

University of Massachusetts Amherst

**ScholarWorks@UMass Amherst**

---

Women, Gender, Sexuality Studies Faculty  
Publication Series

Women, Gender, Sexuality Studies

---

2017

## **Forests and Food Security: What's Gender Got to Do with It?**

Kiran Asher

Annie Shattuck

Follow this and additional works at: [https://scholarworks.umass.edu/wost\\_faculty\\_pubs](https://scholarworks.umass.edu/wost_faculty_pubs)

---

Article

# Forests and Food Security: What's Gender Got to Do with It?

Kiran Asher <sup>1,\*</sup> and Annie Shattuck <sup>2</sup>

<sup>1</sup> Department of Women, Gender, Sexuality Studies, University of Massachusetts, Amherst, MA 01003, USA

<sup>2</sup> Department of Geography, University of California, Berkeley, CA 94720-4740, USA;  
annieshattuck@gmail.com

\* Correspondence: kasher@umass.edu; Tel.: +1-413-545-6656

Academic Editor: Rebecca R. Scott

Received: 30 October 2016; Accepted: 13 March 2017; Published: 20 March 2017

**Abstract:** Hunger remains a key development problem in the 21st century. Within this context, there is renewed attention to the importance of forests and their role in supplementing the food and nutrition needs of rural populations. With a concurrent uptake of “gender mainstreaming” for sustainable development, there is also a call for understanding the gendered dynamics of forest governance and food security. In this paper, we reviewed emerging research (2009–2014) on forests and food security and on the ways gender is said to matter. As with previous work on gender and natural resource management, we found that gender is an important variable; but how, to what degree and why are different in every context. That is, despite the suggestion of clear linkages, the relationships between gender, forests and food security are not generalizable across contexts. Understanding the relationship between forest resources and food security requires attention to gender disparities at the local level, but also to the broader political and economic context in which those disparities are reinforced. We flag the need to guard against ahistorical and technical approaches to gender and suggest some example research questions that use a more relational view of gender—one that examines how political economy and social power structure access to resources at multiple scales.

**Keywords:** gender; food security; forests; forest governance; forest food systems

---

## 1. Introduction

Recent broad-scale changes to rural landscapes—setting aside land for conservation, largescale land acquisitions, plantation agriculture, extractive industry and consequent deforestation—are profoundly impacting food security. A growing body of scholarship explores the role of forests as sources of food and nutrition [1–4]. A significant amount of this research is spearheaded by the Center for International Forestry Research (CIFOR), one of the 15 institutions of the Consortium Group on International Agricultural Research (<http://www.cgiar.org/>). With a resurgence of interest in the role of forests and gender “mainstreaming” for sustainable development, CIFOR scientists that were engaged in research on the subject of food security in forest landscapes were looking to understand its gendered dimensions. This review of the existing and emerging literature was undertaken in 2014 as a first step to developing a more rigorous approach to gender in the field.

Forty years after Ester Boserup’s landmark study (1970) about women’s key but invisible role in agricultural production, there is now an extensive literature on the importance of gender for food security and natural resource management, including forest governance [5–7]. But despite clear indications that gender matters to food security in forest landscapes, we found few empirical studies that examine these dynamics in depth. Furthermore, the emerging literature on the relationships between gender, forests and food security indicates that such relationships are not generalizable across contexts. For example, gender differences were common in a large-scale global study of gender

and forest product use in 33 countries using the same methodology, but those differences are not generalizable or predictable across geographies [8].

As researchers begin responding to the international call for more gender-sensitive work on forests and on food security, we offer insights from our review of 87 papers on gender and food security in forest landscapes where resource users are at least partially dependent on resources from forests. We focus on papers published in the five-year period from 2009–2014—using Web of Science (<https://apps.webofknowledge.com/>), JSTOR (<https://www.jstor.org/>), Academic Search Complete (<https://www.ebscohost.com/academic/academic-search-complete>) and Google Scholar (<https://scholar.google.com>)—with the search terms “gender and forest”, “gender and forest and food security” and “gender and agroforestry”. Papers were included in the review if they specifically addressed gender and food security in forest areas, or gender and access to forest resources. We also reviewed recent policy literature on international institutions, food security, forests and gender, focusing on reports published in the past five years.

This is not a comprehensive review of all existing works. Rather we focus on the emerging literature on food security and resource access in forest landscapes to assess how, why and to what degree gender is considered to be an important variable; and flag the factors that are seen to produce and influence gender disparity. These findings echo insights from early gender scholarship: that women have key roles and responsibilities in agricultural production and resource management, that gender disparities are pervasive, and that this impacts efforts to improve food security and forest management. The analytical and empirical work on gender also reveals that there is much heterogeneity among women; and that their social positions depend not just on their relations with men, but are interconnected with their class, ethnicity, geographic location and age. We begin with a brief overview of these well-documented lessons about women, gender, development and the environment [9–14]. We then outline how this scholarship has informed our understanding of how gender structures differential access to forest resources and thus affects equity and food security. We conclude by using these insights to develop a research agenda on the gendered dynamics of food security in forest landscapes as those landscapes come under increasing pressure. We flag the need to guard against ahistorical and technical approaches to gender and suggest some example research questions that use a more relational view of gender—one that examines how political economy and social power structure access to resources at multiple scales.

## 2. Key Lessons about Women, Gender, Development and the Environment

An explicit focus on women’s roles in development—especially around the food, nutrition, health and population nexus—emerged in the 1970s and 1980s. Danish economist Ester Boserup’s book *Women’s Role in Agricultural Development* (1970) played an instrumental role in showing that women contributed significantly to agricultural production, especially in Africa [5]. Her work also found important differences in the gender division of labor and productivity across regions and agricultural systems. Furthermore, Boserup’s research was among the first to flag that these differences often result from development interventions which tended to target male farmers. Calls and efforts to integrate women into the development agenda emerged from such work, most reflecting the premise that equal access for women to credit, technology and other development opportunities would contribute to efficient economic growth, food security and better conservation outcomes. Gender professionals advocated the need for sex-disaggregated data to better understand women and men’s roles in economic production and to assess the differential impacts of development efforts.

As is the case today, rural women in the 1970s were disproportionately dependent on natural resources for their livelihoods. Attention to this dependence coincided with debates about tropical deforestation and population growth and may have had something to do with the characterization of poor third world women as “resource degraders” or “forest foes” within early environmental debates [15–18]. Interpreting this dependence differently, advocates of poor women, such as Vandana Shiva from India and Wangari Maathai from Kenya, contended that rural women were

particularly knowledgeable or “virtuous” managers of natural resources and especially vulnerable to resource degradation. While the view of poor women as “forest foes” did not entirely disappear, sustainable development efforts began to acknowledge women’s key contributions to natural resource management [19].

With the growing analytical and empirical work on gender, it became evident one could not generalize about “women’s roles”, nor about relations between women and men. Rather, what is considered “women’s work” or “men’s work” varies across space and time and depends on many other factors: class, caste, race, religious affiliation, age and more. Feminist scholarship examined how gendered forms of power are bound up in and co-produced with other forms of power at multiple scales [20–22]. Gender professionals came up with a working definition of gender as a subset of the social relations of power and dominance that operated not only at the household, community, or local levels, but also at regional, national and international ones [23,24]. Research on the gendered dynamics of natural resource management went beyond portrayals of women as either victims or virtuous [25], to focus on linkages to the broader political economy. Issues such as land titling, resource access and notions of masculinity and femininity received serious attention, including within governmental and nongovernmental institutions [9,11,26–29].

At the start of the 21st century, there has been renewed attention to both economic-environmental linkages and the importance of gender for sustainable development. “Gender mainstreaming”—understood as attention to the internal gender dynamics of institutions and their research products—is also ascendant again, and at an important time. In rural areas of the global south, migration is profoundly transforming local socio-economic systems and leading to what many call the “feminization of agriculture” [30,31]. Data from the International Labor Organization (ILO) indicates that while overall employment in agriculture is decreasing, it is decreasing faster for men, especially in Africa and Asia, though this increased share of labor does not always come with increased control over resources (ILO 2010 cited in [30]). The rapidly changing dynamics of agricultural production underlie the research agenda on forests, food security and gender [32]. More sex-disaggregated data would certainly help identify the roles and responsibilities of women versus men and flag their differential access and control over resources [33]. But these data need to be supplemented with more detailed and context-specific research in order to understand and analyze the multiple axes of gender disparities [13,15,34]. In the section that follows, we explore how these dynamics play out in the context of forests and agrarian economy, which are inextricably linked.

### 3. Forests, Food Security and Gender

We begin with the recognition that ‘food security’ and ‘forest’ are slippery categories. The Forest Resources Assessment (FRA) of the Food and Agriculture Organization of the United Nations (FAO) outlines the basic characteristics of forests as those consisting of more than 0.5 hectares of land with trees taller than 5 meters and a canopy cover of over 10 percent; and excludes land that is largely under agricultural or urban use [35]. But even the FAO and the entities that draw on this definition—the Convention for Biological Diversity (CBD), the Intergovernmental Panel on Climate Change (IPCC) and the United Nations Environmental Programme (UNEP)—acknowledge that forests are defined differently depending on who is doing the defining and for what purpose. For example, the IPCC notes that forests are defined based on at least three different criteria: administrative, land use and land cover [36]. That is, what counts as a forest varies across time and space. Of course what land counts as forest is a political and administrative category, one that is often subject to overlapping and informal tenure claims between states and multiple groups of resource users to resources essential to livelihoods [37]. For the purpose of this paper, we use the broadly accepted FAO definition of forest as a land cover type, acknowledging that the category covers a wide array of ecologies, land

uses and land tenure arrangements.<sup>1</sup> Estimates of how many people worldwide are dependent on forests for all or part of their livelihoods are notoriously unreliable and vary widely: from 240 million to 1.6 billion [38]. While the traditional definition of food security<sup>2</sup> does not reference nutrition, we understand food security as including adequate nutritional status in terms of protein, energy, vitamins and minerals for all household members at all times [39].

Food security and forest landscapes are often presented as competing land use goals: agriculture expanding, tropical forests in retreat [40,41]. But this simple binary elides the existing role of forest landscapes in rural food security. As the contributors to the edited volume “Agrarian Environments” show, forests and the natural environment constitute an important aspect of the agrarian landscape in India [42]. Recently, scholars have begun to explore the direct contribution of forests to food security and nutrition for those living in them [2,4,43]. The social relationships governing access to these resources are often different from those that govern access to agricultural land; forest is more likely to be state-owned, communal, or subject to overlapping claims. Such relationships are also often subject to different development pressures. Access and control over these resources are increasingly framed as food security issues.<sup>3</sup>

Forests may not directly contribute a significant percentage of calories in rural diets, but new evidence suggests that forests may play a role in preventing “hidden hunger”—micronutrient deficiencies that affect billions [47]. Forest foods are a source of valuable micronutrients like iron, vitamin A, vitamin C, folate, calcium and others [4,48–52]. Consumption of diverse wild plant and animal foods is associated with adequate nutrition in many cases [4,43,53–59]. For example, in the East Usambara Mountains of Tanzania, wild food harvests provide few calories but offer a significant percentage of essential nutrients in the diets of women and children, especially those already engaged in agriculture [4]. In this area, the consumption of leafy green vegetables is the best predictor of children’s micronutrient intake; these vegetables are collected from forests, field margins and fallows [60]. Animal source foods from forests are an important contributor to adequate nutrition as well, especially for the poorest households [1,48,50,61,62]. In Madagascar, a study of hemoglobin levels in children associated with bushmeat consumption predicts that without forest-based animal products, anemia cases would triple among the children of the poorest households [50].

Nutritional benefits from forests may be more widespread than previously acknowledged. Researchers have correlated tree cover to dietary diversity, an important proxy for micronutrient intake, in 21 African countries [2]. In Malawi, a comparison of satellite and health data indicates that children in areas with net forest loss are less likely to have a diverse diet, less likely to consume vitamin A-rich foods and more likely to experience diarrhea [63].<sup>4</sup>

Forest foods can have disproportionate importance to households with access to forests, but less access to cash, especially during seasons of low agricultural production when hunger is common [53,72,73]. An analysis of nationally representative data from Mexico maps a U-shaped relationship between dependence on forest products and household wealth [74]. Dependence tapers off as wealth increases;

---

<sup>1</sup> For the purpose of this review, we did not include industrial tree plantations.

<sup>2</sup> We reference the widely accepted definition from the 1996 World Food Summit, “Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.”

<sup>3</sup> Major international efforts that specifically examine food security in forest landscapes include the Global Forest Expert Panel on Forests and Food Security (GFEP-FFS) convened by the International Union of Forest Research Organizations (IUFRO), the Collaborative Partnership on Forests (CPF), research programs at the CIFOR and the World Agroforestry Center (ICRAF) and sessions at the World Landscapes Forum. Rural social movements have long made the link between decent livelihoods and rights to forest as well (see for example [44–46]).

<sup>4</sup> Forests also contribute indirectly to food security. Ecosystem services to agriculture from forest include climate buffering, water filtration, pollination, genetic diversity, hosting natural enemy populations and protection against soil erosion [64–68]. Attempts to quantify the contribution of forests to agriculture are underway (see [69]). However, initial data indicate that the effect of these contributions can be economically significant. Pollination services from natural habitats have been valued at \$112 billion USD [70]. Other services, including water regulation, nutrient cycling, biological pest control and microclimate regulation, all impact agricultural yields [66,71].

forest product use then increases again as households have sufficient capital to engage in commercial forest extraction. Forest products can also act as a smoothing mechanism: trips to gather forest products have also been correlated with both agricultural shocks and expected agricultural risks in the Brazilian Amazon [75].

The gender dynamics of food security in forest dwelling communities are still not clear. However, emerging case studies and reviews of the issue parallel insights from earlier work on gender divisions of labor in natural resource management [5,13,29]. Harvesting forest-based foods, especially vitamin-rich foods that supplement household consumption, is often considered “women’s work” [4,8,51,76]. Case studies in Africa and elsewhere show that women living near forests in the developing world are often responsible for collecting fuelwood and other subsistence products [77].

Who controls forest products can affect the food security impact of those products. One study of the bushmeat trade in Central Gabon reports that spending on food and household services decreased with larger hunting offtakes; increased discretionary incomes controlled by men were not spent on household food needs [78]. This finding follows many other studies in the literature on gender and food security that link women’s income and assets, as opposed to household income, to improved food security and nutrition in children [39,79,80]. However, increasing a household’s endowment of products customarily controlled by men—even if these products flow directly to women—may serve to increase male bargaining power within the household [81]. Customs and context dictate when benefits from such resources may accrue to women and children. While women’s income is important to food security, closely related factors such as mothers’ levels of education and attitudes towards domestic violence can be related to child nutrition as well [82].

However, as previous work on gender and the environment points out, many of these findings from case studies are not generalizable across cases and regions. This is empirically illustrated by a recent cross-country study [8] based on data collected through the Poverty and Environment Network (PEN, [www.cifor.org/pen](http://www.cifor.org/pen)) research project, the largest multi-national study of forest products to date. Sunderland and colleagues conducted a multivariate analysis of income from forests in 24 tropical developing countries to examine the factors associated with women’s share of income from forest products. They found that household demographic characteristics, value of household assets and participation in forest governance, all have no statistically significant impact on forest product use. Regional variations prevail. From their regional analysis it appears that women harvest forest products mostly for local use and subsistence in Africa, but not in Asia or Latin America. However, there are likely to be huge variations within regions.

The specific character of this gender division of labor can also be different. For example, in a study of male and female traders of non-timber forest products in Cameroon, male traders had larger businesses, while women’s businesses were smaller and more oriented towards local markets. However, there was no significant difference in the rate of profit between the two groups of traders [83]. Common narratives about women and forests—including that women collect more products for subsistence than sale, that they have superior knowledge of forest products, that they depend on a larger diversity of products and that women’s control over forest products increase household nutrition—are not universally generalizable. These lessons from the PEN study reflect a key lesson from gender scholarship: gender divisions of labor are common, but the particular character of that division is highly dependent on local context and history and is subject to change [20,21,29,46]. Unfortunately this more relational view of gender rarely makes it into policy and program planning.

#### **4. Gender and Forest Governance—Lessons for Forests and Food Security**

As noted above, ‘forests’ are notoriously difficult to define. They often refer to landscapes that encompass diverse social relationships, management regimes, tenure and ecologies, each with a social and political history [37]. Simple spatial notions of private ownership do not map cleanly onto the economies of forest dependent communities. Drawing on data from the Poverty and Environmental Network project, researchers find that the majority of income from forest products comes from state



and communal lands subject to overlapping use rights—not private property [84]. Access to these lands is governed in some cases by community-based forestry groups, in others by state agencies and in still others by customary tenure systems. Here we highlight lessons from this literature for research on food security in forest landscapes.

Increasing the security of women's claims to land can help improve food security by increasing the likelihood that women will be able to access credit, adopt new technologies, increase yields and become more efficient agricultural producers [30]. However, in customary tenure systems, rights to forest lands and trees are often overlapping, precarious and deeply divided by gender, class, ethnicity and other forms of social difference [46,85,86]. At least in Asia and Latin America, women's access to forest foods is more likely to be secured through overlapping rights to forest products on communal and state lands [8]. This may have to do with women's *de facto*, rather than *de jure*, tenure on these lands. It has long been recognized that many 'common' property regimes include spatially and temporally overlapping use rights. Spaces that may be legally recognized as belonging to men or as village property may be subject to rights and claims by women, especially for tree and plant products [27,87]. For example, Howard and Nabanoga's mapping of tree tenure in Uganda reveal rights and obligations to forest resources nested and layered in the same geographic space, corresponding to species and specific uses of the same species depending on social norms, including gender. Based on her ethnographic fieldwork and participatory mapping exercises, Asher [75] reports that a tree and products associated with it (the fruit or wildlife living on it) can belong to different owners within a family or community and that most community members manage many scattered areas of forest and farm land, rather than having one contiguous plot. In the Colombian Pacific region, usufruct and inheritance rights over many kinds of resources (trees, wildlife, non-timber forest products, cultivated plots and fisheries mineral deposits) are transferred to others—men and women—based on complex and negotiable norms.

Such overlapping rights and obligations structure women's forest management choices. A study of women in Zimbabwe documents that women were less likely to plant trees and invest effort on homestead land—access to which depended on marital status—than in communal land for which their *de facto*, if not *de jure* rights were more secure [88]. Such common or state forest lands may have the least secure forms of legal tenure overall, however, as they are increasingly categorized as 'vacant' or 'wasteland' and subject to competing uses [89]. Efforts to privatize or formalize communal or state lands under individual rights may disproportionately negate women's longstanding overlapping claims [90,91].

Overlapping and often conflicting claims also structure Afro-Colombian collective land ownership and forest management practices in the Pacific lowlands of Colombia. In her long-term research in the region, Asher [9,46] discusses how black women negotiate with the state, environmental entities and their *compañeros* (spouses, boyfriends, or colleagues) for interrelated ethnic and gender rights. The complexity of these multiple negotiations is compounded by the fact that the densely forested Colombian Pacific lands (considered *baldios* or empty lands) are subject to contradictory laws under the 1991 Constitution. On the one hand, the region is the target of ambitious economic growth initiatives. On the other, Law 70 of 1993 accords Afro-Colombian communities ethnic and collective titles to their lands. Many of these lands overlap with existing or proposed protected areas or conservation efforts, because of the region's status as one of the biodiversity hotspots of the world. These complexities have multiplied further since the turn of the century alongside the region's violent conflict and expanding cultivation of illicit (coca) and legal (oil palm) crops.

Within such contexts, securing formal rights to land alone is not enough to make forest users and women farmers more efficient. In a study of land rights, cacao planting and yield in Ghana, productivity was strongly related to the differentiated labor demands, incentives and rights to trees for men and women, as well as legal frameworks of inheritance, access to extension and inputs and tradeoffs with food production [92]. The researchers concluded that "attempts to equalize the land rights of men and women are unlikely to lead to gender equity and improved efficiency and

productivity of women farmers unless other constraints faced by women are also addressed" ([92], p. 177). The introduction to the volume "Agrarian change, gender and land rights" [34] and the contributions therein, argue convincingly for the need to reconceptualize conventional ideas and conventional gender-based land redistribution and the need to take contextual specificities seriously.

These contextual specifics may be more than the sum of their parts and are not precisely reducible to the local difference between men and women. The way gender affects access to forest products is contingent upon both local dynamics and broader political economic conditions. This is also clear in the literature on gender and community forestry. Forest user groups—decentralized forest governance institutions prevalent in Nepal, India and much of the developing tropics—have been extensively studied, given their pivotal roles in negotiation over access to forest resources. Gender disparities are prevalent in forest user groups. Governing bodies with jurisdiction over forest resources are often dominated by men [93–98]. Case study evidence from India and Nepal indicates that increasing the participation of women in forest user groups may increase the potential for the groups to be more effective and to deliver additional livelihood benefits to women and their children [99–101]. Agarwal [99] finds that forest user groups whose decision-making bodies included more women achieved greater improvement in forest conditions. She attributes this association of gender and forest outcomes to women's superior knowledge of plant species and collection methods, as well as their influence on compliance with local rules. Case studies in the same region argue participation in forest governance can benefit women directly. A six-year study of participatory forest governance in Nepal reports that as more women participated in forest user groups, the incomes of the poorest women rose due to an increase in the overall availability of resources as well as a redistribution of resources within groups of forest users [102]. However, these findings may not be generalizable beyond the study sites in India and Nepal.

Although it echoes some familiar themes of gender and development scholarship, the literature—both from larger quantitative comparative studies and in-depth ethnographic accounts of gender and forest governance—highlights complexities that are difficult to distil down to differences between men and women. To cite another example from Nepal, in a study that specifically addressed power and participation in community forestry institutions, a variety of factors (literacy, caste, gender, being 'trusted', not getting privileged information and lack of private resources) all interacted to exclude or empower people [103]. The study argues that while gender was an important factor, participation and influence did not break down evenly along gender lines. Coleman and Mwangi [104], in a review of International Forestry and Resources Institutions programs in 10 countries and other global data on forest user groups, indicate that women's participation in forest user groups is more likely when there is less economic inequality in a community. The "most consistent finding" according to this analysis is that wealth inequality and discrepancy in male and female wages predict women's participation and leadership. Data from a recent analysis of 151 forest user groups in 56 sites in Uganda, Kenya, Bolivia and Mexico indicate that groups dominated by women are less likely to conduct forest regeneration activities and less likely to adopt new technologies than men. Female dominated groups in this survey have less positive outcomes for forest conservation overall [105]. In other words, disadvantages in different domains condition women's ability to participate, access and effectively manage forests.

Broad-scale changes, like increased male out-migration, also affect gender equality and forest access in entirely different ways. Male out-migration may be an "opportunity" for increasing women's access to forest resources and power over forest governance [106]. But whether this is an 'opportunity' depends largely on local context, history and political economy. One study in Veracruz, Mexico illustrates how migration expanded women's labor to new activities, but did not expand the symbolic boundaries that define men and women's domains. This also did not lead to a relative empowerment of women vis-à-vis natural resource management [107].

In her in-depth ethnographic study of two villages in Nepal, Sijapati Basnett [108] demonstrates that while migration reinforced gender divisions of labor, male out-migration had completely different



effects on women's participation in forest user groups and access to forest resources. In one village, women's participation increased after men in the community migrated; but women-led forest user groups still depended on male relatives to interface with local officials. In this village, both women and men had previously been employed at a nearby factory that paid equal wages to men and women before it closed. Women were accustomed to work outside the home, but government officials were still not used to dealing with women. In another village, a significant number of young Dalit men had migrated to the Gulf to work. Their remittances helped partially remove their families from historical patron-client relationships with higher castes and bolster a caste struggle. The latter played out in part in community forestry institutions, where Dalit men with relatives abroad used conservation discourses as a way to legitimize their new-found power over local forests. Women participated only nominally and the rules that eventually emerged from those groups restricted access to products that met women's needs [108]. In both villages, gender dynamics were structured by history, religious discourses, political economy and class. Here, as in the Afro-Colombian case, gender disparity was conditioned and deeply intertwined with these other forms of inequality.

These complexities are admittedly difficult to account for in national legislation and development programs, yet ignoring them can undercut the effectiveness of gender and forest access interventions. Nicaragua's laws and regulations, for example, include numerical quotas for women's participation in community forestry. Gender mainstreaming through natural resource policies are key components of these laws. In communities studied by Mairena and colleagues, NGOs had mandated a gender perspective in community forest management projects. However, the authors argue the quality of women's participation overall was "superficial" [109]. In many communities, they noted that neither men *nor* women felt their opinions were taken into account by local leadership. Moreover, gender was not incorporated in a way that redistributed power between men and women, or between the local community and the users of other resources. As the authors concluded, "NGOs and governmental institutions have not yet considered the forest as an arena in which indigenous men and women are co-owners without distinction, in which to integrate equitable management actions" ([109], p. 46). According to the researchers, the narrow view of gender mainstreaming in these organizations failed to address gender disparities and the result was "a lack of particular or targeted actions that would lead to more comprehensive and holistic alternatives for women and for forests" ([109], p. 7). Asher's research [46] on collective land rights for Afro-Colombians and Sundar's [86] work on Joint Forest Management in India provide other examples of legal or official guarantees of local or gender inclusion with mixed outcomes because of the narrow conceptualization of participation.

The examples above are chosen from many which show that while women's participation and gender matter, it is not always possible to predict in what ways they structure access to forest resources. Efforts to increase women's leadership in community forestry and to strengthen women's land rights are strongly influenced by local dynamics and the broader context in which gender disparities are produced.

The trouble with a contextually-based, relational understanding of gender is that it rarely fits neatly into policy documents and large funding proposals. In the existing literature on forests, food security and gender, current recommendations for future research and policy include: studying the gendered dynamics of forest and tree tenure [76], increasing women's participation in forest management, collecting sex-disaggregated data and incorporating a gender-sensitive approach in institutions and organizations [32,76,110]. These recommendations are similar to those regarding other areas of natural resource management [111–113]. We recognize that these are important components of a robust intellectual program on gender, but the literature on forests and food security would suggest that such proposals are not enough.

## 5. Conclusions

New research on the role of forests in food security is being undertaken to illuminate an often hidden consequence of forest loss. Our review reveals that what literature exists echoes the

findings from previous gender scholarship: women have key roles and responsibilities in agricultural production, forest use and natural resource management; disparities between women and men are widespread; and inequities affect efforts to improve food security and forest management. The common follow-up suggestion—that gender equity and greater participation of women in all levels of decision-making will have positive impacts on forest management and food security—also parallels earlier policy recommendations. In other words, the literature confirms the importance of a gendered approach, but often repeats the assumptions and debates from more than 30 years ago when discussions of women, development and the environment started to gain traction. Specifically, we found this literature frequently pointed to women’s supposed superiority (being more effective agents for promoting household food security or healthy forest management) or their special victimhood (being often the last in the household to eat, having less access to forest resources and less secure rights over forest products).

That gender is an important variable is confirmed by the nascent research on the gender dynamics of forest-based food systems. Across the globe, women are disproportionately dependent on agriculture and natural resources for their livelihoods. The links between gender and food security have been so extensively documented that Raj Patel ([114], p. 2) notes, “It is hard to conceive a discussion about hunger without connecting the epidemiology of hunger to women’s disempowerment.” We need sex-disaggregated data and qualitative studies to understand how these insights might apply to forest landscapes. Do lessons about women’s education and status in broader food security literature hold in forest-based food systems? As women’s education and status increase, does dependence on forest-based foods decrease? While there is evidence that women who own private land have “almost complete insurance against malnutrition” ([115], p. 256) cited in ([30], p. 24), does the same hold for access to forest lands?

As this area of research emerges, we argue for approaches that move beyond operationalizing women or gender as a variable of analysis, to draw on gender lenses that allow us to see how political economy and social power structure access to resources at multiple scales. Research should investigate disparities across these manifold domains, with an eye to informing policy that moves beyond simplistic assumptions about women and their roles in economic production and environmental management. Furthermore, if gender and other forms of social difference are not neatly separable, asking questions that go beyond binaries about men and women may illuminate other important local dynamics. For example, is gendered dependence on products from state and communal forest lands related to women’s and their communities’ (including ethnic and class status) lack of access to secure tenure over adequate land resources as a whole? Do forest products primarily function as access to cash for women, as insurance, as a source of nutrient-dense foods that are too expensive for rural workers to buy? Does access to forest products make local small-scale agriculture more viable, especially for female-headed households? Both broad-scale quantitative and in-depth qualitative work are necessary for this task.

These insights have implications for the kinds of questions we ask about the relationship between forests and food security writ large, including the broader dynamics that condition both gender disadvantage and access to food. Such broader dynamics include macroeconomic pressures on land conversion, state policy, entitlements and competing land uses. Collecting sex-disaggregated data on forests as a safety net is useful, for example, but would be more so if paired with data on other entitlements women have access to. In the places where women receive state anti-poverty and nutrition benefits, does dependence on forest products decrease? How does this affect nutrition for women and children? As tropical forests are converted to plantations, how does that affect local food security, especially for women who are often paid less than men for wage labor on plantations? New work is beginning to address these questions [107,116,117].

Lessons from the past 40 years of gender scholarship remind us that additive relationships between gender and other forms of social difference cannot be assumed [22,118]. Analysis that does not get beyond a binary view of men and women has the potential to overemphasize opposition between

women and men and obscure other relations of power that cause gender disadvantages [11,119]. Policy on forests and food security should not only be sensitive to gender disparities in forest product use at the local level, but work to change the broader context in which those gender disparities are reinforced.

Some emerging research and policy on gender, forests and food security reflects these insights, while in others these complexities fade into the background. What is needed is a long view of both research and policy: increasing access to livelihood resources for men and women; and working to change the social, political and economic contexts that produce gendered and other forms of inequality.

**Acknowledgments:** The authors thank Terry Sunderland and Amy Ickowitz of the Center for International Forestry Research (CIFOR) and acknowledge funding support via CIFOR by the United States Agency for International Development's Biodiversity Fund. They also thank three anonymous reviewers, Maywa Montenegro for her insights and quick wits, Sirisha Naidu for her keen read and comments, Robert Redick for his invaluable editorial skills and Smriti Karwa for her assistance with formatting the bibliography.

**Author Contributions:** Both authors contributed equally to the research and writing of this article.

**Conflicts of Interest:** The authors declare no conflict of interest.

## References

1. Arild Angelsen, Pamela Jagger, Ronnie Babigumira, Brian Belcher, Nicholas J. Hogarth, Simone Bauch, Jan Börner, Carsten Smith-Hall, and Sven Wunder. "Environmental Income and Rural Livelihoods: A Global-Comparative Analysis." *World Development* 64 (2014): 12–28. [CrossRef]
2. Amy Ickowitz, Bronwen Powell, Mohammad A. Salim, and Terry C. H. Sunderland. "Dietary Quality and Tree Cover in Africa." *Global Environmental Change* 24 (2014): 287–94. [CrossRef]
3. Evelyne Kiptot, Steven Franzel, and Ann Degrande. "Gender, Agroforestry and Food Security in Africa." *Current Opinion in Environmental Sustainability* 6 (2014): 104–9. [CrossRef]
4. Bronwen Powell, Patrick Maundu, Harriet V. Kuhnlein, and Timothy Johns. "Wild Foods from Farm and Forest in the East Usambara Mountains, Tanzania." *Ecology of Food and Nutrition* 52 (2013): 451–78. [CrossRef] [PubMed]
5. Ester Boserup. *Woman's Role in Economic Development*. New York: St. Martin's Press, 1970.
6. Carol J. P. Colfer, Bimbika S. Basnett, and Marlène Elias, eds. *Gender and Forestry: Climate Change, Tenure, Value Chains and Emerging Issues*. New York: Earthscan and Routledge, 2016.
7. Bina Agarwal. *Gender and Green Governance: The Political Economy of Women's Presence within and beyond Community Forestry*. New Delhi: Oxford University Press, 2010.
8. Terry Sunderland, Ramadhani Achdiawan, Arild Angelsen, Ronnie Babigumira, Amy Ickowitz, Fiona Paumgarten, Victoria Reyes-García, and Gerald Shively. "Challenging Perceptions about Men, Women and Forest Product Use: A Global Comparative Study." *World Development* 64 (2014): 56–66. [CrossRef]
9. Kiran Asher. "Texts in Contexts: Reading Afro-Colombian Women's Activism." In *Translocalities/Translocalidades: Feminist Politics of Translation in Latin/a Americas*. Edited by Sonia Alvarez, Claudia de Lima Costa, Verónica Feliu, Rebecca Hester, Norma Klahn and Millie Thayer. Durham: Duke University Press, 2014, pp. 189–208.
10. Roberta Hawkins, and Diana Ojeda. "Gender and Environment: Critical Tradition and New Challenges." *Environment and Planning D: Society and Space* 29 (2011): 237–53.
11. Rebecca Elmhirst, and Bernadette P. Resurreccion. "Gender, Environment and Natural Resource Management: New Dimensions, New Debates." In *Gender and Natural Resource Management: Livelihoods, Mobility and Interventions*. Edited by Rebecaa Elmhirst and Bernadette P. Resurreccion. Abingdon: Routledge, 2008, pp. 3–23.
12. Kriemild Saunders. "Introduction: Towards a Deconstructive Post-Development Criticism." In *Feminist Post-Development Thought: Rethinking Modernity, Post-Colonialism and Representation*. Edited by Kriemild Saunders. London: Zed Books, 2002, pp. 1–38.
13. Shahra Razavi, and Carol Miller. "From WID to GAD: Conceptual Shifts in the Women and Development Discourse." United Nations Research Institute for Social Development, 1995. Available online: <http://www.unrisd.org/80256B3C005BCCF9/%28httpPublications%29/D9C3FCA78D3DB32E80256B67005B6AB5?OpenDocument> (accessed on 21 February 2017).

14. Rosi Braidotti. *Women, the Environment and Sustainable Development: Towards a Theoretical Synthesis*. London: Zed Books, 1994.
15. Melissa Leach. "Earth Mother Myths and Other Ecofeminist Fables: How a Strategic Notion Rose and Fell." *Development and Change* 38 (2007): 67–85. [CrossRef]
16. Betsy Hartmann. "Will the Circle Be Unbroken? A Critique of the Project on Environment, Population and Security." In *Violent Environments*. Edited by Nancy Peluso and Michael Watts. Ithaca: Cornell University Press, 2001, pp. 39–62.
17. Maria Mies, and Vandana Shiva. *Ecofeminism*. London: Zed Books, 1993.
18. Vandana Shiva. *Staying Alive: Women, Ecology and Development*. London: Zed Books, 1988.
19. Irene Dankelman, and Joan Davidson. *Women and the Environment in the Third World: Alliance for the Future*. New York: EarthScan, 2009.
20. Doreen B. Massey. *Space, Place, and Gender*. Minneapolis: University of Minnesota Press, 1994.
21. Gillian Hart. "Household Production Reconsidered: Gender, Labor Conflict, and Technological Change in Malaysia's Muda Region." *World Development* 20 (1992): 809–23. [CrossRef]
22. Joan Scott. "Gender: A Useful Category of Historical Analysis." In *Gender and the Politics of History*. New York: Columbia University Press, 1988, pp. 28–50.
23. Naila Kabeer. *Reversed Realities: Gender Hierarchies in Development Thought*. New York: Verso, 1994.
24. Gita Sen, and Caren Grown. *Development, Crises and Alternative Visions: Third World Women's Perspectives*. Washington: Earthscan, 1987.
25. Seema Arora-Jonsson. "Virtue and Vulnerability: Discourses on Women, Gender and Climate Change." *Global Environmental Change* 21 (2011): 744–51. [CrossRef]
26. Andrea J. Nightingale. "The Nature of Gender: Work, Gender and Environment." Institute of Geography Online Paper Series. 2006. Available online: <http://www.era.lib.ed.ac.uk/handle/1842/1451> (accessed on 21 July 2014).
27. Dianne Rocheleau, and David Edmunds. "Women, Men and Trees: Gender, Power and Property in Forest and Agrarian Landscapes." *World Development* 25 (1997): 1351–71. [CrossRef]
28. Carmen Diana Deere. "What Difference Does Gender Make? Rethinking Peasant Studies." *Feminist Economics* 1 (1995): 53–72. [CrossRef]
29. Bina Agarwal. "The Gender and Environment Debate: Lessons from India." *Feminist Studies* 18 (1992): 119–58. [CrossRef]
30. Olivier DeSchutter. *Gender Equality and Food Security—Women's Empowerment as a Tool against Hunger*. Mandaluyong City: Asian Development Bank, 2013.
31. Carmen Diana Deere. "The Feminization of Agriculture? Economic Restructuring in Rural Latin America." United Nations Research Institute for Social Development, 2005. Available online: [http://www.unrisd.org/unrisd/website/document.nsf/\(httpPublications\)/20024EBC6AB9DA45C1256FE10045B101?OpenDocument](http://www.unrisd.org/unrisd/website/document.nsf/(httpPublications)/20024EBC6AB9DA45C1256FE10045B101?OpenDocument) (accessed on 21 July 2014).
32. Food and Agriculture Organization. "Forests, Food Security and Gender: Linkages, Disparities and Priorities for Action." Paper presented at the International Conference on Forests for Food Security and Nutrition, Rome, Italy, 13–15 May 2013.
33. Carmen Diana Deere, and Cheryl R. Doss. "The Gender Asset Gap: What Do We Know and Why Does It Matter?" *Feminist Economics* 12 (2006): 1–50. [CrossRef]
34. Shahra Razavi. "Introduction: Agrarian Change, Gender and Land Rights." *Journal of Agrarian Change* 3 (2003): 2–32. [CrossRef]
35. Food and Agriculture Organization of the United Nations. "Global Forest Resources Assessment 2010 Main Report." FAO Forestry Paper 163, Rome, Italy, 2010. Available online: <http://www.fao.org/docrep/013/i1757e/i1757e.pdf> (accessed on 21 July 2014).
36. Gert Jan Nabuurs, Omar Masera, Kenneth Andrasko, Pablo Benitez-Ponce, Rizaldi Boer, Michael Dutschke, Elnour Elsidig, Justin Ford-Robertson, Peter Frumhoff, Timo Karjalainen, and et al. "Forestry." In *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Edited by Bert Metz, Ogunlade R. Davidson, Peter R. Bosch, Rutu Dave and Leo A. Meyer. Cambridge: Cambridge University Press, 2007, pp. 541–84.
37. Nancy Peluso, and Peter Vandergeest. "Genealogies of the Political Forest and Customary Rights in Indonesia, Malaysia, and Thailand." *The Journal of Asian Studies* 60 (2001): 761–812. [CrossRef]

38. Sophie Chao. "Forest Peoples: Numbers across the world." *Forest Peoples Program*. 2012. Available online: [http://www.forestpeoples.org/sites/fpp/files/publication/2012/05/forest-peoples-numbers-across-world-final\\_0.pdf](http://www.forestpeoples.org/sites/fpp/files/publication/2012/05/forest-peoples-numbers-across-world-final_0.pdf) (accessed on 17 July 2014).
39. Agnes R. Quisumbing, Lynn R. Brown, H. Sims Feldstein, Lawrence Haddad, and Christine Peña. "Women: The Key to Food Security." *Food Policy Report*. August 1995. Available online: <http://www.ifpri.cgiar.org/sites/default/files/publications/fpr21.pdf> (accessed on 17 July 2014).
40. Kimberly M. Carlson, Lisa M. Curran, Dessy Ratnasari, Alice M. Pittman, Britaldo S. Soares-Filho, Gregory P. Asner, Simon N. Trigg, David A. Gaveau, Deborah Lawrence, and Hermann O. Rodrigues. "Committed Carbon Emissions, Deforestation and Community Land Conversion from Oil Palm Plantation Expansion in West Kalimantan, Indonesia." *Proceedings of the National Academy of Sciences of the United States of America* 109 (2012): 7559–64. [[CrossRef](#)] [[PubMed](#)]
41. Holly K. Gibbs, Aaron S. Ruesch, Frédéric Achard, Murray K. Clayton, Peter Holmgren, Navin Ramankutty, and Jonathan A. Foley. "Tropical Forests Were the Primary Sources of New Agricultural Land in the 1980s and 1990s." *Proceedings of the National Academy of Sciences of the United States of America* 107 (2010): 16732–37. [[CrossRef](#)] [[PubMed](#)]
42. Arun Agrawal, and K. Sivaramakrishnan, eds. *Agrarian Environments: Resources, Representations and Rule in India*. Durham: Duke University Press, 2000.
43. Barbara Vinceti, Amy Ickowitz, Bronwen Powell, Katja Kehlenbeck, Céline Termote, Bruce Cogill, and Danny Hunter. "The Contributions of Forest Foods to Sustainable Diets." *Unasylva* 64 (2013): 54–64.
44. Stephen Schwartzman, Ane Alencar, Hilary Zarin, and Ana Paula Santos Souza. "Social Movements and Large-Scale Tropical Forest Protection on the Amazon Frontier: Conservation from Chaos." *The Journal of Environment & Development* 19 (2010): 274–99. [[CrossRef](#)]
45. Lucas Anton, and Carol Warren. *Land for the People: The State and Agrarian Conflict in Indonesia*. Athens: Ohio University Press, 2013.
46. Kiran Asher. *Black and Green: Afro-Colombians, Development and Nature in the Pacific Lowlands*. Durham: Duke University Press, 2009.
47. Alexander J. Stein, and Matin Qaim. "The Human and Economic Cost of Hidden Hunger." *Food & Nutrition Bulletin* 28 (2007): 125–34. [[CrossRef](#)] [[PubMed](#)]
48. Christopher D. Golden, Matthew H. Bonds, Justin S. Brashares, B. J. Rodolph Rasolofoniaina, and Claire Kremen. "Economic Valuation of Subsistence Harvest of Wildlife in Madagascar." *Conservation Biology* 28 (2014): 234–43. [[CrossRef](#)] [[PubMed](#)]
49. Terry Sunderland, Bronwen Powell, Amy Ickowitz, Samson Foli, Miguel Pinedo-Vasquez, Robert Nasi, and Christine Padoch. *Food Security and Nutrition: The Role of Forests*. Bogor: Center for International Forestry Research, 2013.
50. Christopher D. Golden, Lia C. H. Fernald, Justin S. Brashares, B. J. Rodolph Rasolofoniaina, and Claire Kremen. "Benefits of Wildlife Consumption to Child Nutrition in a Biodiversity Hotspot." *Proceedings of the National Academy of Sciences of the United States of America* 108 (2011): 19653–56. [[CrossRef](#)] [[PubMed](#)]
51. Sarah A. Kaschula. "Wild Foods and Household Food Security Responses to AIDS: Evidence from South Africa." *Population and Environment* 29 (2008): 162–85. [[CrossRef](#)]
52. C. E. Freiberger, D. J. Vanderjagt, A. Pastuszyn, R. S. Glew, G. Mounkaila, M. Millson, and R. H. Glew. "Nutrient Content of the Edible Leaves of Seven Wild Plants from Niger." *Plant Foods for Human Nutrition* 53 (1998): 57–69. [[CrossRef](#)] [[PubMed](#)]
53. Albert Ahenkan, and Emmanuel Boon. "Improving Nutrition and Health through Non-Timber Forest Products in Ghana." *Journal of Health, Population and Nutrition* 29 (2011): 141–48. [[CrossRef](#)]
54. Sonia Blaney, Micheline Beaudry, and Michael Latham. "Contribution of Natural Resources to Nutritional Status in a Protected Area of Gabon." *Food & Nutrition Bulletin* 30 (2009): 49–62. [[CrossRef](#)] [[PubMed](#)]
55. Minse Modi, Albert Modi, and Sheryl Hendriks. "Potential Role for Wild Vegetables in Household Food Security: A Preliminary Case Study in Kwazulu-Natal, South Africa." *African Journal of Food, Agriculture, Nutrition and Development* 6 (2006): 1–13. [[CrossRef](#)]
56. Fiona Marshall. "Agriculture and Use of Wild and Weedy Greens by the Piik ap Oom Okiek of Kenya." *Economic Botany* 55 (2001): 32–46. [[CrossRef](#)]



57. Britta M. Ogle, Pham Huang Hung, and Ho Thi Tuyet. "Significance of Wild Vegetables in Micronutrient Intakes of Women in Vietnam: An Analysis of Food Variety." *Asia Pacific Journal of Clinical Nutrition* 10 (2001): 21–30. [[CrossRef](#)] [[PubMed](#)]
58. Louis E. Grivetti, and Britta M. Ogle. "Value of Traditional Foods in Meeting Macro- and Micronutrient Needs: The Wild Plant Connection." *Nutrition Research Reviews* 13 (2000): 31–46. [[CrossRef](#)] [[PubMed](#)]
59. David Pimentel, Michael McNair, Louise Buck, Marcia Pimentel, and Jeremy Kamil. "The Value of Forests to World Food Security." *Human Ecology* 25 (1997): 91–120. [[CrossRef](#)]
60. Bronwen Powell, Jaclyn Hall, and Tim Johns. "Forest Cover, Use and Dietary Intake in the East Usambara Mountains, Tanzania." *International Forestry Review* 13 (2011): 305–17. [[CrossRef](#)]
61. Emmanuel De Merode, Katherine Homewood, and Guy Cowlshaw. "The Value of Bushmeat and Other Wild Foods to Rural Households Living in Extreme Poverty in Democratic Republic of Congo." *Biological Conservation* 118 (2004): 573–81. [[CrossRef](#)]
62. Suzanne P. Murphy, and Lindsay H. Allen. "Nutritional Importance of Animal Source Foods." *The Journal of Nutrition* 133 (2003): 3932S–35S.
63. Kiersten B. Johnson, Anila Jacob, and Molly E. Brown. "Forest Cover Associated with Improved Child Health and Nutrition: Evidence from the Malawi Demographic and Health Survey and Satellite Data." *Global Health: Science and Practice* 1 (2013): 237–48. [[CrossRef](#)] [[PubMed](#)]
64. Teja Tsharntke, Cagan H. Sekercioglu, Thomas V. Dietsch, Navjot S. Sodhi, Patrick Hoehn, and Jason M. Tylianakis. "Landscape Constraints on Functional Diversity of Birds and Insects in tropical Agroecosystems." *Ecology* 89 (2008): 944–51. [[CrossRef](#)] [[PubMed](#)]
65. Felix J. A. Bianchi, C. J. H. Booij, and Teja Tsharntke. "Sustainable Pest Regulation in Agricultural Landscapes: A Review on Landscape Composition, Biodiversity and Natural Pest Control." *Proceedings of the Royal Society B: Biological Sciences* 273 (2006): 1715–27. [[CrossRef](#)] [[PubMed](#)]
66. Teja Tsharntke, Alexandra M. Klein, Andreas Kruess, Ingolf Steffan-Dewenter, and Carsten Thies. "Landscape Perspectives on Agricultural Intensification and Biodiversity-Ecosystem Service Management." *Ecology Letters* 8 (2005): 857–74. [[CrossRef](#)]
67. Taylor H. Ricketts, Gretchen C. Daily, Paul R. Ehrlich, and Charles D. Michener. "Economic Value of Tropical Forest to Coffee Production." *Proceedings of the National Academy of Sciences of the United States of America* 101 (2004): 12579–82. [[CrossRef](#)] [[PubMed](#)]
68. John O. Niles, Sandra Brown, Jules Pretty, Andrew S. Ball, and John Fay. "Potential Carbon Mitigation and Income in Developing Countries from Changes in Use and Management of Agricultural and Forest Lands." *Philosophical Transactions of the Royal Society of London. Series A: Mathematical, Physical and Engineering Sciences* 360 (2002): 1621–39. [[CrossRef](#)] [[PubMed](#)]
69. Samson Foli, James Reed, Jessica Clendenning, Gillian Petrokofsky, Christine Padoch, and Terry Sunderland. "To what extent does the presence of forests and trees contribute to food production in humid and dry forest landscapes?: A systematic review protocol." *Environmental Evidence* 3 (2014): 15. [[CrossRef](#)]
70. Paulo De Marco Jr., and Flávia Monteiro Coelho. "Services Performed by the Ecosystem: Forest Remnants Influence Agricultural Cultures' Pollination and Production." *Biodiversity & Conservation* 13 (2004): 1245–55. [[CrossRef](#)]
71. Wei Zhang, Taylor H. Ricketts, Claire Kremen, Karen Carney, and Scott M. Swinton. "Ecosystem Services and Dis-Services to Agriculture." *Ecological Economics, Special Section—Ecosystem Services and Agriculture* 64 (2007): 253–60. [[CrossRef](#)]
72. Sirisha Naidu. "Access to benefits from forest commons in the Western Himalayas." *Ecological Economics* 71 (2011): 202–10. [[CrossRef](#)]
73. Viviany Teixeira do Nascimento, Maria Angélica da Silva Vasconcelos, Maria Inês Sucupira Maciel, and Ulysses Paulino Albuquerque. "Famine Foods of Brazil's Seasonal Dry Forests: Ethnobotanical and Nutritional Aspects." *Economic Botany* 66 (2012): 22–34. [[CrossRef](#)]
74. Alejandro López-Feldman. "Shocks, Income and Wealth: Do They Affect the Extraction of Natural Resources by Rural Households?" *World Development* 64 (2014): 91–100. [[CrossRef](#)]
75. Subhrendu K. Pattanayak, and Erin O. Sills. "Do Tropical Forests Provide Natural Insurance? The Microeconomics of Non-Timber Forest Product Collection in the Brazilian Amazon." *Land Economics* 77 (2001): 595–612. [[CrossRef](#)]



76. Evelyne Kiptot, and Steven Franzel. "Gender and Agroforestry in Africa: Who Benefits? The African Perspective." In *Agroforestry—The Future of Global Land Use*. Edited by P. K. Ramachandran Nair and Dennis Garrity. Dordrecht: Springer Netherlands, 2012, pp. 463–96. Available online: [http://link.springer.com/chapter/10.1007/978-94-007-4676-3\\_23](http://link.springer.com/chapter/10.1007/978-94-007-4676-3_23) (accessed on 21 July 2014).
77. Melinda Wan, Carol J. P. Colfer, and Bronwen Powell. "Forests, Women and Health: Opportunities and Challenges for Conservation." *International Forestry Review* 13 (2011): 369–87. [[CrossRef](#)]
78. L. Coad, Katharine Abernethy, Andrew Balmford, Andrea Manica, Lesley Airey, and Eleanor J. Milner-Gulland. "Distribution and Use of Income from Bushmeat in a Rural Village, Central Gabon." *Conservation Biology* 24 (2010): 1510–18. [[CrossRef](#)] [[PubMed](#)]
79. Elisabeth Fischer, and Matin Qaim. "Gender, Agricultural Commercialization and Collective Action in Kenya." *Food Security* 4 (2012): 441–53. [[CrossRef](#)]
80. Lawrence James Haddad, Christine Peña, Chizuru Nishida, Agnes R. Quisumbing, and Alison T. Slack. *Food Security and Nutrition Implications of Intrahousehold Bias*. Washington: International Food Policy Research Institute (IFPRI), 1996.
81. Ruth Meinzen-Dick, Nancy Johnson, Agnes Quisumbing, Jemimah Njuki, Julia Behrman, Deborah Rubin, Amber Peterman, and E. Waithanji. *Gender, Assets and Agricultural Development Programs: A Conceptual Framework*. Washington: International Food Policy Research Institute, 2011. Available online: <https://www.results.waterandfood.org/handle/10568/12520> (accessed on 21 July 2014).
82. Priya Bhagowalia, Purnima Menon, Agnes R. Quisumbing, and Vidhya Soundararajan. "What Dimensions of Women's Empowerment Matter Most for Child Nutrition? Evidence Using Nationally Representative Data from Bangladesh." International Food Policy Research Institute Discussion Paper 01192, International Food Policy Research Institute, Washington, DC, USA, 2012.
83. Manuel Ruiz Pérez, Ousseynou NDoye, Antoine Eyebe, and Danielle Lema Ngono. "A Gender Analysis of Forest Product Markets in Cameroon." *Africa Today* 49 (2002): 97–126. [[CrossRef](#)]
84. Pamela Jagger, Martin K. Luckert, Amy Duchelle, Jens Friis Lund, and William D. Sunderlin. "Tenure and Forest Income: Observations from a Global Study on Forests and Poverty." *World Development* 65 (2014): 43–55. [[CrossRef](#)]
85. Amita Baviskar. "Written on the Body, Written on the Land: Violence and Environmental Struggles in Central India." In *Violent Environments*. Edited by Nancy Peluso and Michael Watts. Ithaca: Cornell University Press, 2001, pp. 354–79.
86. Nandini Sundar. "Beyond the Bounds? Violence at the Boundaries of New Legal Geographies." In *Violent Environments*. Edited by Nancy Peluso and Michael Watts. Ithaca: Cornell University Press, 2001, pp. 328–53.
87. Patricia L. Howard, and Gorette Nabanoga. "Are There Customary Rights to Plants? An Inquiry among the Baganda (Uganda), with Special Attention to Gender." *World Development, Property Rights, Collective Action and Local Conservation of Genetic Resources* 35 (2007): 1542–63. [[CrossRef](#)]
88. Louise Fortmann, Camille Antinori, and Nontokozi Nabane. "Fruits of Their Labors: Gender, Property Rights and Tree Planting in Two Zimbabwe Villages1." *Rural Sociology* 62 (1997): 295–314. [[CrossRef](#)]
89. Liz Alden-Wily. "'The Law Is to Blame': The Vulnerable Status of Common Property Rights in Sub-Saharan Africa." *Development and Change* 42 (2011): 733–57. [[CrossRef](#)]
90. Ruth Meinzen-Dick, and Esther Mwangi. "Cutting the Web of Interests: Pitfalls of Formalizing Property Rights." *Land Use Policy, Formalisation of Land Rights in the South* 26 (2009): 36–43. [[CrossRef](#)]
91. Susana Lastarria-Cornhiel. "Impact of Privatization on Gender and Property Rights in Africa." *World Development* 25 (1997): 1317–33. [[CrossRef](#)]
92. Agnes R. Quisumbing, Ellen Payongayong, J. B. Aidoo, and Keijiro Otsuka. "Women's Land Rights in the Transition to Individualized Ownership: Implications for Tree-Resource Management in Western Ghana." *Economic Development and Cultural Change* 50 (2001): 157–82. [[CrossRef](#)]
93. Yen Hoang Mai, Esther Mwangi, and Melinda Wan. "Gender Analysis in Forestry Research: Looking Back and Thinking Ahead." *International Forestry Review* 13 (2011): 245–58. [[CrossRef](#)]
94. Kristyn A. Richardson, John Sinclair, Maureen G. Reed, and John R. Parkins. "Constraints to Participation in Canadian Forestry Advisory Committees: A Gendered Perspective." *Canadian Journal of Forest Research* 41 (2011): 524–32. [[CrossRef](#)]
95. Jeji Varghese, and Maureen G. Reed. "Theorizing the Implications of Gender Order for Sustainable Forest Management." *International Journal of Forestry Research*, 2012. [[CrossRef](#)]

96. Bina Agarwal. "Does Women's Proportional Strength Affect Their Participation? Governing Local Forests in South Asia." *World Development* 38 (2010): 98–112. [CrossRef]
97. Akompab Ebainjuaiyuk Benjamin. "Women in Community Forestry Organizations: An Empirical Study in Thailand." *Scandinavian Journal of Forest Research* 25 (2010): 62–68. [CrossRef]
98. Gun Lidestav, and Maureen Reed. "Preface: Gender and Forestry." *Scandinavian Journal of Forest Research* 25 (2010): 1–5. [CrossRef]
99. Bina Agarwal. "Rule Making in Community Forestry Institutions: The Difference Women Make." *Ecological Economics* 68 (2009): 2296–308. [CrossRef]
100. Bina Agarwal. "Gender and Forest Conservation: The Impact of Women's Participation in Community Forest Governance." *Ecological Economics* 68 (2009): 2785–99. [CrossRef]
101. Arun Agrawal, and Ashwini Chhatre. "Explaining Success on the Commons: Community Forest Governance in the Indian Himalaya." *World Development* 34 (2006): 149–66. [CrossRef]
102. Cynthia McDougall, Janice Jiggins, Bishnu Hari Pandit, Sushila K. Thapa Magar Rana, and Cees Leeuwis. "Does Adaptive Collaborative Forest Governance Affect Poverty? Participatory Action Research in Nepal's Community Forests." *Society & Natural Resources* 26 (2013): 1235–51. [CrossRef]
103. Paul Lachapelle, Patrick D. Smith, and Stephen F. McCool. "Access to Power or Genuine Empowerment? An Analysis of Three Community Forest Groups in Nepal." ScholarWorks, Montana State University, Bozeman, MT, USA, 2004. Available online: <http://scholarworks.montana.edu/xmlui/handle/1/2939> (accessed on 21 July 2014).
104. Eric A. Coleman, and Esther Mwangi. "Women's Participation in Forest Management: A Cross-Country Analysis." *Global Environmental Change* 23 (2013): 193–205. [CrossRef]
105. Esther Mwangi, Ruth Menzien-Dick, and Yan Sun. "Gender and Sustainable Forest Management in East Africa and Latin America." *Ecology and Society* 16 (2011): 17. [CrossRef]
106. Kalpana Giri, and Ika Darnhofer. "Outmigrating Men: A Window of Opportunity for Women's Participation in Community Forestry?" *Scandinavian Journal of Forest Research* 25 (2010): 55–61. [CrossRef]
107. Rosío Córdova-Plaza, Ana Isabel Fontecilla-Carbonell, and Alma Angélica Fuertes-Jara. "Migration, Natural Resource Management, and Women's Empowerment in the Rural Communities of Central Veracruz." In *Migration, Rural Livelihoods and Natural Resource Management*. Edited by Susannah Hecht, Susan Kandel and Aberlardo Morales. Ottawa: International Development Research Centre (IDRC) of Canada, Ford Foundation, and Fundación PRISMA, 2012, pp. 197–216. Available online: [http://www.prisma.org.sv/uploads/media/migration\\_rural\\_livelihoods\\_RRNN\\_management.pdf](http://www.prisma.org.sv/uploads/media/migration_rural_livelihoods_RRNN_management.pdf) (accessed on 16 March 2017).
108. Bimbika Sijapati Basnett. "Taking Migration Seriously What Are the Implications for Gender and Community Forestry?" *CIFOR InfoBrief* 65 (2013): 1–6. Available online: [http://www.cifor.org/publications/pdf\\_files/infobrief/4183-infobrief.pdf](http://www.cifor.org/publications/pdf_files/infobrief/4183-infobrief.pdf) (accessed on 21 July 2014).
109. Eileen Mairena, Gema Lorio, Xochilt Hernández, Ceferino Wilson, Pilar Müller, and Anne M. Larson. "Gender and Forests in Nicaragua's Indigenous Territories from National Policy to Local Practice." *CIFOR Working Paper: Center for International Forestry Research* 9 (2012): 1–49. Available online: <http://www.cifor.org/es/online-library/browse/view-publication/publication/3891.html> (accessed on 21 July 2014).
110. World Bank. "Module 15: Gender in Forestry." In *Gender in Agriculture Sourcebook*. Edited by The World Bank, FAO and IFAD. Washington: The World Bank, 2013, pp. 643–74. Available online: <http://siteresources.worldbank.org/INTGENAGRLIVSOUBOOK/Resources/CompleteBook.pdf> (accessed on 21 July 2014).
111. FAO, IFAD, and WFP. *The State of Food Insecurity in the World 2014. Strengthening the Enabling Environment for Food Security and Nutrition*. Rome: FAO, 2014. Available online: <http://www.fao.org/3/a-i4030e.pdf> (accessed on 21 July 2014).
112. Ruth S. Meinzen-Dick, Lynn R. Brown, Hilary Sims Feldstein, and Agnes R. Quisumbing. "Gender, Property Rights, and Natural Resources." *World Development* 25 (1997): 1303–15. [CrossRef]
113. Gift Manase, Jerry Ndamba, and Fungai Makoni. "Mainstreaming Gender in Integrated Water Resources Management: The Case of Zimbabwe." *Physics and Chemistry of the Earth, Parts A/B/C* 28 (2003): 967–71. [CrossRef]
114. Rajeev C. Patel. "Food Sovereignty: Power, Gender, and the Right to Food." *PLoS Medicine* 9 (2012). [CrossRef] [PubMed]

115. Klaus Deininger, and Hans Binswanger. "The Evolution of the World Bank's Land Policy: Principles, Experiences, and Future Challenges." *The World Bank Research Observer* 14 (1999): 247–76. Available online: <http://siteresources.worldbank.org/DEC/Resources/wbro99.pdf> (accessed on 21 July 2014). [CrossRef]
116. Tania M. Li. *Social Impacts of Oil Palm in Indonesia: A Gendered Perspective from West Kalimantan*. CIFOR Occasional Paper 124. Bogor: CIFOR, 2015. Available online: [http://www.cifor.org/publications/pdf\\_files/OccPapers/OP-124.pdf](http://www.cifor.org/publications/pdf_files/OccPapers/OP-124.pdf) (accessed on 21 July 2014).
117. Rebecca Elmhirst, Mia Siscawati, and Carol J. Pierce Colfer. "Revisiting Gender and Forestry in Long Segar, East Kalimantan, Indonesia." In *Gender and Forests: Climate Change, Tenure, Value Chains and Emerging Issues*. Edited by Carol J. Pierce Colfer, Bimbika Sijapati Basnett and Marlène Elias. New York: Routledge, 2016, pp. 300–17.
118. Gillian Hart. "From 'Rotten Wives' to 'Good Mothers': Household Models and the Limits of Economism." *IDS Bulletin* 28 (1997): 14–25. [CrossRef]
119. Andrea Cornwall. "Revisiting the 'Gender Agenda'." *IDS Bulletin* 38 (2007): 69–78. [CrossRef]



© 2017 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).