

Gender Bias Affects Forests Worldwide

Marlène Elias^{1*}, Susan Stevens Hummel², Bimbika Sijapati Basnett³, and Carol J. Piece Colfer^{3,4}

¹Bioversity International, Rome, Italy. ²USDA Forest Service, Pacific Northwest Research Station, Portland, Oregon, USA.

³Center for International Forestry Research, Bogor, Indonesia. ⁴Southeast Asia Program, Cornell University, Ithaca, New York, USA.

*Marlene.Elias@cgiar.org

Abstract Gender biases persist in forestry research and practice. These biases result in reduced scientific rigor and inequitable, ineffective, and less efficient policies, programs, and interventions. Drawing from a two-volume collection of current and classic analyses on gender in forests, we outline five persistent and inter-related themes: gendered governance, tree tenure, forest spaces, division of labor, and ecological knowledge. Each emerges across geographic regions in the northern and southern hemisphere and reflects inequities in women's and men's ability to make decisions about and benefit from trees, forests, and their products. Women's ability to participate in community-based forest governance is typically less than men's, causing concern for social equity and forest stewardship. Women's access to trees and their products is commonly more limited than men's, and mediated by their relationship with their male counterparts. Spatial patterns of forest use reflect gender norms and taboos, and men's greater access to transportation. The division of labor results in gender specialization in the collection of forest products, with variations in gender roles across regions. All these gender differences result in ecological knowledge that is distinct but also complementary and shifting across the genders. The ways gender plays out in relation to each theme may vary across cultures and contexts, but the influence of gender, which intersects with other factors of social differentiation in shaping forest landscapes, is global.

Received November 30, 2016

Accepted January 17, 2017

OPEN ACCESS

DOI 10.14237/eb1.8.1.2017.834

Keywords Gender bias, Governance, Tenure, Gendered spaces, Division of labor, Ecological knowledge

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Introduction

Human gender relations shape natural resource use, management, and prospects for economic development that sustains people and the planet. This is firmly recognized in international agreements, such as the Convention on Biological Diversity (1992), the Declaration on the Rights of Indigenous Peoples (2010), and the Sustainable Development Goals (2015). Yet, gender biases persist. These are reflected in forest science and result in inequitable, ineffective, and less efficient forest policies, programs, and interventions. We recently documented such biases and the relevance of gender relations to the field of forestry in two volumes (Colfer et al. 2016). The first is a collection of current analyses on gender in forests whereas the second is comprised of classic articles in the field.

Building on these two volumes, we outline five persistent themes related to gender and forests,

explored from the communal to the individual scale: gendered governance, tree tenure, spatiality of forest use, division of labor, and ecological knowledge. Each reflects inequities in women's and men's ability to make decisions and benefit from forests and their products. These themes emerge across geographic regions in both the southern and northern hemispheres, carrying implications for researching and achieving the sustainable and equitable management of forests. The varying citation dates demonstrate the longevity of these concerns.

Gendered Governance

Globally, forests are mainly government-owned (86%), with a smaller proportion being privately (10%) or communally (4%) held (Agrawal et al. 2008). In reality, the lines among these forms of ownership are blurred. Formal and customary tenure regimes overlap and governance of 'public' forests is increas-

ingly being decentralized and managed as common property by local communities, organizations, or private timber concessions (Agrawal et al. 2008). Power relations among the state, private sector, communities, and social relations within communities shape forest governance arrangements and institutions mediating how forest resources are to be used, sustained, and shared. Gender and other factors of social differentiation, such as ethnicity, socio-economic status, and age, play a critical role in determining who can participate in making decisions and reaping associated benefits.

At the community level, poor men's ability to actively participate in forest-user groups tends to exceed poor women's (Agrawal 2002; Sunderland et al. 2014). Reasons for women's exclusion from these decision-making instances range from heavy competing demands for their time, to their limited access to information on forest management, and low levels of formal education in many rural contexts. Women's exclusion also results from their lack of a recognized role in public forums, and norms of silence leave them feeling out of place in this domain (Agrawal 2002). Similar exclusions may apply to marginalized groups, such as migrants and indigenous peoples, although the intersection between gender and social identity/ethnicity may pose additional challenges. Such exclusions have implications for sustainable forest management, as the specific interests and expertise of excluded groups are ignored, and inequitable access to decision-making and benefits, forest stewardship is discouraged. More fundamentally, exclusion infringes on social justice and human rights to acquire information and participate in decision-making.

Gendered Tree Tenure

Tenure regimes govern who can access, use, control, and benefit from natural resources such as land or trees. Rights to trees are complex, particularly in the global South where customary regimes—rooted in spiritual or social morals—prevail and can differ from rights to land (Howard and Nabanoga 2007). Access to tree products is negotiated with the formal resource 'owner' and can be shared by many individuals (Rocheleau and Ross 1995). Gender intersects with other social factors, such as marital and indigenous or migrant status, to determine who can plant, harvest or fell trees. Women's rights to land and trees are typically mediated by their relationship with men (Mwangi et al. 2011): a husband, if married, or father

in patrilineal systems, often an uncle in matrilineal systems.

When land belongs to men, women are frequently prohibited from planting trees for themselves as this can be considered a land claim. Due to their limited access to land, rural women are often highly dependent on common property resources such as forests (Agrawal 2002; Sunderland et al. 2014). Gender differences are thus manifest with respect to planted versus spontaneously growing (or 'wild') trees and to the physical spaces where trees are located. They also shape access and use of native versus exotic species, different taxa, functional/use groups, and tree products used for subsistence or trade (Fortmann and Bruce 1988; Howard and Nabanoga 2007). Different parts of the same tree can be harvested by different individuals in patterns typically following gender lines. For instance, men are generally responsible for climbing trees to collect honey and other forest products located at higher altitudes. They may harvest a tree's bole whereas women will harvest the same species' leaves for fodder, food, or medicine (Pfeiffer and Butz 2005). Tree use, control, and benefits cannot be fully understood without adopting a gender lens because competing claims, exclusions, and negotiations in relation to tree products are embedded in gender and other social relations.

Gendered Forest Spaces

Gender relations play a key role in shaping the forest spaces men and women frequent and the ways they access these. For instance, in certain rainforest societies, men collect tree products in primary forests, whereas women gather in secondary forests and around the homestead (Elias 2016). Differentiated spatial patterns of forest use partly result from gender-specific access to transportation. Men are typically able to access larger forest areas when they have access to bicycles, motorcycles, carts, or trucks. Gender norms and taboos limit women's access to certain forest areas, as do concerns for women's safety, and socially determined household duties that require women's presence near home (Howard and Nabanoga 2007). Age, socio-economic status, and culture are among other factors that interact with gender to shape women's and men's movements and imprints on the forest.

Gender Division of Labor

The gender division of labor relegates specific forest-related activities to women and men, which is

consistent with their responsibilities for maintaining and providing for their households. A global comparative study finds marked gender specialization in the collection and processing of most forest product categories (Sunderland et al. 2014) with variability in gender roles observed across regions. For instance, women dominate the collection of firewood in Asia and Africa, but not in Latin America. This division of labor influences women's and men's familiarity with, valuation of, and priorities for forest products (Sunderland et al. 2014).

The fact that many tree products require little to no labor to grow is important for women, who are typically time-limited (Colfer et al. 1999). Moreover, forest-related activities can often be interwoven with other livelihood activities. For instance, women multi-task by gathering forest products while on their way to their fields. Forest product processing may be carried out at home and in non-peak labor hours, which sits well with women's competing work demands. Although these features offer prospects for women in forest product value chains, they also contribute to maintaining the invisibility of women's work, and their temporary or low wage employment in the forest sector. Relatively low barriers to entry into forest product markets and women's association with certain non-timber forest products that are gaining market value provide an entry point for value chain initiatives focused gender equity and women's livelihoods (Ingram et al. 2016). Yet, they also carry risks of a male takeover as products traditionally reserved for women gain value (Ingram et al. 2016).

Gender-differentiated Knowledge

Gender norms that shape women's and men's ability to participate in forest governance, their tree tenure, spatial forest use, and division of labor result in gender-differentiated sets of knowledge about the forest. Gender-specific use and knowledge of the forest may be linked to life form (annuals, short-lived perennials, long-lived perennials), taxa, parts of trees used, methods of forest-product processing, ecological processes, and more (Pfeiffer and Butz 2005). Although gendered spheres of knowledge are distinct, they are also shared, complementary, adaptive and shifting amid current climate and socio-economic changes (Elias 2016). For instance, male out-migration from many rural areas is causing responsibilities that were previously considered 'male' to fall to women (Djoudi and Brockhaus 2016).

Despite the extent of their knowledge repertoires (Díaz-Reviriego et al. 2016), "In many cultural and economic contexts [...] women are [...] seen as 'minor' actors, secondary to men who are presumed to be the knowledge holders, managers and preservers of most plant resources that are thought to be 'valuable', particularly to outsiders" (Howard 2003:3). The invisibility and low value attributed to women's knowledge results in research biases. It also perpetuates women's exclusion and the omission of their knowledge from natural resource management policy and practice.

Conclusion

In sum, gender relations directly affect forest use and management and local women and men derive benefits from these. This is evidenced in five inter-related (and non-exhaustive) thematic areas, where gendered patterns are observed in forests worldwide. The relationship between gender and each theme varies across cultures and contexts, and intersects with other factors of social differentiation to shape forested landscapes. Careful attention to study design is desirable to promote science that is not gender-biased, but equitable and sustainable in forest management.

Acknowledgements

The authors gratefully acknowledge Earthscan/Routledge's help in publishing an expanded version of these ideas in the introduction to Colfer et al. (2017).

Declarations

Permissions: None declared.

Sources of funding: This research is funded by the CGIAR Research Program on Forests, Trees and Agroforestry, the CGIAR Fund Donors (who-we-are/cgiar-fund/fund-donors-2), and the United States Forest Service (USFS).

Conflicts of Interest: None declared.

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