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Review Article

Community, conflict, and conservation - a review on socio-ecological impacts of community forest management in India

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India was once considered 'too poor to be green', but the strong historicity and prevalence of community forest management (CFM) suggest otherwise – that 'environmental consciousness' was always, and still to this day, present among Indians. At present, CFM is practiced all over Asia but is even more prevalent in India. This review synthesises case studies to assess the socio-ecological success and challenges faced within community forest management in the backdrop of India. CFM has improved forest regeneration, biomass, and carbon stock, but despite these gains, challenges persist. Climate change threatens the forest, while benefit-sharing mechanisms often favour state authorities, reducing community participation. Limited knowledge dissemination and bureaucratic constraints weaken local governance. Social disparities, especially gender-based exclusion, further hinder equitable resource distribution. By linking community, their forest conservation and the conflicts that arise from it, we recommend enhancing transparency, promoting justice and inclusive participation, and integrating technology to strengthen community forest management in India.

Keywords: *forest policy, carbon sequestration, climate change, environmental justice, socio-ecological benefits*

Introduction

Forests are essential landscapes. Essential in the sense that they are landscapes providing multiple benefits ranging from floral and faunal diversity, livelihood sustainability, and culture for mankind, all while storing carbon and serving as climate refugia. Rightfully so, their management, protection and restoration are being prioritized as one of the most efficient strategies in the planetary fight against climate change (FAO, 2020; Martin et al., 2021; Awé et al., 2021; FAO, 2022; IPCC 2022; Shivanna, 2022; Adu-Poku et al., 2023; Cuesta et al., 2023). However, forests are being threatened, not just metaphorically but literally, forests are at threat of being degraded and mis-managed as our present-day management strategies may become disconnected with future climate. Such issues are causing concerns among experts (Halofsky et al., 2018; Jandl et al., 2019; Ontl et al., 2020; Thom & Keeton, 2020) and effectively responding to such issues call for proper management, not just from the government and expert bodies, but also from the communities that live near, observe and depend on forests.

From a historical perspective, Indians are known to live harmoniously with nature and are highly reliant on forests, having had a root sense of 'environmental consciousness' as written by Ramachandra Guha (2024). Around 275 million people rely on forest for livelihood and survival among which more than a hundred million are forest dwellers. Tribal communities are found to be even more reliant on forests with around 70 million tribals fulfilling their requirements

through forests (Ravindranath, 2007). It, therefore, becomes clear that Indians practice community forest management (CFM), a forest management regime that is defined as 'the use, the management and conservation of forests by communities' (Arts & de Koning, 2017). It is a form of decentralised governance with over 700 million hectares of global forests managed under this regime, and in the present day is prominent particularly in the tropics (Gilmour, 2016; Arts et al., 2017). It becomes increasingly important to ask, 'Community Forest management, quo vadis?' Discussing a topic as vast as CFM calls for an interdisciplinary eye – a perspective that is rooted in sociological, political and ecological lenses. If we were to narrow the scope of the issue, we would fail to identify key participants and therefore, this paper is a scoping review on CFM in India – the origin, the socio-ecological benefits and challenges.

Methodology

This scoping review synthesizes evidence from peer-reviewed articles, government reports (including FAO and IPCC assessments), and case studies, selected through a structured search of Scopus, Web of Science, and Google Scholar. Literature was screened for relevance to three thematic pillars: (1) historical policy shifts, (2) documented socio-ecological benefits of CFM, and (3) systemic challenges. Priority was given to studies with empirical data from Indian contexts, supplemented by global comparative analyses to contextualize findings. The review adopts a narrative synthesis approach, critically evaluating patterns of success and failure across regions while highlighting gaps in climate resilience and participatory governance literature.

1. Evolution of forest policies in India

In India, community forest management is not just a conservation strategy but a socio-political movement, shaped by history, identity, and the fight for forest rights. It plays a crucial role with community reserved forests serving as a win-win solution – an area for biodiversity conservation that also allows the regional population to reap socio-ecological benefits (Hajjar & Oldekop, 2018; Hajjar et al., 2021; Sze et al., 2022). Although it is practiced all over the globe, its dominance in Asia is worth noting, and it is found to have a long history, particularly in India, where it is undergoing transformation under the pressures of climate change, policy shifts, and social inequities (Dhanapal et al., 2019).

There is a clear struggle over forest rights. The implementation of the forest policies has been criticized and suggestions have been made by researchers, aiming to ensure that the policies benefit the rightful beneficiaries via accurate claim checks and fair local processes while protecting forests (Kumar et al., 2015; Katiyar, 2024). Regulations and policies regarding forests are dynamic and often subjected to change, especially in a country like India where the socio-ecological interactions are largely unexplored and unpredictable. As shown in Figure 1, India's forest policy has undergone several phases each marked by shifting priorities between conservation, commercialization, and community rights, setting the stage for a nuanced evaluation of the present-day CFM landscape.

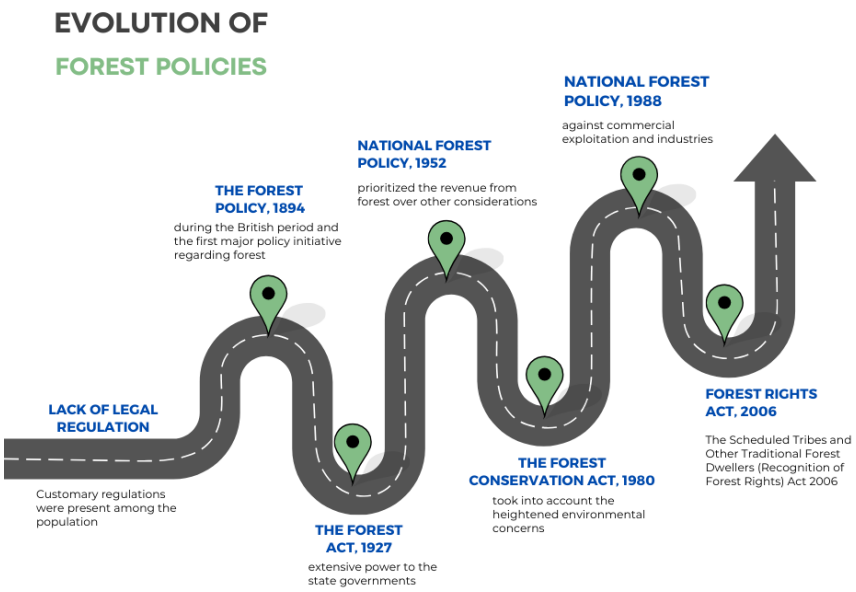

Figure 1. Evolution of forest policies in India, highlighting political and environmental changes

2. Community forest management practices in India

In India 'livelihood environmentalism' has had roots since ancient times and CFM, being the product of such environmentalism, has been crucial for conserving biodiversity. The evergreen forests of Parambikulam Tiger Reserve, Kerala is an example, serving as home to many threatened and endemic species. Conservation efforts like 'Parambikulam Dhara' aim to address human and natural threats while promoting local involvement in biodiversity preservation (Ranjith et al., 2024). In Bonai Forest Division, Odisha, long-term biodiversity conservation through community participation is encouraged with livelihood programs designed for reducing forest dependency and mitigating forest fires, illegal activities and wildlife trade (Kumar et al., 2023). Non-Timber Forest Products (NTFPs) also play an undeniably essential role in Kerala's communities, providing sustainable income through Kerala's Participatory Forest Management (PFM) institutions, although challenges like middlemen and inadequate training persist (George & Alexander, 2023). Sacred groves of Bankura District, West Bengal are recognized for their ecological and cultural importance and recommendations have been made to improve conservation efforts by classifying groves based on disturbance levels while actively involving local communities in restoration and monitoring activities (Nayak et al., 2023). It therefore, becomes clear through recent studies that CFM is not just a strategy of the past but is presently being practiced effectively, highlighting the ongoing inter-connectedness between man and forest in India.

3. Successes of community forest management in India

CFM's role in forest regeneration

India was once perceived as 'too poor to be green', salvaging the forest wherever and whenever it could, degrading its natural forest without any sense of environmentalism. Contrary to such claims, it upheld community forest management which has led to many positive outcomes ranging from species richness to carbon storage. First and foremost, it was found that forest degeneration can be reversed, surprisingly and hopefully, through collaboration between the forest department and forest communities which will lead to effective protection, which will further lead to ecological and economic benefits for both parties involved (Paul & Chakrabarti, 2011; Sharma & Wagh, 2025). It was found that Joint Forest Management (JFM), a form of community-based forest management, has supported species regeneration, leading to the reappearance of species that had once disappeared from the forest (Sudha et al., 2003; Borah et al., 2024). The ecological impact of JFM in Harda Forest Division was investigated, which led to findings that showed Assisted Natural Regeneration (ANR), control of forest fire and grazing resulted in increased production of grass, better natural regeneration status and improvement in other forest site conditions. In addition to such benefits, the diversity of animals within such sites were also found to increase significantly (Bhattacharya & Joshi, 2002; Singh & Sinha, 2005, Sethy, 2025).

Socio-economic benefits

The constructive involvement of local communities in forest protection, although jarring at times, has led to improvement in forest conditions (FSI, 2001) and different studies have supported this, reporting an increase in the number of plant species, overall biodiversity, forest productivity and increasing availability of NTFPs for local communities themselves (Prasad & Kant, 2003; Sudha et al., 2003, Osuri et al., 2024). Activities that aim to develop forests like clearing, singling, planting, soil and moisture conservation works, have generated additional employment for communities involved. It, therefore, becomes obvious that community involvement has been seen as means of poverty alleviation, additionally due to the fact that community management can harmonize with agriculture, pasture, plantation and NTFP processing (Rangachari & Mukherji, 2000; Sudha et al., 2003; Ramakrishnan et al., 2024). Strong evidence favouring CFM has also been found, achieving a dual target of forest growth as well as economic growth (Raghavan & Shrimali, 2015), however, there is need a to weaken the role of middlemen in the management process, and giving forest gatherers and farmers more negotiating leverage (Singh et al., 2024).

Carbon sequestration and biomass dynamics in community-managed forests

Community forest management has shown mixed results in accumulation of biomass and carbon stock. Studies by Baland et al. (2010) and Mbwambo et al. (2012) reported positive outcomes. Mbwambo et al. observed higher basal area, stem density, biomass, and carbon sequestered in forests under Joint Forest Management (JFM) and community-based forest management (CBFM) compared to state-managed forests over 14 years. Similarly, Baland et al. found Van Panchayat-managed forests in Uttaranchal to have reduced lopping but no significant differences in biomass, canopy cover, or regeneration compared to non-CFM forests, while also warning the need to account for omitted variables that may underestimate CFM's benefits. Overall, CFM demonstrates potential for enhancing forest carbon stock and biomass parameters. What we gain and what challenges we face in CFM are summarized in Figure 2.

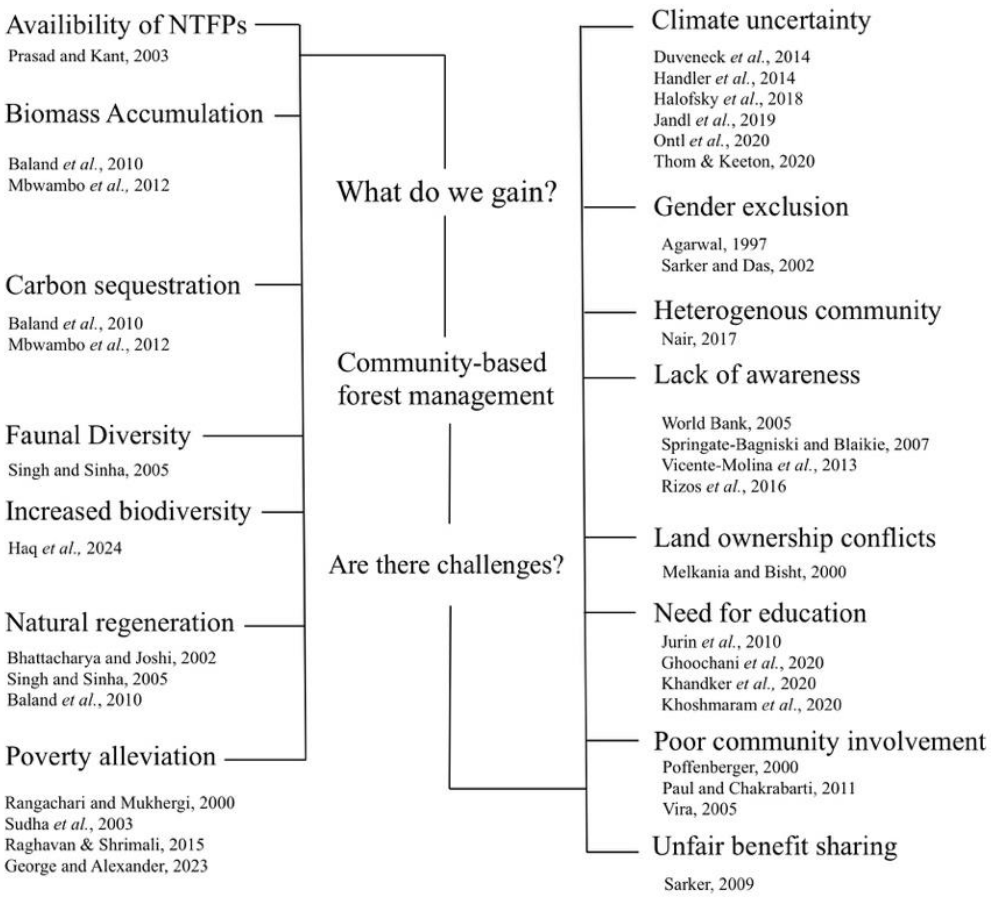

Figure 2. Flow chart showing the benefits and challenges of community forest management in India

4. Challenges faced in community forest management

Climate vulnerability

The first and most obvious challenge faced in CFM is the same challenge that is threatening forests worldwide – the challenge at hand being the ever-changing, unpredictable and uncertain climate which may make our present forest management strategies ineffective (Jandl et al., 2019; Thom & Keeton, 2020). The challenges posed by climate change may exceed the forests' ability to adapt. This is a pressing issue – an issue recognised and well-discussed among forestry communities (Handler et al., 2014; Duveneck et al., 2014; Halofsky et al., 2018; Ontl et al., 2020; Swanston et al., 2016). So, there is a need to develop suitable policies and effective climate mitigation strategies to protect livelihoods (Roy et al., 2024). The emergence of conflict patterns in forest management can be identified through topic modelling using artificial intelligence (Hallberg-Sramek et al., 2024) which underscores the need for human-centered AI (HCAI) approaches that integrate local knowledge with technical systems (Holzinger et al., 2022). Despite these advances, sustainable management remains constrained by data and cost barriers (Nie et al., 2022), particularly for stakeholders in the Global South who are frequently excluded from AI governance conversations (Roche et al., 2023). Realizing AI's full potential for climate modeling requires addressing persistent challenges in uncertainty quantification and interdisciplinary collaboration (Eyring et al., 2024).

Inequitable benefit-sharing and participation gaps

Under current CFM benefit-sharing arrangements, local communities are entitled to 100% of the revenues from non-timber forest products (NTFPs). However, this system often proves unprofitable and unsatisfactory for these communities, as they remain confined to the role of raw product collectors, while the forest department retains control over marketing and sales (Sarker, 2009). This imbalance reflects a deeper issue: most villages possess limited understanding of Joint Forest Management (JFM) resolutions. The root of this knowledge gap lies in the original design of state-level JFM guidelines, which centralized the control of valuable forest resources and decision-making authority within State Forest Departments (Poffenberger, 2000; World Bank, 2005; Springate-Bagniski & Blaikie, 2007). Although JFM was envisioned as a mutually beneficial partnership between forest departments and local communities, in practice, the relationship frequently falls short of this ideal, resulting in diminished community engagement and

participation (Paul & Chakrabarti, 2011). Given the interconnected nature of individuals within forest-dependent communities and the potential for localized issues to trigger wider repercussions, policy formulation must embrace approaches that address all levels of the system (Behera & Engel, 2006), ensuring inclusivity, transparency, and shared responsibility among people who rely on forests.

Barriers to women's participation in decision-making

Injustice can come in many forms and 'injustice in gender' is one that is well-known, expected and prevalent in India. The exclusion of women remains a persistent issue in community forest management (CFM). Despite their increasing involvement in forest conservation and management activities, women are often marginalized in decision-making processes within CFM institutions (Sarker & Das, 2002). Yet, research shows that female participation in decision-making has a distinctly positive impact, particularly in gender-progressive regions (Misra & Kant, 2004), contributing to more equitable and effective forest governance. Enhanced involvement of women is not only a matter of fairness but also a catalyst for ecologically balanced and sustained forest regeneration, benefiting not just women, but entire households and communities (Agarwal, 1997). Another challenge lies in the heterogeneity of communities engaged in CFM. Committees often comprise members from diverse ethnic and socio-economic backgrounds, which can complicate management and lead to inequitable benefit-sharing (Nair, 2017). Such internal challenges, if left undiscussed, will weaken the collective action. Therefore, for CFM to succeed in socio-ecological terms, it is crucial to adopt procedural, distributional and epistemic justice (Brousseau et al., 2024) – making sure that the voices and concerns of all communities, especially those that are often marginalized, are genuinely heard and meaningfully included.

Institutionalizing community rights and environmental education

Community forest management (CFM) often struggles due to the absence of clear land ownership, which can spark conflicts between local communities and government authorities (Melkania & Bisht 2000). Moreover, maximizing the sustainable use of forest resources requires equipping forest-dependent communities with proper education and training (Jurin et al., 2010). A lack of environmental knowledge can hinder the development of conservation-friendly attitudes and behaviours (Rizos et al., 2016; Vicente-Molina et al., 2013). Indeed, studies reveal that education levels significantly influence individuals' awareness, attitudes, and practices related to forest management and its sustainability (Ghoochani et al., 2020; Khandker et al., 2020; Khoshmaram et al., 2020). Community participation when supported by appropriate policy leads to improved forest health, carbon sequestration and socio-economic benefits for forest-dependent people. It has been suggested that policymakers should strengthen community rights, improve local participation, mitigate the effects of climate change and address socio-economic inequalities for better community-based forest management in India (Lalrinmawia et al., 2025). The challenges mentioned above highlight how forests are contested landscapes where different forces compete to gain power over it, leading to marginalization of communities and degradation of the forest itself. Addressing these structural issues is essential in shaping future regulatory frameworks, and only by doing so will India be able to reap the full benefit that forest has to offer.

Conclusion

The afore-mentioned collection of literature speaks for itself, that in a climate-conscious world where forests are being threatened and contested, community forest management in India has shown great success in balancing protection and development. It, however, is accompanied by certain challenges that currently limit its larger impact. At the outset of this review, we conclude that community forest management (CFM) in India has achieved measurable success in forest regeneration, carbon sequestration, and livelihood support, but these gains are unevenly distributed due to structural inequities, including gendered participation gaps, injustice and centralized control of NTFP markets, which marginalizes local communities. It becomes necessary to address these challenges, so we recommend inclusive policies, more community engagement, fair distribution of resources and adaptation from all stakeholders with attention on structural reforms, education, training, and justice. The journey of forest management in India is on-going, requiring relentless efforts from all stakeholders – the government, organizations, and communities.

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Ethics approval

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AI tool usage declaration

No AI tools have been used in manuscript preparation. Grammarly software is used to correct grammatical errors.

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