastrophe, requiring early-warning systems, glacial lake monitoring and evacuation planning; the relevant ITK response Van Panchayat-based collective forest and watershed stewardship is a governance-institution asset. Lowland vulnerability is characterised by chronic, recurring, seasonally predictable stress requiring

flood-plain water management, wildlife-corridor planning and health-system resilience; the relevant ITK response Tharu irrigation knowledge and, distinctively, an inherited biological resistance trait is a combined livelihood-and-biomedical asset. A single,

undifferentiated 'Himalayan state' climate-adaptation policy risks under-serving one zone or the other; the two tribal populations of Uttarakhand are, in effect, adapted to two different climates within one state.



## Recommendations

- Institutionalise and expand women's Van Panchayat leadership state-wide, building on existing precedent (e.g., Chokhuta, Sarmoli-Jainti), for the highland zone specifically.
- Integrate transhumance-corridor and bugyal-pasture protection into glacier-retreat and GLOF adaptation planning, recognising Bhotia seasonal migration as an active climate-adaptive practice rather than a residual cultural artefact. This work should be coordinated with, and channelled through, the National GLOF Risk Mitigation Programme, rather than designed as a parallel state-level effort.
- Commission dedicated Raji and Buksa ITK documentation, given the severe, comparable data gaps identified for both communities across the two ecological zones. Since both communities are officially notified PVTGs, they can draw directly on the funding and institutional channels already open under PM-JANMAN (Pradhan Mantri Janjati Adivasi Nyaya Maha Abhiyan), the Government of India's PVTG-focused mission launched in November 2023.
- Support Terai flood-plain and wildlife-corridor community management structures for the Tharu and Buksa through the Forest Rights Act, 2006, which offers an immediately usable legal channel for this than a newly designed institution; programme design should first assess existing Forest Rights Act claims and titles in the Terai before proposing a parallel structure.
- Commission targeted public-health and population-genetics research building on the documented Tharu alpha-thalassaemia/malaria-resistance finding,



both to inform regional vector-borne disease policy and to ensure any such research is conducted with full, ongoing community consent and benefit-sharing.

This research agenda should also explicitly extend to non-malarial vector-borne disease risk in the Terai due to the changing climate.

## Conclusion

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This comparative study matters because Uttarakhand's tribal-studies and climate-policy literatures have largely developed on separate tracks: hill ethnography on one side, Terai ethnography on the other without asking what the two records look like set against each other. Unfortunately, there are directions this article could not itself pursue. The Tharu's alpha-thalassaemia adaptation, so far documented mainly as a malaria-resistance trait, invites closer population-genetic and epidemiological study as the Terai's disease burden shifts with warming.

The gendered consequences of highland outmigration, only sketched here, warrant dedicated fieldwork on how women's Van Panchayat authority is changing as villages empty. Moreover, the near-complete absence of gender-disaggregated scholarship on the Raji and Buksa remains, the single largest gap in Uttarakhand's tribal ITK record one that existing PVTG-focused funding channels make newly practical to close. The authors hope this comparison offers later researchers a starting point for further study.

## References

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- Bahuguna, R. (2022). Participation of tribal women in the implementation of development programmes: A study on Jaunsari women of Dehradun district.
- Census of India. (2011). List of Scheduled Tribes in Uttarakhand. Office of the Registrar General and Census Commissioner, India.
- Chaubey, G., Singh, M., Crivellaro, F., Tamang, R., Nandan, A., et al. (2014). Unravelling the distinct strains of Tharu ancestry. *European Journal of Human Genetics*, 22(12), 1404–1412.
- Dialogue Earth. (2024). Van panchayats: Upholding forest rights in Uttarakhand's hillside communities.
- Eos.org. (2025). Millions in India vulnerable to glacial lake floods.
- Government of India, Ministry of Tribal Affairs. (2023). Pradhan Mantri Janjati Adivasi Nyaya Maha Abhiyan (PM-JANMAN): Operational guidelines.
- Himalayan Weavers. (2026). Bhotiyas and Himalayan wool.
- Joshi, A., & Pande, N. (2016). Indigenous practices used by Bhotia tribe in Kumaun for prenatal and postnatal care. *Global Journal for Research Analysis*.

Mamgain, R. P., & Reddy, D. N. (2017). Outmigration from hill region of Uttarakhand: Magnitude, challenges, and policy options. In D. N. Reddy & K. Sarap (Eds.), *Rural Labour Mobility in Times of Structural Transformation*. Palgrave Macmillan.

Ministry of Tribal Affairs, Government of India. State-wise list of Particularly Vulnerable Tribal Groups (PVTGs).

Modiano, G., Morpurgo, G., Terrenato, L., Novelletto, A., Di Rienzo, A., et al. (1991). Protection against malaria morbidity: Near-fixation of the  $\alpha$ -thalassemia gene in a Nepalese population. *American Journal of Human Genetics*, 48, 390–397.

Rural Development and Migration Commission (Palayan Aayog), Government of Uttarakhand. (2018). District migration survey reports.

Singh, K. K. (1997). Studies on native medicine of Jaunsari tribe of Dehradun district, Uttar Pradesh, India. *International Journal of Pharmacognosy*, 35(2).

Terrenato, L., Shrestha, S., Dixit, K. A., Luzzatto, L., Modiano, G., Morpurgo, G., & Arese, P. (1988). Decreased malaria morbidity in the Tharu people compared to sympatric populations in Nepal. *Annals of Tropical Medicine and Parasitology*, 82(1), 1–11.

Vajiram & Ravi. (2026). *Tribes of Uttarakhand: Traditions, livelihoods, distribution*.

Virdi, M. (2022). Sarmoli-Jainti Van Panchayat: An initiative in community-managed forests. *FAO India Success Stories*.

Wikipedia contributors. (2026). *List of Scheduled Tribes in Uttarakhand; Bhoksa people; Gaura Devi*.











## Who Gets to Speak for Women

*Ms. Shubbika, fifeorganization@gmail.com*  
*Managing Trustee, FIFE*

For all the conversations we are having around gender, there is one pattern that rarely gets questioned. Even in spaces created for women, their voices are not always the ones people listen to most.

It is easy to point at male-dominated industries and call out the imbalance. What is harder to admit is how this imbalance quietly continues even within the gender-sensitive domain itself. A space that is meant to centre women often ends up doing something else. It listens to them, but does not always trust them with authority. Their experiences are heard, but not always treated as if they are enough on their own.

Over time, a certain preference has become visible. People seem more willing to engage with uncomfortable truths when they are articulated by men. This holds true even for issues that women live through every day. A man explaining a woman's reality is often seen as thoughtful, informed, sometimes even brave. His voice carries a kind of automatic legitimacy.

When a woman says the same thing, especially with clarity and conviction, the response shifts. She is questioned more closely. Her tone is examined. Her words are sometimes softened, sometimes resisted. A woman calling herself a feminist is still, in many contexts, seen as someone difficult, excessive, or confrontational. It becomes less about what she is saying and more about how she is saying it.

Consider a man in the same position. A man who identifies as a feminist is more likely to be appreciated. He is seen as progressive, as someone who has chosen to stand for something larger than himself. The same label that complicates a woman's identity often enhances his.

The difference becomes even more visible when emotion enters the conversation. When a man speaks about women's issues and appears affected by them, it is powerful. His words are read as those of an empathetic ally, carrying a depth of understanding. When a woman expresses the same intensity, it is often reduced to overreaction or dramatics. The same emotional expression is validated in one case and dismissed in another.

This raises a larger question about credibility. Why does lived experience not translate into authority? Why must it still be explained, reframed, or endorsed by someone else to be taken seriously? When the person closest to the issue is not the one most readily believed, something fundamental is being overlooked.

This is not to dismiss the importance of allyship. It is necessary, and it has value. However, allyship should not come at the cost of overshadowing the very voices it intends to support. There is a difference between standing beside someone and speaking in their place. Too often, that line is crossed without recognition.

If gender sensitive domain is to truly serve its purpose, it must confront this contradiction. It must ask not only who is present in the room, but whose words are trusted without resistance, and whose words are still required to prove themselves.

A space cannot call itself safe if a woman's voice within it still needs validation to be taken seriously. Until her experience is treated as complete and authoritative in itself, the work of sensitisation remains unfinished.





## Motherhood in Research: Claiming Your Rights to Thrive Without Compromise

Dr. Jhimli Mondal, [jmjhimli@gmail.com](mailto:jmjhimli@gmail.com)

Estuarine and Coastal Studies Foundation, West Bengal, India.

Motherhood is a fascinating experience that is cherished by a significant section of the female population across the world. Unfortunately, for working women, this memorable phase is often beset with challenges. The prospect of balancing professional responsibilities with personal obligations can be a source of considerable apprehension to them. Many women fear that motherhood may adversely affect their professional lives, leaving them deprived of opportunities despite their brilliance, dedication and hard work. This fear may even contribute to depression. For women who are unwilling to take an immediate career break, planning how to reconcile work and research with parenting should therefore begin as early as conception.

Maintaining a healthy balance between personal and professional life also requires women to be aware of their rights at the workplace. The Indian legal system provides considerable protection for motherhood. The new labour codes extend this protection to different forms of motherhood, including adoption and "commissioning mothers" (biological mothers who use surrogacy), thereby providing women with greater safety, equality and flexibility in the workplace.

Moreover, maternity leave is clearly defined under the *All India Services (Leave) Rules, 1955*. In addition, there are new laws that seek to safeguard women's rights during pregnancy, childbirth, the postpartum period and childcare. Such provisions recognise not only a young mother's physical health but also her emotional need to establish a bond with her infant. They further seek to protect women's physical and mental well-being, enabling them to resume their lives following a miscarriage or abortion, depending on the circumstances.

In the academic sector, the Department of Higher Education, the Department of Science and Technology (DST), and the Department of Biotechnology (DBT) have introduced several programmes through scholarships, fellowships, project funding and awards to encourage and support women researchers. Also, government initiatives such as INSPIRE-SHE, the PRAGATI Scholarship and the Post-Graduate Indira Gandhi Scholarship for Single Girl Child specifically encourage women to pursue higher education. Several government programmes also support women researchers who have had to take a career break to manage their personal lives, including motherhood, and subsequently wish to return to the workforce. These include WISE-KIRAN by DST, the DBT BioCARE Fellowship and the UGC-Post Doctoral Fellowship for Women Candidates. Also, the government periodically introduces international schemes dedicated to women. Several conferences and meetings also provide additional fellowships for women with young children, enabling them to make use of daycare facilities.

Despite these provisions, lack of awareness of one's rights can leave women vulnerable to exploitation. Many employers fail to adequately inform their employees about the latest codes and the facilities that they are required to provide for women. It is therefore important for women to familiarise themselves with their rights before approaching their employers. Awareness of these provisions can help ensure that employers do not deny women the facilities and protections to which they are entitled.

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## References and reading links:

<https://www.pib.gov.in/FactsheetDetails.aspx?id=150499&NoteId=150499&ModuleId=16&reg=3&lang=1#:~:text=The%20new%20Labour%20Codes%20in%20India%20include,child%20attains%20the%20age%20of%2015%20months> viewed on April 15, 2026.

[https://dopt.gov.in/sites/default/files/Revised\\_AIS\\_Rule\\_Vol\\_I\\_Rule\\_03.pdf](https://dopt.gov.in/sites/default/files/Revised_AIS_Rule_Vol_I_Rule_03.pdf) viewed on April 16, 2026.

<https://www.indiascienceandtechnology.gov.in/nurturing-minds/scholarships/post-graduation/inspire-she-innovation-science-pursuit-inspired> viewed on April 24, 2026.

<https://www.ncw.gov.in/publications/women-centric-schemes-by-different-ministries-of-government-of-india-goi/> viewed on April 24, 2026.



## Gendered Experiences in Academia

Dr. Reena Singh, [drreenasingh13@gmail.com](mailto:drreenasingh13@gmail.com)

Assistant Professor, Department of Management Studies, G L Bajaj Institute of Technology and Management, Greater Noida

Exploring the dynamics of gender within the academic landscape is crucial, as it reveals the significant ways that institutional structures influence opportunities and recognition. Many universities, shaped by traditional patriarchal values, allocate teaching loads, research funding, mentorship, and administrative support unevenly, leaving women and marginalised genders underrepresented and disadvantaged. This perpetuates systemic barriers that limit diversity in leadership and scholarship, creating an environment lacking varied perspectives and ideas.

The consequences of these disparities are profound, as they lead to the undervaluation of contributions from women and marginalised genders. With fewer women in leadership positions, the challenges faced by these individuals remain inadequately addressed, further entrenching inequities in the academic landscape. This lack of representation affects day-to-day operations and influences research agendas, hiring practices, and the overall culture within academic departments. Consequently, the aspirations and capabilities of a significant portion of the academic workforce go unrealized, undermining the institutional mission to advance knowledge and understanding. Addressing these issues requires more than symbolic gestures; it demands meaningful policy changes that embed transparency, accountability, and inclusivity into the core of academic institutions. Reforms such as equitable hiring practices, transparent allocation of research funding, and mentorship programs tailored to marginalized groups can create a more balanced academic



environment. Ensuring equitable access to resources allows diverse scholars to participate fully in their pursuits without being hindered by systemic bias.

Women and marginalized genders in academia often navigate an unequal distribution of responsibilities, with teaching and service commitments heavily impacting time allocated for crucial research. Inconsistent access to grants, laboratory space, and administrative support typically favours established male networks, leading to a cycle of disadvantage where contributions are overlooked, further reducing chances of advancement.

The challenge deepens with intersectionality, as women of colour, LGBTQ+ scholars, and individuals from disadvantaged backgrounds face additional layers of discrimination. These overlapping inequities hinder personal career progression and stifle diversity of thought in academia, weakening the academic fabric. Institutions need to understand that marginalization is multi-dimensional; policies must be crafted to address the varied experiences of diverse scholars. To dismantle these entrenched inequities, universities must adopt a holistic approach toward reform. This includes ongoing training for faculty and administrators on bias and inclusivity, regular assessments of departmental culture, and active involvement from diverse voices in decision-making processes. By fostering an environment where all scholars can contribute to discussions on policy and practice, institutions can better respond to the unique needs of their communities.

In conclusion, creating an equitable academic environment is crucial for the health and progress of educational institutions. When we actively address the gendered experiences shaping our academic landscape, we not only empower individuals but also enrich the entire community. Embracing diversity in thought and background leads to stronger scholarship and leadership, paving the way for a brighter, more innovative future in academia. By committing to ongoing change and accountability, we can build a more inclusive academic culture that uplifts all voices.



## CSR and Gender Equity: Integrating Inclusive Funding Strategies

*Sujatha Parthasarathi, sujatha@caacs.iitm.ac.in*

*Coordinator, Centre for Atmospheric and Climate Sciences, IIT Madras*

### Introduction

Gender equity is no longer a peripheral concern in institutional funding; it is a strategic imperative. As corporations expand their Corporate Social Responsibility (CSR) mandates, the intersection of philanthropy, accountability, and inclusion has grown more complex and consequential. According to the Ministry of Corporate Affairs (2023), Indian companies above the prescribed threshold must allocate at least two percent of their average net profit toward CSR activities. This framework creates a significant opportunity: to embed gender equity not as a footnote but as a foundational principle in how funds are designed, directed, and evaluated. We should observe firsthand how institutional research ecosystems can either amplify or attenuate gender disparities, particularly in STEM fields. Only 7% of global venture financing reaches women-led initiatives, a disparity mirrored in academic grant distribution (International Finance Corporation, 2021).

## The CSR–Gender Equity Nexus

The CSR investments hold enormous potential to reshape gender dynamics in education, entrepreneurship, and scientific research. However, many CSR programmes in India still treat gender as a secondary beneficiary category rather than a primary lens (Poddar et al., 2025). Funds flow toward broad social indicators - rural development, healthcare, and education without disaggregating outcomes by gender or mandating women-led governance structures.

The consequence is a funding gap that perpetuates inequality even within well-intentioned initiatives. According to the International Finance Corporation (2021), women-owned enterprises receive less global venture financing, a disparity mirrored in academic grant distribution. When CSR strategies do not explicitly earmark resources for women researchers, women entrepreneurs, or gender-responsive programmes, structural inequity is inadvertently subsidised. Therefore, each stage of design, disbursement, monitoring, and evaluation must embed gender equity targets and disaggregated metrics for meaningful impact (Fig. 1).

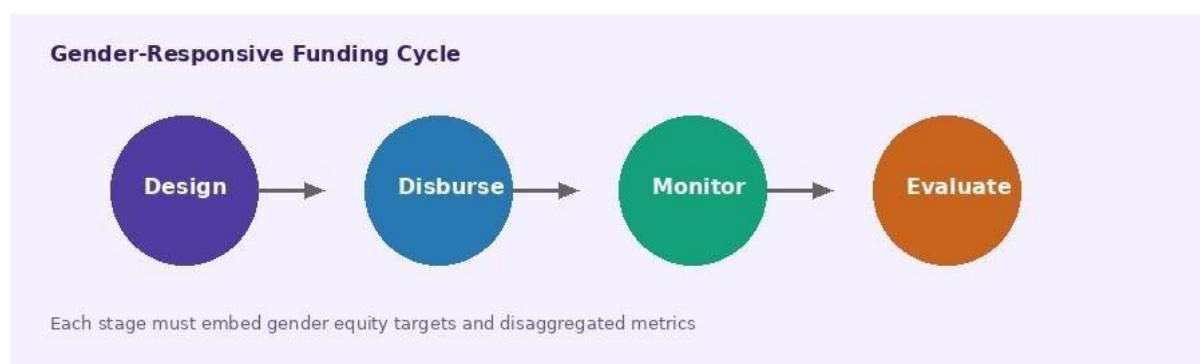


Figure 1. Gender-Responsive Funding Cycle.

## Integrating Gender Equity into Funding Strategies

Meaningful integration requires more than quota-setting. It demands a gender-responsive framework across the full funding cycle: design, disbursement, monitoring, and evaluation. Oxfam India (2020) advocates for Gender Budget Tracking (GBT) as a tool that enables organisations, including corporates and academic institutions to assess whether expenditure patterns reflect equity commitments. Three practical mechanisms stand out. First, *gender-disaggregated reporting* should become mandatory in CSR disclosures. When companies report on beneficiaries, they must track who benefits by gender, geography, and socioeconomic category. Second, CSR committees should include *women decision-makers at senior levels*. Third, CSR funds directed at educational and scientific institutions should include conditions that support *women faculty recruitment*, mentorship networks, and childcare infrastructure, enabling conditions that are often invisible in standard grant frameworks. Beyond institutional mechanisms, aligning these practices with broader policy and global frameworks is essential for ensuring consistency and scalability.

In the Indian context, there is growing recognition of the need to align CSR with national and global frameworks such as the Sustainable Development Goals (SDGs), particularly SDG 5 (Gender Equality). However, operationalizing this alignment demands measurable targets, accountability mechanisms, and transparent reporting. The United Nations Women's Empowerment Principles (UN Women, 2020) offer a voluntary framework that corporations can adopt to align business strategy with gender equality.



## Conclusion

In conclusion, integrating gender equity into CSR funding strategies is not merely a normative imperative but a strategic necessity for achieving sustainable and inclusive development. It requires a shift from a token inclusion to systemic transformation, embedding gender analysis in financial decision-making, fostering partnerships, and aligning corporate governance with equity goals. As CSR continues to shape development trajectories, its potential to drive gender justice will depend on how deeply equity is woven into its core strategies rather than treated as an adjunct concern.

## References

- International Finance Corporation. (2021). Financing women: Moving from talk to action. IFC. <https://www.ifc.org>
- Ministry of Corporate Affairs. (2023). Report of the high-level committee on CSR. Government of India. <https://www.mca.gov.in>
- Oxfam India. (2020). Mind the gap: The state of employment in India. Oxfam India.
- Poddar, A., Bagadeem, S. & Magry, M.A. (2025). Aligning corporate social responsibility with sustainable development goals in India across pandemic phases. *Discov Sustain* 6, 1355. <https://doi.org/10.1007/s43621-025-02223-4>
- UN Women. (2020). Women's empowerment principles. United Nations. <https://www.weps.org>















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## Progyan Foundation for Research and Innovation ( PFRI)

**Administrative Office:** A30, Loknath Bhaban, Santoshpur, Kolkata – 700075 West Bengal,  
India

**Phone:** +91 8240031767

**E-mail:** [office@progyanfoundation.org](mailto:office@progyanfoundation.org), [info@progyanfoundation.org](mailto:info@progyanfoundation.org)

**Website:** [www.progyanfoundation.org](http://www.progyanfoundation.org)