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Forgotten Forests? Food Potential of Ancient Coffee Forests and Agroforestry Systems in the Southwestern Ethiopian Mountains, Seen Through a Gender Lens

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Forests play an important role in the provision of food and livelihoods across the globe. Thus, forest protection contributes to a diverse set of Sustainable Development Goals. The Yayu Coffee Forest Biosphere Reserve in the southwestern Ethiopian mountains (elevation 1100–2300 m above sea level) hosts an ancient coffee forest with high biodiversity and a large nutritional potential. It is managed in zones, and smallholder farmers can still use forest resources in the buffer and transitional zones in a sustainable manner. The forest is rarely used as a food source, although a large majority of the population in this area suffers from micronutrient deficiencies. This article investigates whether sustainable use of forest resources can contribute to the achievement of different Sustainable Development Goals by looking, through a gender lens, at which forest ecosystem services the community uses; traditional coffee farmers' perceptions of wild edible plants, agricultural territories, and labor divisions; and the constraining factors for forest conservation and sustainable agroforestry on private forest plots. Data for this study were collected through ethnography, transect walks, a sex-disaggregated household survey (n = 334), 32 semistructured interviews, 40 focus groups, and 13 key stakeholder interviews. One reason for neglecting the forest as a food source is that forests are considered a male territory, while vegetable raising and nutrition are female responsibilities. In addition, the collection of wild foods is perceived as a last resort during a famine and as a practice of tribal groups. Because coffee production represents the traditional livelihood source, farmers accept the need to conserve the forest, which is necessary to achieve the Sustainable Development Goals. While it may have negative implications for food security, the absence of a tradition of collecting wild plants is positive news for forest conservation.

Keywords: *Yayu Biosphere Reserve; biodiversity; non-timber forest products; forests as a food source; agroforestry; indigenous vegetables; gender; coffee; Sustainable Development Goals; Agenda 2030.*

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Introduction

Across the globe, forests play an important role not only as part of the terrestrial ecosystem but also in terms of their immense potential to contribute to nutrition and livelihoods (Wunder et al 2014). The socioeconomic role of forests goes far beyond the market value of timber or the use value of firewood. Forests also provide communities in the global South with non-timber forest products (NTFPs) such as wild fruits and vegetables, medicinal plants, honey, birds, and cash crops (coffee and spices), which can have a similar monetary value as agricultural crops (Angelsen et al 2014). There is a tendency for men to utilize the forest more for cash and women for consumption; both poor and wealthy people rely heavily on the forest (Sunderland et al 2014). From a conservation perspective, the forest as a livelihood source only has limited potential for poverty alleviation and economic development, but makes a vital contribution to sustainable development (Wunder et al 2014).

Ethiopia, described as the water tower of Africa, has some of the most extensive forest resources on the continent, covering 3,651,935 ha or 3.56% of the area of the country (FAO 2014). Ethiopia is facing rapid deforestation and habitat destruction, estimated at 1.25% per year (FAO 2014), mostly due to human activities, such

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as agriculture (shifting cultivation and large-scale intensification), and a higher demand for construction material, fuelwood, fodder, and charcoal as well as for land for settlements and pastures, fueled by high population growth (Woldemariam and Teketay 2001; Moges et al 2010). Most of the remaining forest resources are in the southwestern part of the country, including 60% in Oromia State, where the research for this article was conducted. Yet wild foods are rarely collected from the forest, even though the region suffers from micronutrient deficiencies and low diet diversity (Central Statistical Agency 2012; Hirvonen et al 2015).

Due to the presence of the Yayu Coffee Forest Biosphere Reserve, this mountain ecosystem has been well studied with regard to flora and fauna (Woldemariam 2003; Woldegeorgis and Wube 2012), forest conservation and management (Moll and Zander 2013; Worku 2015), and the development of coffee genetic resources (Senbeta 2006; Krishnan 2013). Researchers in this region have not, however, studied the gender dimension of natural resource management, although this is vital for a detailed understanding of farming and livelihood systems (Verma 2001). There is a need to go beyond gender analysis and develop gender-transformative change approaches in order to advance gender equality and to create sustainable environments so that both men and women in mountain communities can enjoy development benefits (Molden et al 2014). Other topics that have not been explored by scientists for this region are the role that agroforestry can play to conserve forest resources in the protected forest zone and the agricultural zone as well as the potential for growing indigenous vegetables on private forest lands around Yayu.

The objective of the study was to understand the gendered dimensions of natural resource use, territories of cultivation and resource collection, and perceptions of wild plants and their consequences for food security and forest conservation in Yayu, including opportunities and challenges to achieve the Sustainable Development Goals (SDGs). This article identifies the potential contribution of forest protection and sustainable use to the forest-related SDGs (6.6 and 15) and to SDG 2 (nutrition) and SDG 5 (women's empowerment), contributions that go far beyond forests' ecosystem services.

Sustainable Development Goals

Forests are not only locally important for NTFPs and ecosystem services they also have regional and international significance through their watershed protection functions, such as soil retention and water infiltration. They are rich in biodiversity, and as carbon sinks they are highly relevant to climate change mitigation. The Yayu Biosphere Reserve is part of the Nile River catchment area (Woldemariam et al 2009), within which the forest plays this important role. The water-related SDGs (United Nations General Assembly 2015) are highly linked to forest and its conservation, for example, Target 6.6—"By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes". Protecting such resources will also sustain Ethiopia's special role on the African continent as one of its most important water sources, which plays a crucial role in climate change protection (Swain 1997).

Effective zoning and management of forest reserves, including promoting farmers' support for the protection of forest resources, contribute to forest conservation (Lindenmayer and Franklin 2002) and through that to achieving not only SDG 6.6 but also SDG 15.1 (and 15.4, see below)—"by 2020 ensuring the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands" (United Nations General Assembly 2015). This is measured by assessing the area of forest under sustainable forest management as a percentage of total forest area (Brack 2014). At the same time, sustainable management would be a major contribution to SDG 15.4, which aims to ensure "by 2030 [...] the conservation of mountain ecosystems, including their biodiversity, to enhance their capacity to provide benefits which are essential for sustainable development" (United Nations General Assembly 2015). However, as the detailed review by Ticktin (2004) showed, NTFP use needs to be managed in a way that takes into account the reproductive characteristics of local species; otherwise, it can have harmful consequences—as in case of the Kangchenjunga landscape in the Himalayas (Uprety et al 2016), where excessive use of medicinal and edible plants became a major threat to conservation and biodiversity. Despite some progress in estimating the ecological impact of NTFP harvesting, a central challenge remains the lack of data and standardized methods of estimation. One recent analysis (Solomon 2016) was optimistic about the potential positive effects of NTFP use on conservation, especially if it is an integral part of community development.

A gendered perspective on the protection and use of forest resources will support the achievement pf not only forest-related SDGs but also other SDGs. NTFPs play an important role in both men's and women's livelihoods and consumption. Due to their reproductive role, women tend to be focused on nutrition and family and often prefer to spend income on health and education. Therefore, in places where women collect NTFPs (especially those of high value), additional income is likely to have positive effects on the well-being of families. At the same time, this means that protecting the forest contributes to SDG 2 (ending hunger, achieving food security, and improving nutrition) and SDG 5 (achieving gender equality and empowering women and girls).

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The current Growth and Transformation Plan of the Ethiopian government (National Planning Commission 2016), like the previous plan (which ended in 2015), is said to be the trailblazer in sub-Saharam Africa with regard to incorporating global development goals in national action plans (Accorsi et al 2010). Major achievements in gender equality in education, food security, and child mortality were made in the past decade, which is good news for the communities in the region. The Growth and Transformation Plan sets goals for forest development, protection, and utilization, but implementation has been slow. The SDGs provide a good chance for Ethiopia to rethink its policies that affect the use of forests and mountain ecosystems. More research is needed on ways to ensure sustainable management of forests and halt deforestation, at least in such vital regions as the biosphere reserve, in order to reduce the loss of natural habitats and biodiversity and to counterbalance the unprecedented land degradation and loss of arable land (Million and Leykun 2001).

Research questions and hypothesis

As part of its contribution to the investigation of how forests can be managed more sustainably, this study was guided by the following 4 questions:

1. Which functions does the forest fulfill with regard to peoples' livelihoods?
2. What are men's and women's perceptions of wild plants, and what prevents people from using them as a food source?
3. How do gender roles, labor division, and workloads affect the collection and consumption of wild foods?
4. What is the potential for reviving indigenous species in agroforestry systems to support better nutrition?

We hypothesized that edible plants and other forest food resources are neglected because forest land in the research area is gendered and almost entirely men's territory, whereas nutrition and horticulture are women's tasks, so that the nutritional value of the forest is not exploited despite substantial knowledge, especially by men, of edible plants. Areas such as the Yayu Biosphere Reserve have an exceptional status and play an important role as trailblazers for conservation of forest resources and mountain ecosystems in Ethiopia.

Study site and methods

Study site

The Yayu Coffee Forest Biosphere Reserve (8°0′42″ to 8°44′23″ N and 35°20′31″ to 36°18′20″ E) is located at elevations between 1100 and 2337 m above sea level. The reserve is part of an Afromontane biodiversity hot spot (Mittermeier et al 2011), a distinct eco-region that can be characterized as montane rainforest. It is part of a woodland belt that surrounds the highlands of Ethiopia and Eritrea. The Yayu forest can be categorized into undisturbed natural forest, managed semi–coffee forest systems (coffee is of wild origin but understory vegetation is reduced), and old secondary forest, which together host 100 endemic plant, bird, and mammal species, 44 threatened species, and the largest wild population of *Coffea arabica* in the world (Woldemariam et al 2009), which is the most important understory crop (Senbeta 2006). Parts of the Yayu coffee forest were declared a National Forest Priority Area and gene reserve in 1998, and the whole zone was declared a United Nations Educational, Scientific and Cultural Organization (UNESCO) biosphere reserve in 2010. Today, the reserve encompasses 167,021 ha of forest (UNESCO 2010) and aims to conserve coffee genetic resources and overall biodiversity. The reserve is managed in zones, so that smallholder farmers can still use forest resources sustainably (Figure 1). The core zone encompasses 27,733 ha of undisturbed natural forest; the buffer zone 21,552 ha of mostly semi–coffee forest, where restricted use of forest resources is allowed; and the transitional zone, which covers 117,736 ha of agricultural land, plantations, grasslands, wetlands, managed coffee forests, and settlements.

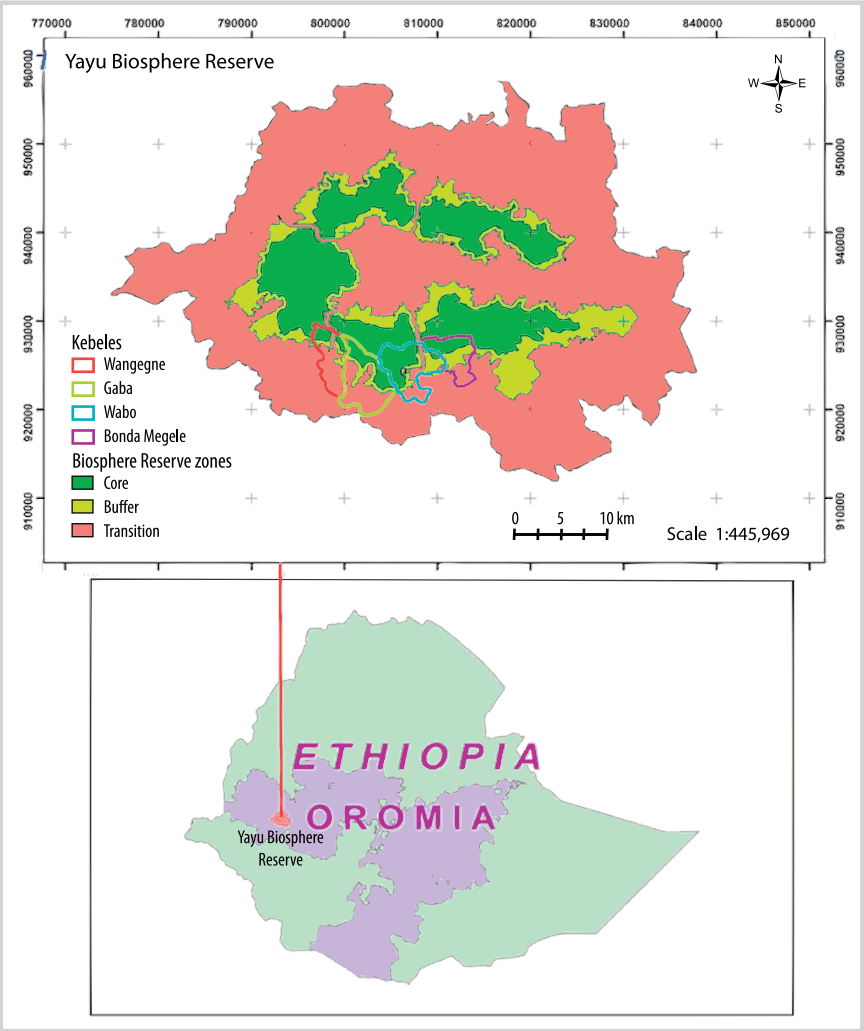
About 154,300 permanent residents live in the Biosphere, of whom the majority depend on agriculture for their livelihoods (UNESCO 2010). Farmers in the transitional zone own and cultivate land and are free to use it as they like. Many of them also own patches of private coffee forest in the transitional zone and have been assigned patches in the buffer zone. Biodiversity is highest in the core zone, as the whole forest there remains untouched, whereas in the buffer zone, wild coffee plants are managed by community members, who are allowed to harvest coffee, spices, wild vegetables, fruit, and honey and to collect firewood. Many male farmers have secretly removed 30–50% in the buffer zone of the understory vegetation, which is prohibited because of the negative effects on floristic composition and diversity (Senbeta 2006).

Forest governance and management in the study area

Since the mid-1990s, participatory forest management has been practiced in Ethiopia (Siraj et al 2016) and in the biosphere reserve. These practices are closely observed by local authorities. A staff member of the Oromia Forest and Wildlife Enterprise (a government forest-management institution) expressed doubts about the genuine engagement and ecological interest of officials in the districts around the Yayu forest (oral communication, Metu, Ethiopia, 19 April 2016), saying that they pursued their personal interests in exploiting the buffer-zone forest resources. This study found that there is no systematic procedure for issuing land certificates in the transitional zone. In 1 district in the study area, farmers

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FIGURE 1 Map of the study area. Top map: Yayu Biosphere Reserve and the 4 *kebeles* participating in the study (Source: Central Statistical Agency 2007); bottom map: Location of the biosphere reserve within Oromia State, Ethiopia. (Source: created by staff of the Environment and Coffee Forest Forum, based on data of the Central Statistical Agency 2007)



had land certificates for their cropland that also included coffee forest land, but this was not delineated separately. In another district, farmers were not issued certificates for coffee land at all. In both cases, it is impossible for authorities to keep track of the size of the existing forest cover and how land is used. This is needed for control and strategizing as well as to pursue SDG 15 (which would require tracking annual change in forest area and land under cultivation). The lack of transparency in management in Yayu supports Ticktin's (2004) argument that management practices need to be designed and evaluated jointly by researchers, foresters, and local harvesters in order to be effective in the long run and on multiple ecological levels.

Methods

Data were collected in 4 wards (*kebeles*) in the 2 districts (*woredas*) of Yayu and Hurumu in the transitional zone in Oromia State. All had access to the paved national highway, which was under construction, and the area encompassed households at different distances to the road and to the biosphere buffer and core zones. We conducted participatory observation (Bernard 2002) to explore the community dynamics and gender relations and conducted transect walks to understand connections and distances between the transitional, buffer, and core zones. A gender-disaggregated survey was conducted of 334 households (interviewing female household heads in 71 female-headed households and both male and female household heads in 263 male-headed households); in addition, 40 gender-disaggregated focus group discussions, 32 in-depth interviews, and 13 key stakeholder interviews were conducted. A household was defined as consisting of 1 or more people, related or unrelated, who jointly produce or purchase food and who regularly take their food from the same kitchen. The household survey used a representative stratified sample, so that all zones (subdivisions of the *kebeles*) were covered.

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The household survey contained a livelihood and farming system assessment as well as a dietary diversity score. Participants were asked about the frequency, timing, constraints, perceptions, and labor division of NTFP collection; their livelihood profiles and opportunities, including the role of forest vegetables and fruits; the main challenges to farming systems; financial, working, and social capital; farm and nonfarm assets; crop production and marketing potential for vegetables and fruits; their gendered perspectives on labor division in horticulture; overall farming and household systems; general gender roles and any changes in these; interest in trainings on agroforestry of wild vegetables and fruits; vegetable consumption habits; dietary diversity; and hunger periods.

Qualitative analysis was based on the Harvard gender framework (Rao et al 1991). Qualitative interviews were screened using structuring content analysis with encoding rules following Mayring (2000). For analysis of the survey data, only descriptive statistics were used.

In a participatory process involving men and women from the 4 study *kebeles,* crop species were selected for field trials that are currently being conducted as a follow-up to the part of the study reported on here. The field trials will explore the potential for stimulating the cultivation of indigenous African vegetables in agroforestry systems in the transitional zone. Selection criteria, which were identified jointly with male and female farmers, were minimal damage to coffee roots at harvest, ease of coffee harvest, canopy competition, tolerance to shade, and the calculated nutrition index of the vegetables. Based on the criteria, 10 crops were preselected by the research team. In the following step, male and female farmers separately selected their 4 favorite crops for field trials.

The research was supported by local translators with excellent Oromifa, Amharic, and English language skills, who enabled the authors to overcome the language barrier. Two Ethiopian postdoctoral students helped with cultural translation. The research was also supported by a local nongovernmental organization, the Environment and Coffee Forest Forum, which works on forest research, education, and conservation planning; Forum staff, who have excellent knowledge of the area, led the transect walks. Questions on forest use focused only on activities that are legal in the reserve (not on timber harvesting or hunting); people's knowledge of what was legal and illegal was quite detailed, but there is a chance that responses were biased.

Research findings

Forest contributions to livelihoods

The community in the biosphere reserve is proud of its coffee forest; as a male farmer (Wangene, age 47) said, "we are a community of coffee cultivators." Coffee is an important part of the cultural identity and the most important livelihood source for men. Of the households participating in the survey, 75% collect coffee from the buffer zone (where only collection is allowed), and 93% collect from their own private lands in the transitional zone (where cultivation is allowed). The income from coffee is used to buy grain, to make up losses in grain production, and to cover household expenses and investments. However, conservation restrictions, deteriorating coffee prices, and bad harvests due to erratic rains put a great deal of pressure on the male farmers, some of whom have shifted to other cash crops, such as khat and spices, which do not require shade trees and now threaten coffee and forest territory. The biggest conservation conflict is that farmers try to nurture new seedlings underneath ancient coffee trees and like to remove older trees in the buffer zone, where this is prohibited, to make space for young, more productive trees. As pointed out by Wunder et al (2014), such illegal techniques of coffee cultivation conflict with conservation goals and local regulations. Farmers seemed well aware of the landmarks that separated the transitional, buffer, and core zones, and of what they were allowed to do in each. Forest conservation plays an important role in their lives, as the coffee trees provide their most important livelihood. However, survival and income determine their decision making.

The second livelihood source from the forest is firewood (79% of participating households collect this from the buffer zone). Women walk up to 4 hours several times a week to collect firewood from the forest for cooking, whereas men primarily collect firewood for sale and transport it by donkey a few times a month.

Other NTFPs, including food products, are of minor importance for the community (Table 1). Irrespective of sex, 94% of survey participants stated that they did not collect any forest food products other than coffee. Only 6% of the households collected wild vegetables, fruits, medicinal plants, or honey or occasionally caught guinea fowl and partridges or collected their eggs. If spices (aromatic plants) are counted as food, the proportion of households rises to 38%, because men irregularly collect wild pepper (*Piper umbellatum*) and false cardamom (*Aframomum corrorima*). However, these are nutritionally insignificant.

Men are familiar with a few medicinal and aromatic plants, such as *damakasi* (*Plectranthus* sp.), which helps against colds, and *makanisa* (*Croton macrostachyus*), which is used to treat stomach problems. Of the small number of households that collect wild foods, a small minority of men collect medicinal plants from the forest, while women cultivate the 2 or 3 species that they need around the home garden. In the forest, it is mostly children who collect wild fruits, such as mango (*Irvingia gabonensis*) and physalis (*Physalis peruviana* L.), and women who collect wild green leafy vegetables, mostly in the lean period between

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TABLE 1 Use of non-timber forest products from the buffer zone.

Product	Households collecting product	Men	Women	Children	Time period
Wild fruits	2%	–	xx	xx	Mostly mango season (May)
Wild vegetables	4%	x	xxx	–	Lean season for farmed vegetables (October–April)
Medicinal plants	2%	xx	x	–	Rainy season (June–August)
Wild honey	1%	x	–	–	All year
Wild birds	1%	x	–	–	September
Aromatic plants (spices)	28%	xxx	x	–	All year
Wild coffee	75%	xxx	xx	–	Coffee harvest season (November)
Firewood	79%	x	xxx	–	All year
No forest foods	62%	–	–	–	–

Note: xxx, very often collect; xx, often collect; x, sometimes collect; –, never collect.

October and April, when fresh vegetables and fruits are not available from the home gardens. Among survey participants, only households with irrigation (12% of male-headed and 2% of female-headed households) can grow vegetables during the off season. Male and female respondents without access to irrigation reported that they had to buy vegetables and fruit from the market during the off season, which reduced their frequency and diversity of consumption from daily to once or twice a week, limited mostly to a vegetable side dish consisting of chilies and a single vegetable, such as Ethiopian kale or beetroot. In poorer households, the traditional staple food, *injera* (fermented bread), is then only eaten with *shiro wat* (a sauce made of dried lentil powder), so that diet diversity is low.

Men's and women's perceptions of forest food products

A group of 6 men in a focus group discussion in Bondo Megela (19 April 2016) agreed that "there is nothing edible in the forest," a point of view that was shared by around one-third of the households in the survey. One female farmer (age 38) in Gaba *kebele* explained further that "nutrition needs to come from our own land, crop fields, and cultivation, and not from the forest." Another woman from the same location (age 41) added, "I prefer to feed my family what I grow in the garden. It is not comparable to forest vegetables. The former generations collected more from the forest. Now we lack knowledge and interest. Only the black tribes still collect forest food."

The status of the male farmers depends heavily on staple and cash crops because these determine most of the household income, whereas income from vegetable cultivation only pays for everyday needs. Women consider a man to be respectable if he produces a good coffee harvest and high-quality staples that can be exchanged for *teff* (traditional Ethiopian grain) and enables the family to send its children to school. From the harvest and resulting income, women believe they need to be able to nurture their families. Other reasons for not collecting wild foods in the forests were lack of knowledge, dislike of the taste, and distance (Table 2). Several farmers also reported a lack of abundance due to wildlife: "[The amount is] not comparable to a cultivated vegetable, and what is available is eaten by monkeys" (female farmer, Gaba, age 45).

Among female-headed households (21% of the sample), only 1 woman collected wild fruit from the forest; the others were unable due to time constraints and lack of knowledge. Men's overall knowledge of edible plants (especially fruits and medicinal and aromatic plants) and birds was better than women's; older women had deeper knowledge than younger women, while younger and older men had equal knowledge levels. Only in a few households could the lack of knowledge be explained by the fact that they had recently moved to Yayu from the northern and

TABLE 2 Reasons for not using edible forest products.

Reason	Men	Women
Lack of knowledge	47%	42%
Nothing edible in the forest	28%	17%
Distance	12%	16%
Taste	9%	17%
Time constraints	2%	7%
Products eaten by wildlife	2%	1%

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central highlands (mostly the Amhara region). Collecting plants from the wild is associated with famine and severe hunger as well as with tribal hunter-gatherer groups from southern Ethiopia (described according to their linguistic origin as *omotik*). The research results show that knowledge does not depend on the distance between house and coffee forest plot or on whether households have assigned plots in the buffer-zone coffee forest.

Gendered territories, roles, and labor

Responsibility for different agricultural cultivation and use areas in the study site was divided by gender, with women primarily responsible for the home gardens and fruit trees and men for the forest and crop fields. This does not mean that men and women never enter each other's areas. The cultural values of the Oromo community rely heavily on conventions and pride (Gella and Tadele 2014), which includes clear gender roles. Women are expected to be involved in agricultural cultivation and to take care of children and household tasks, which include collecting water and firewood, mostly from coffee forests.

Vegetable cultivation is controlled by women, and the home garden, close to the house, is perceived by both sexes as women's territory. Plowing, a male task, is a cultural taboo for women. Men prepare the land for vegetable cultivation, build and maintain fences, and prune the fruit trees. They also harvest high trees and heavy banana bunches. Female-headed households need support from neighbors or laborers to do the plowing. A few women had learned to plow, and they were perceived by the community as strong and progressive. However, an unmarried woman (age 47) stated that "Men do not encourage us to do it. They assume that they are the only ones entitled to do it." Women also take care of the whole cycle of horticultural production—planting, maintenance, weeding, harvesting, and selling—sometimes assisted by male and female children. In the coffee forest, the situation is the reverse. Women are frequent visitors in the forest because they collect firewood for cooking 2 to 3 times a week (Figure 2).

During the coffee harvest, from November onward, the whole family usually works in the coffee forest, often assisted by female wage laborers. However, maintenance and control of the coffee forests is considered a male responsibility. Men take care of the seedlings and trees, clear the shrubs, harvest the trees, and sell the coffee. Labor during the coffee harvest is divided, with men mostly harvesting from the trees and women collecting the cherries from the ground. Whereas in other places in the world women are the primary collectors of wild food from the forest, in this location, on the rare occasions when the forest is exploited as a food source, it is by men and women alike.

FIGURE 2 Women collecting firewood from the buffer zone coffee forest, Bondo Megela, Yayu. (Photo by Nischalke, ZEF 2015)



Gender roles in this community are very traditional; women are responsible for food preparation and decide what is cooked and how it is prepared. Nutrition remains a woman's responsibility. This arrangement is reinforced by the fact that health extension agents work mostly with women, so that women's knowledge of nutrition is much more advanced than men's. Women describe themselves as heavily overburdened with work and cultural responsibilities, working up to 18 hours per day, compared with 8–10 hours for men (this was confirmed in interviews with men). Several women stated that they would not be able to collect anything other than firewood from the forest. Interest in and capacity for training are limited; as 1 woman (Gaba, age 37) said, "We are sitting in trainings, thinking of the household chores that need to be done at home."

Potential for reviving indigenous species in agroforestry systems

The tremendous biodiversity of the forest was not reflected in study participants' diets; they had relatively low diet diversity and low frequency of fruit and vegetable consumption. Woldemariam (2003) conducted a species inventory of the Yayu Biosphere Reserve across the 3 zones and identified 220 plant species, of which 84 are edible and widely available in the reserve; a large number are highly nutritious, especially the indigenous green leafy vegetables (Yang and Keding 2009; Kamga et al 2013). Out of 32 plants that were selected by a local botanist as edible and known in the community, the women in the focus group discussions recognized between 3 and 10, whereas men recognized between 7 and 16. Men stated more frequently than women that they knew a plant but thought it was not edible, while women stated more often that they did not know the plant.

Study participants also participated in the selection of 10 species for field trials intended to revive indigenous African vegetables that grow wild in the forest but can be cultivated: cowpea (*Vigna unguiculata* [L.] Walp.) for leaf

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and seed production, amaranths (*Amaranthus* sp.), African nightshade (*Solanum anguivi*), Ethiopian kale (*Brassica carinata*), spider plant (*Cleome gynandra* L.), jute mallow (*Corchorus olitorius* L.), physalis (*P. peruviana* L.), asparagus (*Asparagus officinalis* L.), pigeon pea (*Cajanus cajan* [L.] Millsp.), and cucurbits (*Cucurbita* sp.) for leaf production. Male and female farmers alike preferred to try out on their private fields the species that were most familiar to them: Ethiopian kale, cowpea, cucurbits, pigeon pea, and amaranths. While discussing indigenous crops in focus groups, men and women considered wild vegetables to be animal fodder, weeds, or inedible, and men in particular considered wild fruit, such as physalis, to be children's food of minor importance. The selected species were used in on-farm and community trials in all 4 communities and promoted through cooking demonstrations in the hope that a small local market would develop.

Results of the in-depth interviews and focus group discussions suggest that there is little enthusiasm for agricultural innovation among farmers in the biosphere reserve. Farmers depend heavily on extension agents for progressive ideas and rarely exchange knowledge among themselves. In particular, the overburdened women, the vegetable cultivators, showed limited interest in tasting or testing any vegetable they did not already know. The men, for whom the introduction of a new crop or practice would not create additional work, were more open to letting the women experiment, hoping it would bring in additional cash. One conclusion that can be drawn from the study is that interest in indigenous cultivable forest foods first needs to be raised through field demonstrations, trials, and cooking events. Local markets need to be gradually established, starting at the village-to-village level. Willingness to change practices is limited. Farmers were concerned about wildlife damage to vegetables in coffee forests, negative effects on coffee trees and their root systems and potentially deteriorating coffee yields, and low performance of vegetables under shade. For women, the most convincing argument in favor of agroforestry was its potential to reduce their workload, for example, through multipurpose crops (eg inter-row planting of staple crops and green leafy vegetables can eliminate weeding).

Conclusions

Although the buffer zone of the biosphere reserve has high biodiversity, it is negligible as a food source because local residents only use it as a livelihood and fuel source. The forest's potential as a food source has been forgotten, a process reinforced by the gendered division of territory and labor responsibilities. Women, who have little spare time, go to the forest frequently, but cultural aspects weigh more heavily (as described previously). Traditionally, wild plant collection has a low status in this community and belongs to a time when famines were more common, farmers were not able to produce sufficient food on their own land, and the sedentary lifestyle was not perceived as ideal. Status in the community is gained through successful agricultural cultivation, which means that the land nurtures the family and enables people to afford a good life. The forest can contribute as a livelihood source and a source of products that can generate cash to buy food, but it cannot be a food source itself. Nevertheless, from a conservation perspective this is a big advantage.

At a time when young people in many countries of the Global South have little interest in agriculture and difficulty accessing scarce cultivable land, forest conservation stands at a crossroads. What is needed to protect forest resources and achieve the forest-related SDGs is the provision of alternative livelihoods—either by intensifying the agroforestry system by integrating vegetable crops, which is only feasible on a small scale, or outside of the forest. If livelihoods are less precarious, pressure on forest resources diminishes. To achieve the SDGs, it will not be enough to protect the most valuable and productive eco-regions but the important role of forests as vital habitats for millions of species and a source of clean air and water needs to be targeted.

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REFERENCES

Accorsi S, Bilal NK, Farese P, Racalbuto V. 2010. Countdown to 2015: Comparing progress towards the achievement of the health Millennium Development Goals in Ethiopia and other Sub-Saharan African countries. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 104(5):336–342.

Angelsen A, Jagger P, Babigumira R, Belcher B, Hogarth N, Bauch S, Börner J, Smith-Hall C, Wunder S. 2014. Environmental income and rural livelihoods: A global comparative analysis. *World Development* 64:12–28.

Bernard RH. 2002. *Research Methods in Anthropology: Qualitative and Quantitative Methods*. 3rd ed. Walnut Creek, CA: AltaMira Press.

Brack D. 2014. *Sustainable Development Goals and Forests: A Summary of UN Open Working Group Debates and Country Reflections*. London: International Institute for Environment and Development.

Central Statistical Agency of Ethiopia. 2012. *Ethiopia Demographic and Health Survey 2011*. Addis Ababa, Ethiopia, and Calverton, MD: Central Statistical Agency and ICF International.

FAO [Food and Agriculture Organization of the United Nations]. 2014. *Global Forest Resources Assessment 2015—Country Report Ethiopia*. Rome, Italy: FAO.

http://dx.doi.org/10.1659/MRD-JOURNAL-D-16-00096.1
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Gella AA, Tadele G. 2014. *Gender and Farming in Ethiopia: An Exploration of Discourses and Implications for Policy and Research*. Working Paper 84. Brighton, UK: Future Agricultures Consortium.
Hirvonen K, Taffesse AS, Hassen WI. 2015. *Seasonality and Household Diets in Ethiopia*. Working Paper 74. Washington, DC, and Addis Ababa, Ethiopia: International Food Policy Research Institute and Ethiopian Development Research Institute.
Kamga RT, Kouamé C, Atangana AR, Chagomoka T, Ndango R. 2013. Nutritional evaluation of five African indigenous vegetables. *Journal of Horticultural Research* 21(1):99–106.
Krishnan S. 2013. Current status of coffee genetic resources and implications for conservation. *CAB Reviews* 8(16):1–9.
Lindenmayer DB, Franklin JF. 2002. *Conserving Forest Biodiversity. A Comprehensive Multiscaled Approach*. Washington, DC: Island Press.
Mayring P. 2000. *Qualitative Inhaltsanalyse. Grundlagen und Techniken*. Weinheim, Germany: Deutscher Studien Verlag.
Million B, Leykun B. 2001. *State of Forest Genetic Resources in Ethiopia*. Forest Genetic Resources Working Paper 21E. Rome, Italy: Food and Agriculture Organization of the United Nations.
Mittermeier RA, Turner WR, Larson FW, Brooks TM, Gascon C. 2011. Global biodiversity conservation: The critical role of hotspots. *In:* Zachos FE, Habel JC, editors. *Biodiversity Hotspots: Distribution and Protection of Conservation Priority Areas*. Berlin, Germany: Springer, pp 3–22.
Moges Y, Eshetu Z, Nune S. 2010. *Ethiopian Forest Resources: Current Status and Future Management Options in View of Access to Carbon Finances*. Addis Ababa, Ethiopia: Forestry Research Center, Ethiopian Institute of Agricultural Research.
Molden D, Verma, R, Sharma, E. 2014. Gender equality as a key strategy for achieving equitable and sustainable development in mountains: The case of the Hindu Kush-Himalayas. *Mountain Research and Development* 34(3):297–300.
Moll P, Zander U. 2013. Implementation-oriented and transformative research—Lessons from a project on conservation and sustainable use of forest resources in Ethiopia. *Environmental Science and Policy* 28:82–91.
National Planning Commission. 2016. *Growth and Transformation Plan II (GTP II)—(2015/16–2019/20)*. Addis Ababa, Ethiopia: Federal Republic of Ethiopia.
Rao A, Anderson MB, Overhold C. 1991. *Gender Analysis in Development Planning: A Case Book*. West Hartford, CT: Kumarian Press.
Senbeta, FW. 2006. *Biodiversity and Ecology of Afromontane Rainforests with Wild* Coffea arabica *L. Populations in Ethiopia*. Ecology and Development Series No. 38. Göttingen, Germany: Cuvillier Verlag.
Siraj M, Zhang K, Xiao W, Bilal A, Gemechu S, Geda K, Yonas T, Xiaodan L. 2016. Does participatory forest management save the remnant forest in Ethiopia? *Proceedings of the National Academy of Sciences, India Section B: Biological Sciences* 2016:1–14.
Solomon MM. 2016. Importance of non-timber forest production in sustainable forest management and its implication on carbon storage and biodiversity conservation in case of Ethiopia. *Journal of Biodiversity and Endangered Species* 4(1):2–8.
Sunderland T, Achdiawan R, Angelsen A, Babigumira R, Ickowitz A, Paumgarten F, Reyes-Garcia V, Shively G. 2014. Challenging perceptions about men, women and forest product use: A global comparative study. *World Development* 64:56–66.
Swain A. 1997. Ethiopia, the Sudan, and Egypt: The Nile River dispute. *Journal of Modern African Studies* 35:675–694.
Ticktin T. 2004. The ecological implications of harvesting non-timber forest products. *Journal of Applied Ecology* 41:11–21.
UNESCO [United Nations Educational, Scientific and Cultural Organization]. 2010. *MAB Biosphere Reserve Directory*. Paris, France: UNESCO.
United Nations General Assembly. 2015. *Transforming our World: The 2030 Agenda for Sustainable Development*. Resolution adopted by the General Assembly on 25 September 2015. New York, NY: United Nations.
Uprety Y, Poudel R, Gurung J, Chettri N, Chaudhary RP. 2016. Traditional use and management of NTFPs in Kangchenjunga landscape: Implications for conservation and livelihoods. *Journal of Ethnobiology and Ethnomedicine* 12(1):19.
Verma R. 2001. *Gender, Land and Livelihoods in East Africa: Through Farmer's Eyes*. Ottawa, Canada: International Development Research Centre.
Woldegeorgis G, Wube T. 2012. A survey on mammals of the Yayu forest in southwest Ethiopia. *Ethiopian Journal of Science* 35(2):135–138.
Woldemariam T. 2003. *Vegetation of the Yayu Forest in SW Ethiopia: Impacts of Human Use and Implications for In Situ Conservation of Wild* Coffea arabica *L. Populations*. Ecology and Development Series No. 10. Göttingen, Germany: Cuvillier Verlag.
Woldemariam T, Teketay D. 2001. The forest coffee ecosystems: Ongoing crises, problems and opportunities for coffee gene conservation and sustainable utilization. *In: Imperative Problems Associated with Forestry in Ethiopia*. Workshop proceedings. Addis Ababa, Ethiopia: Biological Society of Ethiopia, pp 131–142.
Woldemariam TG, Senbeta F, Kassahun T, Fite G. 2009. *Yayu Coffee Forest Biosphere Reserve*. Nomination form, UNESCO Man and the Biosphere Programme (available from the corresponding author of this article).
Worku M. 2015. Traditional uses of non-timber forest products in southwest Ethiopia: Opportunities and challenges for sustainable forest management. *Journal of Agriculture and Environmental Sciences* 1(1): 42–63.
Wunder S, Angelsen, A, Belcher, B. 2014. Forests, livelihoods, and conservation: Broadening empirical base. *World Development* 64:1–11.
Yang RY, Keding G. 2009. Nutritional contributions of important African indigenous vegetables. *In:* Shackleton CM, Pasquini MW, Drescher AW, editors. *African Indigenous Vegetables in Urban Agriculture*. London, UK: Earthscan, pp. 105–135.

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