Gender analysis in forestry research: looking back and thinking ahead

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SUMMARY

This review charts out recent developments in gender research in forestry research, with a focus on tropical and dry forests in developing countries. We reviewed 121 publications extracted from the Web of Knowledge database and publications by the Center for International Forestry Research for the past 10 years. Over the past decade (2000–2011) gender-focused forestry research has been dominated by studies that evaluate men's and women's participation in community forestry initiatives and the commercialisation of forest products and market access. Community forestry studies were mainly conducted in South Asia and market access studies in Africa. The geographical spread of studies is uneven, with most studies in India and Nepal. We suggest that the observed patterns relate to recent devolution reforms of forest management, which have a longer tradition in South Asia. The patterns also relate to the focus on poverty reduction efforts that gained widespread prominence in the 1990s. Integrating gender into forestry research is constrained by the broad perception that forestry is a male-dominated profession, a lack of clarity among researchers of the concept of gender, and a lack of technical skills, interest and/or awareness of gender. Key knowledge gaps are identified.

Keywords: gender, forestry, Africa, Asia, Latin America

Analyse du rôle des sexes dans la recherche forestière: évaluation du passé et réflexions pour l'avenir

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Cette étude retrace l'évolution de l'intégration des sexes dans la recherche forestière, en s'attachant plus particulièrement aux forêts tropicales et sèches des pays en développement. Nous avons procédé à l'examen de 121 publications extraites de la base de données du Web of Knowledge et des documents publiés par le Centre de recherche forestière internationale depuis les 10 dernières années. De 2000 à 2011, la recherche forestière traitant du rôle des sexes a été dominée par des études évaluant la participation des hommes et des femmes aux initiatives de foresterie communautaire, à la commercialisation des produits forestiers et à l'accès au marché. Les études sur l'exploitation communautaire des forêts ont été principalement réalisées en Asie du Sud et celles sur l'accès au marché en Afrique. La répartition géographique des études est inégale, la plupart de celles-ci ayant eu lieu en Inde et au Népal. Nous supposons que les phénomènes observés sont liés aux récentes réformes de décentralisation de la gestion forestière, dont la tradition est plus ancienne en Asie du Sud. La situation est aussi en rapport avec les mesures de réduction de la pauvreté qui ont pris une ampleur considérable dans les années 1990. La prise en compte du genre en recherche forestière est freinée par l'opinion répandue que la foresterie est surtout une profession masculine, par le fait que les chercheurs n'ont pas une idée claire de la notion de genre et par l'absence de compétences techniques, d'intérêt et/ou de sensibilisation sur le sujet. Des lacunes dans les connaissances essentielles sont mises en évidence.

Análisis de género en la investigación forestal: mirando al pasado y planeando el futuro

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Esta reseña registra los desarrollos recientes relacionados al estudio de género dentro de la investigación forestal, con énfasis en los bosques tropicales y secos de los países en vías de desarrollo. Hemos utilizado 121 publicaciones extraídas de la base de datos de la Web of Knowledge y publicaciones del Centro para la Investigación Forestal Internacional de los últimos 10 años. En la última década (2000-2011) la investigación forestal enfocada en el género ha sido dominada por estudios que evalúan la participación de hombres y mujeres en las iniciativas comunitarias forestales, y la comercialización de los productos forestales y su acceso al mercado. Los estudios comunitarios forestales fueron llevados a cabo mayormente en Asia del Sur mientras que en el África el enfoque de la investigación fue el acceso al mercado. La distribución geográfica de estos estudios es desequilibrada puesto que la mayoría de los mismos fue desarrollada en la India y Nepal. Nuestra investigación indica que los patrones observados se relacionan a las recientes reformas de devolución de los derechos de manejo forestal que ha sido tradicional por más tiempo en Asia del Sur. Los patrones también se relacionan al enfoque sobre los esfuerzos para reducir la pobreza que ganaron amplia prominencia en los años 90. La integración del género a la investigación forestal está limitada por la percepción generalizada de que la silvicultura es una profesión dominada por los hombres, la falta de claridad por parte de los investigadores sobre el concepto del género, y la carencia de habilidades técnicas, interés y/o conciencia para trabajar temas de género. Se identifican brechas clave en el conocimiento.

INTRODUCTION

Climate change, energy security and food security are overarching processes that have renewed focus on the world's forests. Gender inequalities are increasingly viewed as a weak link in the effective design and implementation of interventions aimed at moderating the negative impacts of these broad processes on forests and people. Development practitioners and policy makers are once again confronted with the reality that inequitable distribution of benefits and excluding a large proportion of forest users and managers from meaningful participation in decision making may not yield intended outcomes under planned Reduce Emissions from Deforestation and Degradation (REDD) initiatives or may further impair efforts at poverty reduction and sustainable resource management (Behrman *et al*. 2011, Brown forthcoming).

Research has a role in generating knowledge that is central to how interventions can be designed to respond to men and women's needs, capabilities and priorities. In particular, lessons on what has worked and what has not can be harvested to inform new and ongoing efforts. Understanding the scope and reach of prior gender-related forestry research can also help focus new research, building on existing knowledge while mapping out gaps for further research. However, despite the fact that there have been many women and gender studies in relation to forestry sector, broad reviews and syntheses are lacking. This paper synthesises research and policy lessons from diverse forestry settings and analyses approaches to the integration of gender analysis in forestry research. It highlights some of the fundamental constraints to gender incorporation and outlines the thematic areas in which gender has been most addressed. It proposes areas for further research.

This paper reviewed literature on women, gender and forests that was published from 2000 to mid 2011. Publications reviewed were mostly extracted from the Web of Knowledge database, using 'gender and forest*' and 'women and forest*' as search terms. A total of 121 peer reviewed works, both journal articles and books, were located in this manner. All reviewed literatures are in English and were selected to focus on tropical and dry forests of developing countries. The term 'forestry research' is used in this paper to reference research about forestry issues, which may occur within the profession of forestry, or in any other field, such as public policy, gender/women's' studies, anthropology, rural sociology. The time frame of the past 10 years is intended to reflect emerging priorities and to capture ongoing concerns in forestry research. Gender inclusion in forestry research means taking into account the differences between men's and women's contributions to forestry. This involves analysing their interactions, their particular roles, their knowledge in various forestry domains, and the factors that underpin any evident difference (Camou-Guerrero *et al.* 2007, FAO 2007, PRB 2001, USAID 2001).

The first part of this paper discusses the benefits of incorporating gender analysis into forestry research. The second part focuses on the factors that influence the incorporation of gender in forestry research. The third part charts out specific studies that have been conducted in forestry research in the last 10 years. It identifies the arenas in the forestry sector that gender has been analysed and provides a brief summary of some of the key findings of previous research. The fourth section summarises and discusses the reviews' findings, points out some research gaps and suggests future research. The final section concludes the paper.

BENEFITS OF INCOPORATING GENDER IN FORESTRY RESEARCH AND MANAGEMENT

The benefits of incorporating gender analysis in research have been amply demonstrated. Research projects that adopt gender analysis techniques help in enhancing the prospects for sustainable forest management, ensuring an equitable distribution of benefits and in enhancing the efficiency of policy implementation.

On efficiency, Agarwal's (2009, 2010a) studies in Nepal and India demonstrated that women's inclusion in forest management executive committees, and their effective participation in decision making (for examples rule crafting and enforcement) were positively correlated with improved forest governance and resource sustainability. She argued that women's presence in executive committees of community forest management groups (CFGs) helped to improve forest quality because of effective protection. Women's presence helped CFGs frame more acceptable rules of extraction and protection, and decreased violations by the community. It improved protection of the forest as sometimes women, through their work as forest products collectors, were able to notice illegal cuttings missed by male guards. Acharya and Gentle (2006) noted positive changes in community forest user groups in Nepal when women participated and held key decision-making positions in the groups. Better financial management, increased application of gender sensitive policies and programs, increased budget allocations for pro-poor programs, increased adoption of practices that reduce pressure on forests (for example fodder cultivation on farm, campaigns against forest grazing), and support for the education sector were some of the improvements associated with women's participation.

On equity, the benefits of engaging both men and women in forest management include the empowerment of marginalised groups by providing them an opportunity for voicing and acting on their preferences and needs (Argarwal 2009, 2010a). Through the use of adaptive collaborative management techniques, researchers facilitated processes that resulted in increasing the decision-making and bargaining power of marginalised groups, especially women (Colfer 2005a, 2005b). Elite capture of benefits during decentralisation reforms were offset through facilitated multi-stakeholder consultations. Such consultations were instrumental in securing women's and men's access to local forest resources and to improving women's access to district-level budgeting processes (de Vries and Sutarti 2006, Komarudin *et al*. 2008, Siagian and Neldysavrino 2007, Syamsuddin *et al*. 2007).

With regard to improved policy implementation, not taking gender into account in policy research undermines potential opportunities for successful policy implementation as it may distort the understanding of human impacts on resources management, hinder forestry planning and skew resource allocation (FAO 2007, PRB 2001). In Thailand, for example, a community forestry project that invested in seedling distribution to communities failed because women, who cared for the seedlings, were not informed. However, when both men's and women's preferences and roles were included, the failure was reversed (Wilde and Vainio-Matilla 1995 in PRB 2001). Researchers acknowledge that excluding gendered knowledge in climate adaptation strategies can result in uncertain predictions of climate change that negatively affect the efficiency and effectiveness of the response to climate change (Djoudi and Brockhaus 2011, Nelson *et al*. 2002, Shea *et al.* 2005).

Besides the benefits to forest management demonstrated above, studying and incorporating the knowledge of both men and women facilitates the generation of more accurate and clearer research results (Hovorka 1998).

FACTORS INFLUENCING THE INCLUSION OF GENDER IN FORESTRY RESEARCH

While there are benefits to including gender in forestry research, gender inclusion is not automatic because researchers face constraints that may undermine the likelihood of applying gender analysis to research and management (Agarwal 2000, FAO 2007, Gurung 2002). This section discusses the main challenges to incorporating gender in forestry research that have been identified in the literature. The discussion is punctuated with experiences of the Center for International Forestry Research (CIFOR), which has a global forestry research mandate[1].

Magnus (2003) and Watson (2005) found that gender was often addressed inconsistently in natural resource management projects; some projects employed detailed gender analysis while others' attention to gender was only superficial and stopped at just counting the number of women involved. Magnus (Op. Cit.) suggested that factors that influenced gender incorporation included: 1) a lack of understanding of the concept gender; 2) skewed interest and skills among researchers, with more social scientists and female researchers having greater interest; and 3) the presence of a "community of practice" across research teams enhances the likelihood of gender incorporation. CIFOR's research projects from the late 90's through 2008/9 showed that the incorporation of gender depended on the research purpose, on the specific topic, the level of individual interest in gender analysis by researchers, and requirements from donors that supported CIFOR's research (Mai and Mwangi, forthcoming). Research conducted in community forestry management, the use and conservation of non timber forest products (NTFPs), human health and forests, biodiversity management, land tenure and forest poverty relationships appeared to incorporate gender perspectives in research design and data collection. Most of these research projects had an explicit equity motivation that necessitated a disaggregated approach to data collection and the inclusion of socially marginalised actors such as women and the poor in decision making and benefits capture.

One of the main obstacles to gender incorporation appears to be a lack of clarity over the meaning of gender. Researchers commonly relate gender studies to women's studies (Magnus 2003). The perception that gender means women has several consequences. It increases resistance from male researchers who prefer not to work on "women's issues" or even from female colleagues who do not want to be identified and labelled as "feminist police" (Pandolfelli 2009). Another consequence is that it often side-tracks a deeper understanding and may lead to guidance for policy and practice that fails to address the fundamental changes needed to improve gender equity (Cornwall 2001). In the worst case they may unleash negative reactions from men that place women at risk. CIFOR's research over the past 10 years was not exempt from this narrow interpretation, where gender had been equated either with a focus only on women or with the collection of sex-disaggregated data; and little effort had been made to unpack the drivers of gendered relationships (Mai and Mwangi forthcoming). Razavi and Miller (1995) suggested that the confusion over the meaning of gender had been deliberate. Donor agencies involved in mainstreaming gender were partly accountable for this reinterpretation as it suited their institutional objectives which were specific and time-bound.

Gender is also incorporated where researchers are aware of its impacts on the outcome of interest and thus omitting it would bias results. For instance, a large literature points to the importance of women's knowledge, skills and management of NTFPs and to the benefits they derive from such management. In order to provide a systematic understanding of the economic importance of NTFPs, and their potential in conservation and development in Africa, Asia and Latin America, CIFOR's NTFPs project recognised gender differentiation as a critical variable in influencing access, use and distribution of benefits from NTFPs in these countries. Thus research targeted both men and women during data collection, analysis and reporting (Alexiades and Shanley 2004, Kusters and Belcher 2004, Ruiz-Perez *et al.* 2002, Sunderland and Ndoye 2004). Similar considerations were at play in climate change adaptation where research groups captured men's and women's different perceptions of and actions to reduce vulnerability in order to better understand their adaptive strategies (Djoudi and Brockhaus 2011).

Gender inclusion in research requires knowledge and understanding of social sciences methods and concepts, which is often lacking among biophysical researchers within forestry and more generally (CGIAR Science Council 2009, Fajber and Vernooy 2006). Gender analysis requires, among

[1] see www.cifor.org/about-us/our-vision-and-aspirations/cifors-strategy-2008-2018.html

other factors, the study of gender differentiated roles in households and communities (Moser 1989), gendered interests in and dependence on forest resources (Agarwal 2010b, FAO 2007) and, men's and women's relative priorities, access, control and power to make decision over resources (Reeves and Baden 2000). Gender analysis also requires spotlighting mediating factors such as class, race, ethnicity, religion, and age (as women and men are not homogenous) and the overall social context and its influence over bargaining positions (Reeves and Baden Op. Cit.). Gender issues are thus a social and contextual matter; the dynamics, specific relationships and their drivers may vary depending on local social norms, market penetration and external interventions. Gender is thus a complex concept to operationalise. Gender-responsive research requires that researchers are attuned to these complexities and that they have a basic set of skills, tools and understandings. Yet even social scientist themselves often demand specialised training[2] while biophysical scientists, who are increasingly engaged with communities, tend to lack formal training in gender analysis. This lack of understanding may also depress interest, further alienating researchers from gender analysis. Review of CIFOR's gender research, for example, suggested that a basic interest in gender inclusion by researchers was one of the factors that influenced the likelihood of incorporation of gender dimensions in forestry research. More than half of the projects of the past decade (20 out of 35 projects) that had a gender component in CIFOR were led by gender champions, mostly female, who also had the required skills.

Forests and forestry have traditionally been viewed as a male domain in many cultures, which makes it more difficult to include women in forest management and decision making (Gurung 2002, Lyren 2006, Watson 2005). For example timber extraction and management, where the most money is made in forestry, continue to be male dominated and continue to receive the major emphasis in forestry. Even though in the last decades women have broken through in fields thought to be most resistant to them, their representation in scientific and technological institutions is still low hence masculine knowledge persists in the natural, technical and biophysical sciences (Harding 1998). FAO's study in 10 countries in Africa showed a striking inequality in forestry organisations (FAO 2007). The percentage of women in professional and managerial positions was static in most countries, with no women representation at those levels. Watson (2005:iii) in three case studies in India and Ghana also found perceptions among actors involved in these projects that "natural partners for natural research for development projects are men" and "that men are the main natural resource users and managers and that to work with them will improve the well-being of the whole society, including the women". Gurung (2002) however showed that increasing the number of female personnel in Nepal's Forestry Department helped to change gender biased attitudes of forestry professionals by increasing their awareness and responsiveness to the realities faced by rural women.

In sum, challenges faced in incorporating gender in forestry research are rooted in various dilemmas: confusion about what gender means, lack of technical capabilities of researchers and practitioners, and a male-dominated sector which perpetuates masculine knowledge. However, opportunities are also present. Gender champions provide a nucleus around which such research can develop and grow, while the specific research question and purpose and donor requirements can motivate researchers to pay closer attention to gender issues when they would otherwise not. Increasingly, researchers are required to undertake gender research and research organisations are investing in supplying the necessary skills and incentives to ensure that these new demands are met (Kauck *et al.* 2010).

Given these challenges, the incorporation of gender analysis in forestry research requires resources (time, money and energy), not only to provide relevant scientists and practitioners with the required skills to conduct gender analysis but also to change the age-old perceptions among researchers, policy makers and practitioners that forestry is a male domain (Fajber and Vernooy 2006, FAO 2007).

OVERVIEW OF GENDER INCORPORATION IN TROPICAL AND DRY FORESTRY RESEARCH IN AFRICA, ASIA AND LATIN AMERICA

This section turns to the findings of the review of published literature from 2000 to mid 2011. The purpose is to characterise the content of gender-relevant research in forestry in order to distil some of the lessons learnt and to identify knowledge gaps that warrant further investments in forestry research. We also identify methodologies used and the geographical coverage of the research.

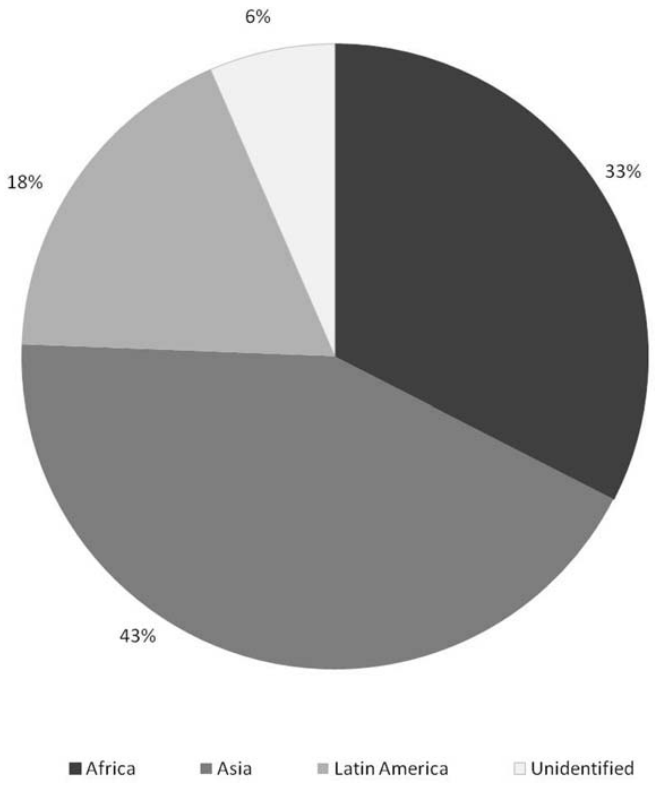
The majority of gender research in forestry was conducted in Asia (53 publications) and Africa (40 publications), and less in Latin America (22 publications). The lower count for Latin America may have been influenced by the exclusion of articles written in languages other than English. About eight more articles are at a global or regional scale, which did not identify the location of the study (Figure 1).

Thematic coverage of gender research

Results present the literature on research conducted on gender and forests of the past decade under 10 categories of topics (Figure 2). Commonly studied topics relate to participatory forestry, livelihoods issues especially market access, and gendered perceptions of forest management. 'Participatory forest management' is considered separately from 'men's and women's roles and perceptions in forestry management' as the former focuses exclusively on participation, while the latter covers diverse issues including staffing in forestry

[2] See more in CIFOR's annual meeting document for gender training needs of CIFOR scientists: www. cifor.org/gender

FIGURE 1 *Geographical coverage of women, gender and forests publications from 2000 – mid 2011*



agencies. Thus forest governance and benefits capture are the main interests over the past decade. This is not surprising as during the 1990s an increasing number of countries across Africa, Asia and Latin America enacted reforms aimed at devolving or decentralising forest management, thus shifting authority to lower levels of governance, including communities (Colfer and Capistrano 2005, Ribot and Larson 2005). Gender focused research was thus intended to establish the extent to which men and women's relative participation in forest management responded to devolving governance and whether or how such programs impacted men and women's livelihoods.

The 1990s were also the decade when increasing global attention was paid to poverty reduction, with countries formulating poverty reduction strategies of which access to markets for improved incomes of rural small holders was a primary concern (World Bank 2000). This global trend is captured in forestry research, with a push towards understanding the factors that influence or determine forest product commercialisation and marketisation, and the relative participation of men and women in markets. Tenure and property rights were also a topic of considerable research. Property rights and tenure were a central component of forest devolution and publications listed under community forestry/joint forest management also capture the theme. Human health and forest certification are the least studied topics. The concept of forest certification emerged in the early 1990s and has been slow to pick up: by end of 2007 certified lands accounted for 7.6% of the world's forest cover mainly in Europe and North America (Auld *et al.* 2008). A significant proportion of literature relevant to human health and forests is scattered across multiple disciplines, including health sciences, while the NTFPs literature has a lot of relevance for nutrition, few studies focus on this (Colfer pers. comm.).

Some of the key findings from the topics that dominated the publications of 2000 - mid 2011 are presented below (see Figure 2).

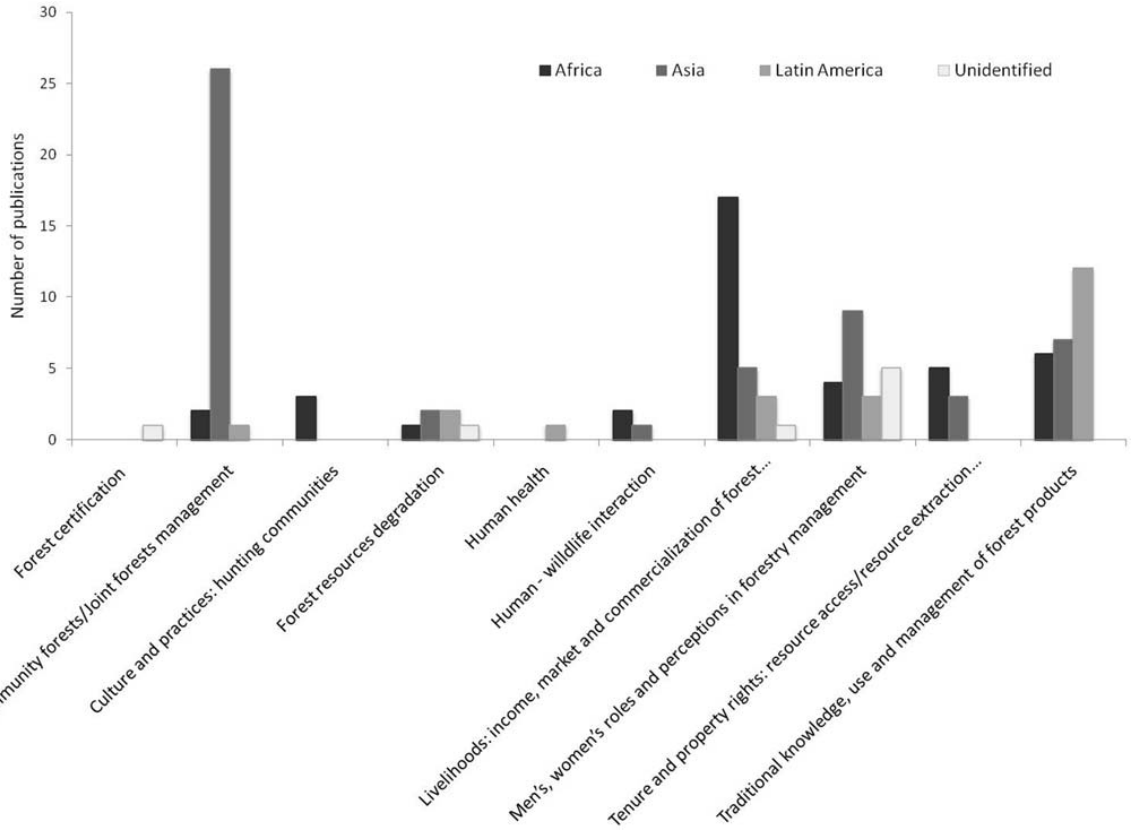
Community forests/Joint forests management

Of the 28 publications on participatory forest management, 26 publications were in Asia, mostly in India and Nepal (22 publications). There were two publications East Africa and one publication in Latin America. The literature on gender and participatory forest management appeared to focus on three areas: factors affecting women's participation, strengthening women's bargaining power in order to improve the quality of their participation, and the sustainability implications of participation.

Studies in Ethiopia, Nepal and Thailand suggested that the shifting of management and use rights to resource users offers opportunities for improved forest management and sustainability as well as enhancing living conditions of participants (Benjamin 2010, Gobeze *et al.* 2009, Pandit and Bevilacqua 2011, Sunam and McCarthy 2010). Local social differentiation along caste, gender and wealth status influences community forestry implementation processes and practitioners should make conscious efforts to involve people from different social backgrounds. In Haiti, Kenya and Nepal, the success of decentralised programs such as community forestry crucially depended on participation of local users, especially women Boyer-Rechlin 2010, (Dolisca *et al.* 2006, Giri and Darnhofer 2010a); and even though other factors such as culture, resource ownership, education were important. A significant number of authors have called attention to women's exclusion from forest decision making bodies (Agarwal 2001, Benjamin 2010, Buffum *et al.* 2010, Giri and Darnhofer 2010a, Gupte 2003, 2004, Saigal 2000, Sunam and McCarthy 2010). Women have little say in the framing of forest use rules, monitoring, and benefit distribution because they are excluded or marginalised in decision-making bodies such as executive committees of community forestry groups (Agarwal 2010a). Overall, factors that discouraged women's participation included:

- Lack of recognition in interpersonal and public spheres, which exacerbates their sense of powerlessness (Sunam and McCarthy 2010);
- Education, household affluence and conservation attitudes (Baral and Heinen 2007, Gupte 2003);
- Ineffective communication networks (such as top-down approaches that lack feedback mechanisms discourage women's participation (Otsyina 2002);
- Unwilling participation in executive committees for example to fulfill donor or NGOs requirements or selection by male executive committee members without their consultation and consent (Agarwal 2001);

FIGURE 2 *Thematic areas of publications from 2000 – mid 2011*



- Inequitable distribution of costs and benefits between men and women (Agarwal 2001, 2009, 2010a, Otsyina 2002);
- Social norms that discriminate against women, women's own class, caste, wealth, literacy and a disdain by men of women's contributions (Agarwal 2010b).

Factors that encouraged women's participation included:

- Concrete benefits, free interaction between men and women and social norms that do not discriminate against women's involvement in decision making (Nuggehalli and Prokopy 2009);
- Viewing participation as an ongoing and open-ended process of social change rather than as a predefined outcome, which helps increase understanding of instances of women's renegotiation of their social roles and status (Giri and Darnhofer 2010a);
- Out-migration of men to cities or other areas (Djoudi and Brockhaus 2011, Giri and Darnhofer 2010b).

How can women's bargaining power be improved so that where they participate, they are able to influence decisions? Agarwal (2001, 2010a, 2010b) suggested that increasing women's numbers in meetings and in committees could result in a critical mass that would encourage women to speak up. Critical mass is crucial for providing solidarity and increases the likelihood that women can gather enough courage and confidence to challenge power relations. Separate women's groups are not encouraged as they tend to sharpen gender segregation (Agarwal 2001) and increase in the number of women in decision-making committees should be accompanied with capacity building.

The general assumption that rural women are keen on resource management does not always bear out empirically. Jewitt (2000a) and Resurreccion (2006) find that not all women who live in forestry settings would like to participate in forest or land-related issues. Religion and wealth were key factors motivating women's self-exclusion from forest-related pursuits (Jewitt 2000a).

Forest resources degradation

A total of six publications are in this category and include studies that focus on reducing pressure on forests under conditions of fuelwood scarcity as well as those that attempt to understand gendered relationships in deforestation processes.

Improved cooking stoves' relative advantage, housewife's exposure to messages about improved cooking stoves, educational level of the housewife and the average educational level of female household members had significant positive effect on the household's adoption of improved cooking stoves (Muneer and Mohamed 2003)[3].

[3] Use of improved cooking stoves has health benefits as well (Wan, Colfer and Powell forthcoming)

The destruction of natural forests altered men's and women's traditional uses of forests and push them to increasingly pursue cash crop production hence losing their identities and their control over economic security (Dey 2008). Land and forest degradation exacerbated historical inequalities between men and women, aggravated existing challenges and created new ones for women such as declining amount and quality of drinking water (Allen 2001).

A study also spotlighted the role of women's NGOs in fighting deforestation (Shandra *et al.* 2008). Data analysed from 61 countries for the period of 1990–2005 found that a high density of women's and environmental NGOs were associated with lower rates of deforestation. Women's non-governmental organisations were increasingly involved in deforestation issues to promote protection, as deforestation raised demands on household labor, resulted in a loss of income, and had negative health implications.

Livelihoods: incomes, markets and commercialisation of forest products

A total of 26 publications were identified with an overwhelming majority of them (17 publications) in Africa, 5 publications in Asia, 3 publications in Latin America and 1 unidentified.

The first grouping of studies under this sub topic highlighted the importance of understanding the value of forests products to rural livelihoods, and the different values that men and women attach to different forest products, in order to better inform and target food security initiatives and to design policies, interventions, and business ventures that serve to safeguard forest assets for the poor. Diverse subjects addressed included: bushmeat in Cameroon (Coad *et al.* 2010), NTFPs in Sub-Saharan Africa (Timko *et al.* 2010), woodlot plantation versus agroforestry in Bangladesh (Muhammed *et al.* 2008), garden production systems in Ghana (Yiridoe and Anchirinah 2005), wild palm (*Phoenix reclinata*) used in manufacturing in South Africa (Gyan and Shackleton 2005), harvested forest plants in Madre de Dios, Peru (Lawrence *et al.* 2005) and shrub fallows in the humid lowlands of Cameroon (Degrande 2001).

The second grouping of studies under this topic focused not only on identifying and explaining gendered use of forest products, but also on establishing and explaining impacts of market and commercialisation of forest products. The roles of men and women in generating incomes and drawing benefits from NTFPs (Fu *et al.* 2009), on extractive reserves (Hecth 2005, 2007), commercial NTFPs collection (Quang and Anh 2006), exploitation, processing and marketing of bivalves (Ajonina *et al.* 2005), on low-land forest-fishery-farming systems (Shams and Ahmed 2000) and on forest product markets (Perez *et al.* 2002) were some of the issues investigated.

These studies showed that:

- NTFPs played different roles in mitigating wealth inequality (Fu *et al.* 2009);
- Income from these actives were important to rural communities; however, men, the elderly and the well-off were more involved in the formal market, acting as project partners while women and children were in the informal sector as collectors (Madi *et al.* 2010);
- Women were more dependent on income from NTFPs since they were limited in access to other alternative income activities (Ajonina *et al.* 2005, Avocevou-Ayisso *et al.* 2009, Fu *et al.* 2009, Kanmegne *et al.* 2007);
- Trees within the homestead area provided many functions to rural households, but female-headed households had significantly fewer trees than their male-headed counterparts (Shackleton *et al.* 2008);
- Men were more in control of the market value chain since women lacked technology, rights and access to resources even though their contribution in the value chain was significant (Ajonina *et al.* 2005, Quang and Anh 2006). Awono *et al.* (2010) and Perez *et al.* (2002) suggested that given the right conditions of technology and knowledge women entrepreneurs could be as successful as men;
- Commercialisation of forest products led to overharvesting, which in turn led to more stringent laws and regulations to control harvesting, which subsequently limited women's access to forests (Avocevou-Ayisso *et al.* 2009, Brown and Lassoie 2010, Madi *et al.* 2010).

Men's, women's roles and perceptions in forestry management

In this sub topic, we found 20 publications: 4 publications in Africa, 9 publications in Asia, 3 publications in Latin America and 5 globally or unidentified. These publications are a mix of theoretical (such as Banerjee and Bell 2007, Jewitt 2000b, Leach 2007, Nightingale 2011) and empirical studies on the distinct roles and perceptions of men and women forest user groups in the management of their resources.

The importance of involving women in diverse programs and projects was empirically highlighted, such as: afforestation programme in combating desertification (Medugu *et al.* 2010), conservation of culturally important endangered tree species (de Albuquerque and de Albuquerque 2005, Singh *et al.* 2010), and in protecting forests ecosystems and environment (Alongi and de Carvalho 2008, Boffa *et al.* 2008, Bolland *et al.* 2006, Upadhyay 2005).

Other empirical studies focused on institutional issues. Mwangi *et al.* (2011) showed that mixed groups of men and women performed better than solely women or men groups in East Africa and Latin America. Arora-Jonsson (2010) suggested that although inclusive and heterogeneous structures were essential for the sustainable and equitable management of natural resources such as forests, mainstream institutions needed to relate to other structures and forms that were exclusive and represent particular interests. Farreras *et al.* (2005) presented evidence from three different valuation studies on the influence of gender in the formation of forestry-related values in ecosystem goods and services. The study revealed significant differences in peoples' preferences, especially between older women and older men, and older and younger women.

There were also publications that proposed strategies or approaches to enhance gender mainstreaming in forestry agencies. For instance, Gurung (2002) showed that increasing the number of female personnel in Nepal's Forestry Department helped in changing the gender biased attitudes of forestry professionals. It increased their awareness and responsiveness to the realities faced by rural women.

Tenure and property rights: resource access/resource extraction conflict

We found eight publications under this theme with five in Africa and three in Asia.

Veuthey and Gerber (2010)'s study on logging conflicts demonstrated that men's control over production tools influenced the division of labor as well as womens' access to forests. Women's organisations that focused on delivering new production tools to women held promise for improving women's technology and resources access. Unlike a broad literature on the commons and common property, recent studies in Nigeria found that women's access to firewood and forest fruits was restricted on communal and family lands, although they had unrestricted access to fodder, snails and mushrooms (Adedayo *et al.* 2010). This study found a positive association between total income and forest incomes; and women's forest incomes contributed significantly to household food, children's education, and health care.

As with the vast literature on women's access to land in Africa, Howard and Nabanoga (2007) found that in Uganda men own trees growing on private land, and women need their permission to plant trees and can only harvest from trees for subsistence uses only with men's permission. The gendered nature of informal rights to selected tree and plant species are embedded in customary norms, but also strongly associated with local cosmologies.

In the Philippines, while men identified themselves as indigenous in order to strengthen their claims to land, women, who were generally better integrated to markets, were less interested in tenure struggles as this underscored their indignity and their special roles as resources managers—an identity they wished to discard (Resurreccion 2006). Thus men and women could position themselves differently in struggles over claims to forest resources, depending on their material interests.

Coulibaly-Lingani *et al.* (2009) presented an analysis of household constraints on accessing forest products in southern Burkina Faso. Formal forest laws that forbid forest grazing and customary rules and regulations pertaining to land tenure were reported to constrain women's (and migrants) forest access.

Traditional knowledge, use and management of forest products

Unlike other topics, Latin America had the most publications under this theme (12 publications). Asia and Africa lag behind with seven and six publications respectively. There was little diversity of discussion under this topic, which mainly featured the differentiated traditional knowledge of different groups of men and women (across age, ethnic, caste, class and religion) on the forests that they lived in. The studies were intended to encourage medicinal discovery and to raise awareness of the positive role of traditional knowledge on forest biodiversity conservation.

Methods used in integrating gender

Common qualitative methods used in data collection included on-site observation, questionnaires/interview (semi-structured, structured, or open-ended interview), key informant interview, and focused group discussion. Participatory approaches to data collection were mostly used by researchers and included participatory rural appraisal, rapid rural appraisal, transect walks, participatory mapping, and diagnostic checklists. For quantitative analysis, researchers used surveys for data collection and the application of statistical analysis, from descriptive statistics to more advanced regressions.

This trend in participatory approaches in gender research was also reflected in CIFOR's research whereby participatory techniques are commonly applied: more than half of reviewed projects (i.e. 21) employed participatory techniques. While it was generally unclear why researchers selected their methodologies, however for CIFOR case at least, the disciplinary backgrounds of scientists generally informed their methodologies. Economists tended to favour quantitative techniques that attempt to measure relevant variables at the household level (like surveys), while anthropologists were keen on participatory approaches that involved groups of men and women mostly at the community level (Mai and Mwangi forthcoming).

Recent work conducted by International Center for Tropical Agriculture (CIAT) suggested that gender-responsive participatory research provide an effective strategy for a more inclusive research that is sensitive to the needs of multiple actors (CIAT 2010). The focus on participatory research is, however, beset with cautions. Since participation is not automatic and is conditioned by rules, norms, power and perceptions, participatory processes face the risk of excluding women if researchers are unaware of contextual factors conditioning social relationships where they work (Agarwal 2001, Gupte 2004). Thus researchers need to be conscious of these risks in their attempts to foster inclusion through participatory approaches.

The risk of women's exclusion is even more pronounced in the administration of household surveys. Conducting interviews with heads of households alone to ascertain income benefits of both male and female headed households, a common practice among researchers, assumes that households are egalitarian units of equal income distribution (Coe 2008). Yet the unitary model of the household is increasingly challenged and studies have shown that not only do men and women in the same household have different preferences and opportunities, but that households can be the arena of intense competition over resources (Alderman *et al.* 1995, Falkingham and Baschieri 2009). Despite the difficulties in time and cost, researchers are increasingly using intra-household surveys (Quisumbing 2004). Generally missing from these studies is

the multi-scalar workings of gender, where the household and community are among a broader suite of scales (or levels) where gender is a dynamic. The interconnectedness of gender dynamics across governance levels is crucial as policy decisions at international and national levels often carry implications for local level practices. Recent commentaries draw attention to this issue (Nightingale 2011, Rocheleau 2008).

Gaps in research

The literature reviewed in this section cannot be viewed as fully exhaustive and representative of the gender research conducted over the years[4]. It is indicative however of the main topical or thematic areas that has concerned researchers, policy makers and practitioners in the past decade. Evidently, the focus on gender in community forestry is a reflection of the trend in devolution and/or decentralisation of forest management authority that has been so dominant among many developing countries over the past 10 years. That majority of the studies are in South Asia is testimony to the pioneering position of these countries in the shift towards devolution in the forestry sector. The literature is thus most advanced in community forestry and especially in South Asia, where researchers are now rigorously testing hypotheses regarding the effects of critical mass on women's effectiveness in decision making, after capably demonstrating that women's participation is important in enhancing forest sustainability. A gap remains in establishing the exact manner of governance, including issues of corruption, when more women are involved in decision making (Acharya and Gentle 2006).

Recent research is starting to show that gender balanced forest user groups, with both male and female participants, perform better with respect to sustainability indicators than female or male dominated groups (Mwangi *et al*. 2011). More information is needed on the emergence of mixed groups, and the distribution of responsibility, benefits and information between men and women participants.

As mentioned above, many countries have engaged in different kinds of formal processes that devolve authority and rights to lower levels, including property rights and tenure reform. While the broad lessons from land tenure reforms provide a pessimistic prognosis of the impacts of formalisation processes on women's rights and access, similar research in assessing the impacts of forestry reforms is rare. Research is sorely needed to establish the implications of reforms on women's rights to trees and forest resources and ultimately on the security of their rights and access, including related outcomes such as livelihoods and forest sustainability. Importantly, while collective action (both large scale, such as social movements, and small scale) is a critical pathway towards increasing bargaining power and defending against threats that are internal and external to groups, there is much less understanding of the relative roles and contributions of women and men in organising and maintaining such action, or of the constraints experienced in forestry settings. The need for this kind of research is urgent as many communities in different parts of the developing world currently confront the spectre of losing rights and access to forests due to land acquisitions for biofuels, food security and even conservation and timber concessions.

A major gap for further research relates to establishing the gender-differentiated impacts of emerging global processes and policies. Climate mitigation (e.g. REDD) and adaptation interventions, and global investments in biofuels have direct implications for women, and may restrict or expand the nature and extent of rights to forests, the distribution of rents generated from the various interventions, and overall gender relations within local communities. While the lessons for improving participation cited in earlier sections of this paper are relevant, areas for further research can be distinguished. These include the mechanisms for ensuring that benefits accrue equitably to women and men, and the relative women and men's involvement in the monitoring, recording and verification processes of REDD schemes.

Gurung's (2002) analysis of staffing within forestry agencies paves way for further research possibilities, both within the formal forestry sector and among civil society agents involved in forestry management. While cultural biases, budgetary support, lack of skills in facilitating gender-sensitive policy implementation and practice, have been widely identified as obstacles to the implementation of gender-sensitive policies, there still exist knowledge gaps with regards to the kinds of incentives, including organisation strategies that can improve implementation. This type of research is motivated by a need to ensure that supporting organisations provide the backstopping necessary to enhance gender equity in forestry.

DISCUSSIONS

Gender-related research in forestry in the past decade has been dominated by research that is concerned with understanding and transforming women's participation and influence in forest management within a more devolved forestry regime. It is also dominated by understanding market access issues, including women's roles and benefits from forest product commercialisation. This is a departure from studies in earlier times that were focused on women's visibility and an appreciation of their contributions to forest management. The shift to participation and market access is largely informed by the forestry reforms of the late 80's through the 90's that devolved or decentralised authority over forest management and administration to lower levels of governance, including districts, municipalities and communities. The focus on market access cannot be delinked from the global focus on poverty that gained momentum in the mid to late 1990's.

[4] Authors are currently working on a broader time frame to include both published and unpublished materials, book chapters and articles, and from databases other than the Web of Science. A preliminary review of trends can be obtained from the authors.

The need for the elaboration of gender relations and the factors that condition them is necessary for identifying relevant strategies for both groups of men and women to meet their specific needs and for preventing backlashes against women that may happen if men are excluded. Moreover, the inclusion of other factors that differentiate men and women even among themselves, such as class, age, ethnicity, religion and wealth continue to be relevant.

An overwhelming majority of the research has been conducted in Asia, but much less in Latin America where the largest stands of forests exist today. While this may reflect a language barrier, it is still illustrative of a need for greater focus, not least because approaches to forestry, including decentralisation to communities as well as community forestry enterprises are most advanced in Latin America and lessons and insights for both Africa and Asia abound.

Methodologically, we find an overwhelming dominance of participatory techniques. Although this may indicate a conscious effort at inclusion, some research questions demand the collection of data disaggregated at broader scales. Household surveys, especially intra-household surveys, provide a pathway for maintaining a focus on gender relations where broad-scale comparisons are made. The quest for methodological pluralism cannot be overemphasised if the goal is to understand the drivers of gender-differentiated outcomes in order to inform policy and practice. Such methodologies should attempt to further disaggregate men and women along other factors that may account for within-group variation (such as age, wealth, ethnicity, caste and religion), as against treating them as homogeneous. In addition, building in gender concerns into new and existing global comparative studies that use similar research techniques to answer similar questions in different settings in the developing world can help further our understanding of gender-related concerns. Gender research that links across different governance levels and scales is scant, yet interconnectedness of global markets, policies and politics makes it necessary that such links between the local, national and global are established.

Importantly, women's involvement needs to be considered as an empirical question and not as a foregone conclusion. On the one hand, there are known cases of women having little interest in forest resource management (Jewit 2000a, Resurreccion 2006). On the other hand, casual attempts at inclusion and participation have in some cases inadvertently increased the time burden of women who already contribute their labour in various forms such as housework, taking care of children and husbandry (Akerkar 2001).

Finally, several matters explored in the previous sections require further investigation. The nature and quality of governance arrangements under increasing participation of women in forestry decision making forums, the dynamics and division of labour between men and women in mixed male/female forest user groups, transforming incentives and attitudes of forestry personnel, the replication of 'critical mass' studies in other settings besides India and Nepal, the implications of global processes, interventions and trends on women's relative participation in decision making and benefits capture such as forest tenure reforms, climate change adaptation and mitigation, and large scale forest land acquisition for biofuels and food security. The latter is an increasing cause for concern (Behrman *et al.* 2011).

CONCLUSIONS

This review intended to establish key forestry research topics conducted in the past decade with respect to gender and to identify areas that require further investments in research. Decisions around whether to incorporate gender analysis into existing research were also considered. Lessons learnt from prior research were highlighted as were promising avenues for new research. Methodological pluralism, including cross-level linkages in the analysis of gender dynamics was emphasised. However, even as we drew attention to the importance of women in forest management, the point raised by earlier researchers against pushing the 'environmental envelope' onto women while side stepping the power relations within which they are embedded cannot be belaboured. A framework for systematic investigation of the complexities underpinning women's rights and access to forests as well as their participation in forest decision making and benefits, appears essential in a substantially interconnected global setting.

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