



Fuelwood, Fodder, and Food: The Hidden Dependence on India's Forests

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India's forests are much more than biodiversity hotspots or carbon sinks they are everyday lifelines for millions of rural families. For many households, forests provide fuelwood for cooking and heating, fodder for livestock, and food such as wild fruits, leafy vegetables, tubers, mushrooms, and sometimes bushmeat. Even with rapid urbanization and economic growth, this dependence continues, especially in remote and forest-fringe villages. However, much of this subsistence use remains invisible in national income statistics and policy discussions because these resources are collected and consumed directly rather than sold in markets. Recent assessments highlight that forest-based subsistence continues to play a critical role in supporting rural livelihoods, food security, and resilience to climate stress (FAO, 2020; Angelsen *et al.*, 2020). As climate variability increases and rural incomes fluctuate, forests often act as fallback support systems, particularly for poorer households and tribal communities (IPBES, 2019; MoEFCC, 2021).

According to the India State of Forest Report 2021 published by the Forest Survey of India, India's forest cover is about 24.62% of its total geographical area (FSI, 2021). While this seems encouraging, a large share consists of open forests with lower canopy density, meaning the availability of biomass and usable forest produce varies significantly across regions. Dense forests are mainly found in the Northeast, the Western Ghats, and parts of central India, whereas northwestern dry regions and parts of the peninsular plateau have relatively sparse forest cover. Recent policy discussions emphasize that maintaining and improving forest quality not just area is essential for sustaining rural dependence and meeting climate commitments (MoEFCC, 2021; FAO, 2022). Understanding the real extent of this dependence is therefore vital for designing inclusive forest management and rural development strategies.

Fuelwood: The Hidden Backbone of Rural Energy

Fuelwood—wood and other biomass collected from forests and trees—remains the hidden backbone of rural energy in India. For millions of households, it is the main source of cooking and heating. Although clean cooking programs such as the Pradhan Mantri Ujjwala Yojana (PMUY) have expanded LPG access, many rural families still depend on firewood because refill costs are high, supply can be irregular, and traditional cooking practices continue. National surveys show that a large share of rural households use firewood either as their primary or secondary fuel (NFHS-5, 2021; MoPNG, 2022). This indicates that the energy transition is gradual, especially among low-income groups where affordability and access remain major barriers (IEA, 2020; NITI Aayog, 2021). At the same time, heavy fuelwood extraction places pressure on forests. Regular removal of branches and small trees reduces biomass and contributes to forest degradation (FSI, 2021). It can disturb wildlife habitats, reduce biodiversity, and increase soil erosion in fragile areas. Socially, the burden falls mainly on women and girls, who often walk long distances to collect firewood, affecting their health,

education, and livelihoods. Regional differences further highlight the need for locally tailored energy and forest policies.

Fodder: Forests as Pastures in Disguise

Why Fodder Matters in India

India has one of the largest livestock populations in the world, with over 535 million animals including cattle, buffaloes, goats, sheep, and camels (fig 2). For smallholder farmers, livestock are not only sources of milk and meat but also provide draught power for farming and manure to improve soil fertility. In times of crop failure or financial stress, animals act as a safety net, offering income through milk sales or livestock trade. However, organized fodder markets are limited in many rural areas, and rising feed prices make regular purchase difficult for small and marginal farmers. As a result, access to affordable and reliable fodder remains a major challenge in sustaining rural livestock systems.

Forests as Fodder Banks

Forests and nearby common lands function as natural fodder banks by supplying grasses, tree leaves, pods, and shrubs for grazing animals. This role becomes especially important in arid and semi-arid regions where agriculture depends heavily on uncertain monsoon rainfall. Landless and marginal farmers, who have little or no land to grow fodder crops, rely heavily on forest-based forage. In several regions, studies indicate that 40–60% of livestock feed during dry months comes from forest grazing and harvested understory vegetation, highlighting the critical link between forests and rural livestock security.

Consequences of Free Grazing: Unregulated grazing leads to forest degradation through trampling and removal of saplings, reducing (fig1) the regeneration of native tree species. Continuous grazing pressure limits natural forest recovery and creates competition between livestock and wildlife for available forage. The removal of dry biomass also alters natural fire regimes, affecting ecosystem balance. In Central India, high grazing intensity has been linked to declining regeneration of sal (*Shorea robusta*) in degraded forests (FSI, 2021; MoEFCC, 2021; IPBES, 2019).

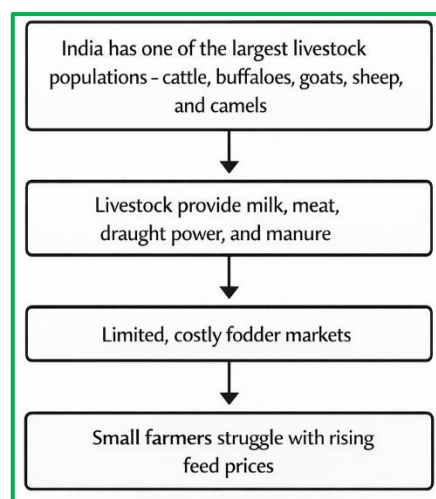


Figure 1

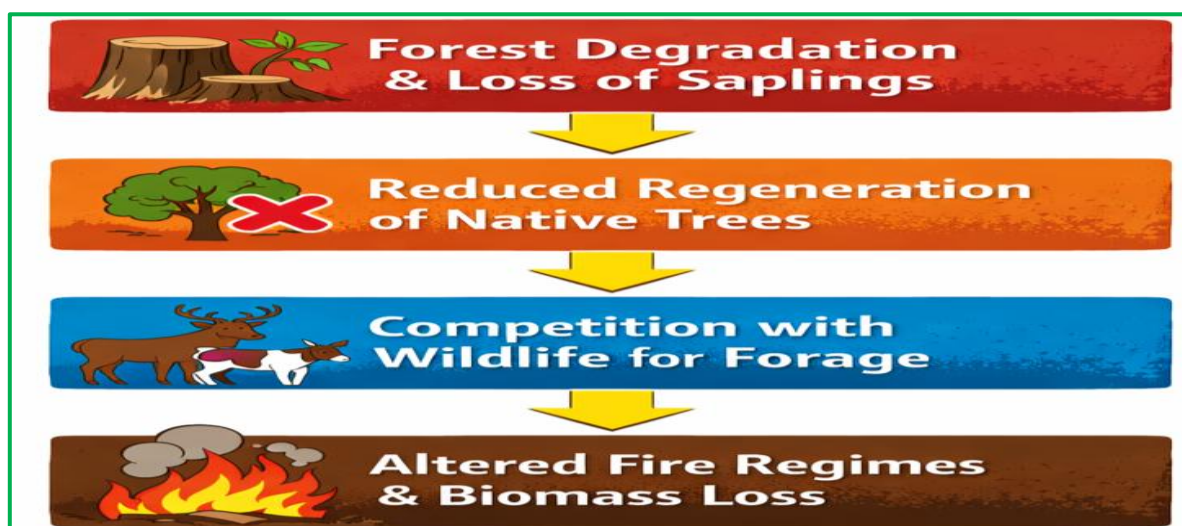


Fig. 2 Different consequence of free grazing

Food from Forests: A Forgotten Safety Net

Forest Produce in Daily Diets

Forests contribute directly to the daily diets of millions of rural and tribal households in India. Wild fruits such as amla, ber, and jamun, edible leafy greens, tubers, mushrooms, nuts, and

honey are regularly collected, especially during lean agricultural seasons. These foods are not simply supplements; they often fill critical food gaps when stored grains are low or incomes are uncertain. Recent assessments show that forest foods remain an important component of household nutrition in forest-fringe villages, particularly among indigenous communities (FAO, 2020; IPBES, 2019). Because these foods are gathered and consumed locally, their contribution is often overlooked in official food security statistics. Yet, they quietly support dietary diversity and resilience in times of stress.

Nutritional and Cultural Importance

Forest foods are rich in micronutrients such as iron, calcium, vitamin A, and antioxidants. Studies from central India suggest that wild foods can provide 20–40% of essential micronutrients in children's diets in some tribal regions (Angelsen *et al.*, 2020; MoEFCC, 2021). Beyond nutrition, forests sustain cultural identity and traditional ecological knowledge. Communities such as the Gonds, Baigas, and Santhals maintain deep knowledge of seasonal food availability, medicinal plants, and sustainable harvesting practices. This connection between forests and food is not only about survival but also about cultural continuity and community well-being.

Risks and Vulnerabilities

Despite their importance, forest foods face growing threats. Climate change is altering flowering and fruiting patterns, while habitat fragmentation and land-use change reduce access to wild resources (IPBES, 2019). Increasing commercial demand can lead to overharvesting, affecting long-term availability. Policy restrictions on forest access, if not carefully designed, may unintentionally reduce food access for vulnerable households. The India State of Forest Report 2021 by the Forest Survey of India highlights concerns about forest quality and regeneration. Ensuring sustainable management and community rights is therefore essential for protecting both biodiversity and rural food security.

Invisible Economy: Valuing Forest Dependence

Undercounted in GDP and Policy

The contributions of forests to rural livelihoods are often excluded or underestimated in national accounts such as the System of National Accounts (SNA). This “invisible economy” is not priced like commercial timber, yet it sustains millions. A study by the International Institute for Environment and Development (IIED) found that forest use may contribute up to 15–20% of annual income for households in forest fringe areas.

Gendered Labor Burdens: Women and girls disproportionately bear the burden of resource collection:

- Time spent gathering fuelwood and fodder reduces time for education, income generation, and rest.
- Health impacts from smoke inhalation due to biomass cooking fuel are significant.

Policy Responses and Challenges

National Forest Policy and Community Rights

India's forest governance framework has gradually shifted from strict state control toward participatory management. The National Forest Policy (1988) emphasized ecological balance, environmental stability, and the involvement of local communities in forest protection and regeneration (MoEFCC, 2018). It recognized that sustainable conservation is not possible without addressing the livelihood needs of forest-dependent populations. Building on this principle, the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006—commonly known as the Forest Rights Act (FRA)—provided legal recognition of customary rights over forest land and minor forest produce. The FRA marked a significant policy shift by acknowledging historical injustices faced by tribal and forest-dwelling communities and by promoting community-based forest governance (MoTA, 2021).

Successes and Limitations of FRA

Over the past decade, the FRA has enabled the recognition of Community Forest Resource (CFR) rights in several states, giving communities legal access to minor forest produce such as

fuelwood, fodder, bamboo, and other non-timber products (MoTA, 2021). It has strengthened local decision-making through Gram Sabhas and forest rights committees, encouraging democratic and decentralized forest management. However, implementation remains uneven. Delays in claim approvals, partial recognition of rights, and limited institutional and technical support have reduced the Act's full potential (MoEFCC, 2021). In some regions, lack of awareness and administrative bottlenecks continue to hinder effective community participation.

Clean Cooking and Renewable Energy Programs

To reduce dependence on fuelwood and address indoor air pollution, the Government of India launched initiatives such as the Pradhan Mantri Ujjwala Yojana (PMUY), which provides subsidized LPG connections to low-income households. According to the Ministry of Petroleum and Natural Gas (2022), the scheme has significantly expanded LPG coverage in rural areas. In addition, programs promoting biogas plants and solar cookers aim to diversify clean energy options (MNRE, 2022). While access has improved, studies show that affordability of LPG refills, supply reliability, and cultural cooking preferences continue to influence sustained use (NITI Aayog, 2021). Therefore, policy efforts must balance clean energy transitions with rural livelihood realities.

Toward Sustainable and Inclusive Forest Policies

Integrating Local Knowledge

Sustainable forest management in India must combine traditional ecological knowledge with modern scientific approaches. Indigenous and forest-dependent communities possess deep understanding of seasonal cycles, species behavior, and sustainable harvesting practices for fodder, fuelwood, and forest foods. Recognizing and integrating this knowledge into formal forest planning can improve conservation outcomes and livelihood security. Recent global assessments emphasize that community participation and respect for local knowledge systems strengthen biodiversity protection and resilience (IPBES, 2019; FAO, 2022). In India, decentralized forest governance frameworks increasingly acknowledge that long-term sustainability depends on collaboration between forest departments and local communities (MoEFCC, 2021).

Payment for Ecosystem Services (PES)

Economic instruments such as Payment for Ecosystem Services (PES) offer promising pathways to align conservation with livelihoods. Under PES models, communities receive financial incentives for protecting forests, conserving biodiversity, or enhancing carbon sequestration. International experiences show that well-designed PES programs can reduce deforestation while improving household incomes (Angelsen *et al.*, 2020; FAO, 2020). As India strengthens its climate commitments and restoration goals, integrating PES-like mechanisms—linked with carbon markets and ecosystem restoration—could encourage communities to view forests as long-term assets rather than short-term resources. However, transparent governance and equitable benefit-sharing are essential for success.

Gender-Responsive Forest Policies

Women play a central role in collecting fuelwood, fodder, and forest foods, yet their contributions are often undervalued in policy frameworks. Gender-responsive forest policies should recognize women's leadership in resource management, provide targeted access to clean energy technologies and credit, and ensure equitable sharing of benefits from forest-based enterprises. Research shows that when women participate meaningfully in forest governance, both conservation outcomes and household welfare improve (FAO, 2022; Angelsen *et al.*, 2020). Strengthening women's rights and decision-making power is therefore not only a matter of social justice but also a practical strategy for sustainable forest management.

Conclusion

India's forests quietly sustain millions of rural households by providing fuelwood, fodder, and food that rarely appear in economic statistics but remain essential for daily survival. This hidden dependence supports energy needs, livestock security, nutrition, and cultural traditions,

particularly among tribal and marginal communities. However, rising ecological pressures, climate change, and uneven policy implementation threaten this balance. Sustainable and inclusive forest governance strengthening community rights, promoting clean energy transitions, integrating local knowledge, and ensuring gender equity is crucial. Recognizing and valuing this “invisible economy” is not only vital for conservation but also for rural resilience, livelihood security, and long-term sustainable development.

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