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## He says, she says: ecosystem services and gender among indigenous communities in the Colombian Amazon

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1 **He says, she says: ecosystem services and gender among indigenous communities in the**  
2 **Colombian Amazon**

3  
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28  
29 **Abstract:**

30  
31 Although it has been hypothesized that men and women vary in the way they value ecosystem  
32 services, research on ecosystem services rarely incorporates a gender dimension. We conducted  
33 research with nine indigenous communities in the Colombian Amazon to understand which  
34 ecosystem services men and women perceive as most important for their wellbeing and to rank  
35 them according to locally-defined criteria of importance. Participants identified a total of 26  
36 ecosystem services and 20 different ranking criteria. Ecosystem services such as land for  
37 agricultural fields (a supporting service), and provision of fish and medicinal plants were equally  
38 important for both men and women. Wild fruits and resources to make handicrafts were more  
39 frequently mentioned by women, whereas timber, materials for making tools and *coca* leaves were  
40 more frequently mentioned by men. There were also differences in the criteria used to value  
41 ecosystem services, with 11 criteria mentioned by both men and women, five mentioned exclusively  
42 by women and another four only by men. Our results suggest that taking gender differences into  
43 account in ecosystem services assessments may result in the prioritization of different services in  
44 conservation and sustainable development programs, and may lead to different outcomes for  
45 ecosystem service provision and local livelihoods.

46  
47 **Key words:** conservation, participatory methods, qualitative, prioritization, valuation, wellbeing.

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49  
50 **1. Introduction**

51

52 The abundant literature on ‘ecosystem services’ (ES) that has been published since the appearance  
53 of the Millennium Ecosystem Assessment in 2005 has generally ignored a gender dimension  
54 (Brown and Fortnam, 2018; Daw et al., 2011; Yang et al., 2018). For instance, recent systematic  
55 reviews of the literature on ES and wellbeing (Cruz-Garcia et al., 2017) and on ES and food security  
56 (Cruz-Garcia et al., 2016) in Latin America, Asia and Africa reported that less than 10% of  
57 published case studies incorporated a gender approach. While it has been hypothesized that men and  
58 women vary in the way they value ES, to date, few ES assessments have taken gender dimensions  
59 into account.

60  
61 Gender is an important mediator of how humans view and interact with their environment. It often  
62 influences the use, knowledge, management, access and control over environmental resources  
63 (Rocheleau and Edmunds, 1997; Sunderland et al., 2014). There is substantial evidence highlighting  
64 gender differences in local ecological knowledge (e.g., Dovie et al., 2008). Gender differences have  
65 also been explained in relation to the use of natural resources (e.g. Meinzen-Dick et al., 1997;  
66 Westermann et al., 2005), including non-timber forest products (e.g., Ingram et al., 2014;  
67 Paumgarten and Shackleton, 2011) and community forestry (e.g., Agarwal, 2001; Mai et al., 2011).  
68 As emphasized by Leach et al. (2016), consideration of gender differences and relations is integral  
69 to achieving sustainable development and avoiding the costs of environmental and economic  
70 change that undermine gender capabilities and the sustainability of communities. Past gender  
71 research has established that there is a need to include women as part of conservation and  
72 development initiatives, decision-making and formal environmental governance, given that different  
73 social groups have diverse ways in which they relate to, and interact, with the environment (Arora-  
74 Jonsson, 2014). Women and men may have different knowledge, perceptions and preferences for  
75 environmental conservation, and these may influence which conservation and development options  
76 are most appropriate for a given site (e.g. Rao, Nautiyal, Maikhuri et al., 2003). Although more than  
77 forty years of gender research has positioned gender as a category that has to be included in  
78 environmental policy making, it has had little influence on environmental practice (Arora-Jonsson,  
79 2014; Ravera et al., 2016).

80  
81 Ecosystem services research, assessments and valuation have yet to incorporate useful theories and  
82 methodologies from the field of gender and the environment. This can have major implications for  
83 ES conservation and community wellbeing. For instance, consideration of gender roles related to ES  
84 can reveal differences in men’s and women’s knowledge, valuation, use of and access to ES, within  
85 multiple social dimensions of power. Failing to consider gender may lead to conservation initiatives  
86 and development interventions that do not meet the interests of both men and women, or reflect  
87 their respective views in the negotiation of trade-offs between different ES. By not providing  
88 accurate information to policy and decision makers, such initiatives, interventions and negotiations  
89 may inadvertently reinforce prevailing power differences (i.e. strengthening the power of certain  
90 groups and diminishing the power of those whose views are excluded from the studies). It is  
91 particularly necessary to incorporate a gender approach in social contexts where the views and  
92 perspectives of women are frequently neglected, and within an ES framework that often overlooks  
93 issues of power imbalance (Fisher et al., 2013).

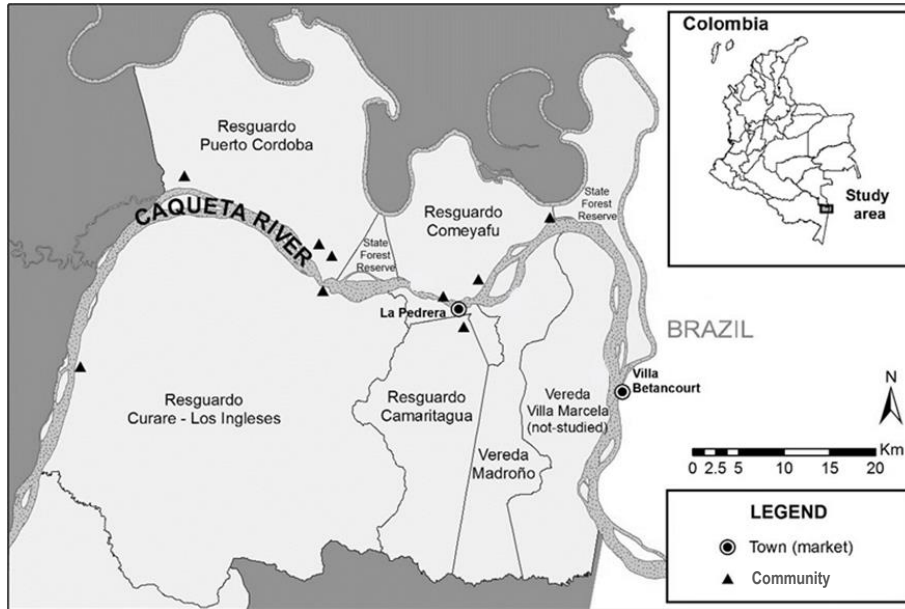
94  
95 Recent studies (e.g., Calvet-Mir et al. 2016) have emphasized that gender should be a transversal  
96 component of all processes of ES assessment and valuation. Indeed, there is a need to examine how  
97 gender influences the identification and perceived value of a range of ES. This is particularly  
98 important in the Amazon, a region inhabited by diverse indigenous populations who are highly  
99 dependent on locally sourced ES for their livelihoods. Although the Amazon basin is one of the  
100 most biodiverse regions on the planet, it is home to a high concentration of vulnerable populations  
101 both in terms of environmental dependence and poverty (Celentano and Vedoveto, 2011). Among  
102 indigenous communities, women are the most affected by poverty and discrimination, as reflected  
103 in lower educational attainments, reduced labor opportunities (United Nations, 2006) and high rates

104 of maternal mortality (Celentano and Vedoveto, 2011). A gendered analysis that compares the  
105 preferences of indigenous men and women for different types of ES in the Amazon could provide  
106 useful insights for the design of conservation and development projects so that they contribute to the  
107 wellbeing of all. However, ES valuation studies that have been conducted in the Amazon do not  
108 usually consider gender (e.g. Lead et al., 2010; Tallis and Polasky, 2009).  
109

110 The objective of our study was to compare how indigenous men and women prioritize ES and the  
111 criteria they use to assess the importance of ES for their wellbeing. Based on the results, we seek to  
112 provide recommendations on how to incorporate gender differences in the use or valuation of ES  
113 into conservation and development plans. We conducted research with nine multi-ethnic indigenous  
114 communities in La Pedrera, located in the Colombian Amazon. Our research provides the  
115 foundation for a gender approach to ES valuation and priority setting aimed at contributing to  
116 Sustainable Development Goal (SDG) number five “Achieve gender equality and empower all  
117 women and girls” and SDG 15 “Sustainably manage forests, combat desertification, halt and reverse  
118 land degradation, halt biodiversity loss” (United Nations, 2015). Our study illustrates the need to  
119 address both goals synergistically to ensure the sustainable management of ecosystems and secure  
120 community wellbeing by incorporating the perspectives of both men and women. In particular, SDG  
121 Target 15.9 requires that ecosystem and biodiversity values are integrated into “national and local  
122 planning, development processes, poverty reduction strategies and accounts”, and serves as a major  
123 imperative for ensuring ecosystem service valuations do not overlook vulnerable populations,  
124 including women. This case study provides a methodology for incorporating the gender dimension  
125 into ES research and assessments that could be helpful for researchers and practitioners working  
126 with indigenous and local communities in other forested areas who want to better incorporate ES  
127 into their conservation and sustainable development initiatives.  
128

## 129 **2. Research site**

130  
131 The research was conducted in nine indigenous multi-ethnic communities that are part of four  
132 different Indigenous Reserves in the *corregimiento* of La Pedrera (a *corregimiento* is an  
133 administrative unit smaller than a municipality), located in the Northeast of the department of  
134 Amazonas in Colombia (Fig. 1). The territory of an Indigenous Reserve is collectively owned and  
135 indigenous groups are autonomous in the management and administration of the natural resources  
136 (Departamento Nacional de Planeación, 2010). The region is characterized by high forest cover,  
137 marginal deforestation rates, limited market integration, and livelihoods that are strongly dependent  
138 on ES (Fontaine, 2008; Ramirez-Gomez et al., 2015). Communities in La Pedrera are river-bank  
139 dwellers situated along the lower reaches of the Caquetá River.  
140



141  
 142  
 143 **Fig. 1.** La Pedrera *corregimiento*, Colombia, indicating the location of the nine communities that  
 144 took part in the study.  
 145

146  
 147 The Colombian Amazon is characterized by the presence of tropical lowland and upland rain forest.  
 148 The annual rainfall fluctuates from 2500 to 4250 mm, and the average annual temperature oscillates  
 149 between 25 and 28 °C (Chaparro, 2007). There are two major periods in the year affecting local  
 150 subsistence activities in La Pedrera, i.e., when the river water level rises from May to July (locally  
 151 called *creciente*) flooding many agricultural areas, and when it decreases from August to April  
 152 (*vaciante*).  
 153

154 The results of a household census conducted in 2014 by the ‘Attaining Sustainable Services from  
 155 Ecosystems using Trade-off Scenarios’ (ASSETS) project, which included an estimated 90% of all  
 156 households in the region, indicated that the study site in La Pedrera had a total population of 879  
 157 inhabitants, 54% males and 46% females. The indigenous communities were patriarchal, with 90%  
 158 of the households being male-headed. The women heading the remaining 10% of households were  
 159 mainly widows or divorcees. Fourteen percent of men and 23% of women older than 15 years were  
 160 illiterate. Communities ranged in size from six to 33 households and the mean household size was  
 161 5.5 persons. Each family cultivated an average area of 1.4 ha in *chagras* (ASSETS, unpublished  
 162 data). From the perspective of indigenous communities in the Colombian Amazon, a *chagra* is not  
 163 only the agricultural field (based on swidden agriculture), but also a traditional space of  
 164 communication, learning and sharing for the family (Muñoz et al., 2011). Most communities have a  
 165 primary school, but there is only one secondary school in the area, located in La Pedrera town  
 166 (Martinez, 2011). Communities generally lack access to electricity and sanitation.  
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168 **3. Methods**

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### 3.1. Data collection

This study relies on the definition of gender of the Cooperative for Assistance and Relief Everywhere (CARE International Gender Network, 2012: 2) as a social construct that “defines what it means to be a man or woman, boy or girl in a given society – it carries specific roles, status and expectations within households, communities and cultures”. Within this definition, this study specifically addresses men’s and women’s roles and perceptions with respect to the prioritization and criteria of ES importance. Sex-based comparisons (i.e., based on a biological condition) are used as indicators of a gender construction.

We collected data through focus group discussion exercises in nine communities between March and June 2013. We used participatory research methods both because they are considered particularly appropriate for analyzing how different social groups prioritize and value different ecosystem services (Poppy et al., 2014), and because they can be used in a less extractive manner that explicitly values local knowledge. The indigenous authorities from the participating communities and the association of indigenous authorities in La Pedrera (AIPEA, Asociación de Autoridades Indígenas de La Pedrera Amazonas) were informed and consulted for approval before conducting the study. They, together with the communities, defined the dates on which field work took place, and were provided a schedule of the activities. All persons who participated in the study did so freely and with prior informed consent, and all exercises were tape-recorded with the permission of the informants. The study obtained ethics approval from the University of Southampton’s Ethics Committee (Ref 8717). Participatory exercises were piloted in an indigenous *Huitoto* community in Leticia district. The purpose of the pilot study was to adjust the methodological tools to the local social, cultural and environmental context. After the pilot study, a few modifications were made (mainly on the wording of questions), but the structure and content of the exercises remained the same. The pilot data were not included in this study.

Prior to the fieldwork, one of the authors (GCG) undertook a scoping visit to the field site. The fieldwork was then undertaken by four field researchers – one man and three women – who were trained in the pilot village by CTV, who, together with GCG, provided frequent long-distance supervision while the team were in the communities. The field team were introduced to the study communities by a research collaborator with 15 years’ experience of working in the La Pedrera area. Although Colombian, the field researchers were not indigenous. The week they spent living in each study community was therefore very important for building trust and rapport with community members. Following the research, the results were presented back to the communities in various formats previously agreed with local people. These included oral presentations at a workshop at which results were discussed and validated, posters co-designed with workshop participants and detailed written reports for each community.

The field researchers visited and conducted exercises separately in four of the communities. The other five were clustered into two groups, with each group comprising communities that belonged to the same Indigenous Reserve, had similar livelihoods and shared access to the forest. We conducted two different types of focus group exercises: (1) a household diagram exercise to provide an overview of the main gender-productive roles in the region, and (2) a matrix scoring exercise to examine differences in how men and women prioritize ES, and the criteria they use to assess the importance of ES for their wellbeing. Each exercise lasted from 2 to 3 hours and involved an average of five participants. Focus group participants were selected using purposive sampling which is a nonprobability sample where informants are selected based on expert knowledge of the population and are assumed to be representative of the larger population or a particular social group (Bauer and Gaskell, 2000; Chambers, 2008). For the first exercise, given that we expected livelihood strategies to differ across socio-economic groups, we conducted two parallel focus group

221 discussions in each community, one with better-off and another with worse-off community  
 222 members. Better-off and worse-off socio-economic groups were locally defined based on  
 223 landholding areas, health and age of family members, and access to cash income<sup>1</sup>. These focus  
 224 groups had a mixed participation of men and women. For the second exercise, we conducted two  
 225 separate focus group discussions in each community, one with men and another with women. We  
 226 structured this set of focus groups with the expert advice of local leaders to ensure not only  
 227 representation of different sexes, but also from residents of different ages and locations within the  
 228 community.

230 **Table 1.** A summary of the number of persons per community that participated in the focus group  
 231 exercises.

Indigenous Reserve	Community	Household system diagram		Matrix scoring exercise	
		better off group	worse off group	with women - only	with men - only
Curare Los Ingleses	Borikada	5	5	4	4
	Curare (Los Ingleses)	6	5	7	6
Puerto Cordoba	Puerto Córdoba, Loma Linda and Bocas del Miriti <sup>1</sup>	5	4	4	6
Comeyafú	Bakuri	4	5	4	4
	Comeyafu Yucuna and Comeyafú Tanimuca <sup>1</sup>	6	7	5	7
Camaritagua	Camaritagua	5	-	6	4
<b>Total</b>		<b>31</b>	<b>26</b>	<b>30</b>	<b>31</b>

233 <sup>1</sup> Clusters of communities.

234  
235

236 A total of 11 household system diagram exercises (six with better-off and five with worse-off  
 237 community groups) were completed, with a total of 57 participants. In this exercise (described as  
 238 exercise F in Schreckenberg et al., 2016), informants were guided by the facilitator to describe local  
 239 livelihood strategies and gender roles in the different parts of the landscape used by the family,  
 240 including *chagras*, home gardens, forests, fallows and rivers. Informants were first asked to draw  
 241 the household in the center of a large sheet of paper, together with the different landscape  
 242 components. They were then asked to indicate the main household supplies, crops and wild  
 243 products, as well as their sources; and to use arrows to link these supplies to the different parts of  
 244 the landscape where they were obtained. During the exercise informants were asked if men, women,  
 245 or both, were responsible for different household productive activities. Although both men and  
 246 women actively participated in the focus groups, having mixed groups might have influenced the  
 247 way men and women discussed gender roles and may thus have affected the results. However, we  
 248 were able to corroborate much of the information obtained from the household diagram exercises  
 249 with information obtained through other exercises that are not reported here, including transect  
 250 walks, participatory mapping of land use and specifically of wild food sources, focus groups on  
 251 wellbeing and livelihoods, and focus groups on foods and food sources (some of which were carried  
 252 out separately with men and women).

253

254 Twelve matrix scoring exercises (described as exercise W in Schreckenberg et al., 2016) were  
 255 conducted in total (six with men and six with women), constituting a total of 31 men and 30  
 256 women. Where possible, a male researcher facilitated the discussions with men and a female  
 257 researcher facilitated discussions with women. The facilitators began the exercise by introducing ES  
 258 as ‘the benefits from the surrounding environment that allow participants to survive and to carry out  
 259 their subsistence activities’. Facilitators and participants discussed this proposed definition to clarify  
 260 its meaning and express it in locally appropriate terms. Following agreement on the concept, the  
 261 participants were asked to make a list of ES in the community. We are aware that this working  
 262 definition – which our pilot community experience showed was the easiest way to explain the  
 263 concept of ES to indigenous communities – might have biased the answers towards provisioning  
 264 services. After reviewing the list, participants were asked to identify the criteria that they use to

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265 decide which services are most important for their wellbeing. Participants then selected the most  
266 important ES for their wellbeing (up to a maximum of 15) and developed a matrix in which they  
267 gave a score from one to ten (where zero is the lowest, ten is the highest) to each ES with respect to  
268 each locally defined criterion of importance. When a particular criterion was not applicable for a  
269 specific ES type, the ES type was not scored for this criterion. For example, the ES 'hardwood' was  
270 not scored in relation to the criterion 'diversity of dishes' as local communities highlighted that this  
271 combination was not applicable.

### 272 273 3.2. Data analysis

274  
275 Data on gender productive roles was extracted from the household diagram exercises using hand-  
276 written notes and audios from the participatory exercises and comparing the texts of the nine focus  
277 group discussions. Matrix scoring exercises were transcribed to make sure that the lists of ES and  
278 criteria of importance included those mentioned by the informants (and were not prompted by  
279 enumerators).

280  
281 Women's and men's lists of ES and criteria of importance were analyzed using quantitative content  
282 analysis. To facilitate the analysis, the ES listed by local communities were coded/grouped into  
283 mutually exclusive ES types, corresponding to different ES categories (following TEEB, 2015).  
284 Likewise, criteria of importance were also grouped into mutually exclusive thematic groups (with  
285 no overlapping criteria). The results from the matrix scoring were analyzed by calculating the  
286 frequency of mention, highest and lowest values (maximum and minimum), medians and modes for  
287 each thematic criteria group per ES type across focus groups, with separate calculations for women  
288 and men. If two or more criteria of importance belonging to the same thematic group were listed for  
289 a particular ES type in the same focus group, all scores were included in the analysis,  
290 correspondingly. When an ES type was not scored with respect to a particular criterion, because it  
291 was not applicable according to the informants, this particular combination was not included in the  
292 analysis. Wilcoxon's non-parametric equality of medians for non-related samples was applied to  
293 test the statistical significance of the differences between men's and women's scores given to all ES  
294 in relation to criteria of importance (Maechler, 2016). All analyses were done in R version 3.5.0.  
295 Only probability values below or equal to 0.05 were considered statistically significant. Results that  
296 reached the 0.10 level of probability were reported as marginally significant differences in order to  
297 indicate a trend.

## 298 299 4. Results

### 300 301 4.1. Main productive activities and gender productive roles

302  
303 The participants reported that their main productive activities were hunting, fishing, farming and  
304 gathering of wild fruits. In addition, informants also collected firewood and water for domestic use,  
305 medicinal plants, construction materials (e.g., timber and thatch) for building houses and boats, and  
306 raw materials for crafting tools for domestic use, cultural activities, and productive activities. They  
307 obtained ES from the surrounding landscape mosaic that includes forests, water bodies, *chagras*,  
308 fallow fields or areas of secondary vegetation arising in abandoned *chagras (rastrajos)*, home  
309 gardens (*patios*) and *salados* (areas within the forest with a high concentration of salt). *Salados*,  
310 which were usually regarded as sacred sites, were particularly important for hunting because the  
311 high salt levels attract game. There were different types of *chagras*, for example, *chagra de monte*  
312 is the field created from the forest, *chagra de rastrajo* is the field created from a fallow field,  
313 *chagra de orilla* is the area on the river bank that is used for agriculture in the dry season when it is  
314 not flooded, and *chagra de isla* is the area of land within the river that only emerges when the water  
315 level decreases and is very productive for agriculture. According to informants, *chagras* were  
316 assigned by traditional authorities to families when they become community members.



317  
 318 The gender productive roles related to these activities are detailed in Table 2. From a total of 15  
 319 productive activities, seven were exclusively conducted by men, two by women and six by both.

320  
 321 **Table 2.** Main gender productive roles in the study site (from 11 focus groups with a total of 57  
 322 participants, including men and women). An activity is shown as being conducted only by women  
 323 or only by men when this was reported in all focus groups; an activity is shown as being carried out  
 324 by both when focus groups either differed in their answers or when they indicated that both  
 325 conducted the activity.

Productive activity	Men	Women
Fishing (and commercializing fish)	X	
Hunting in the forest (and commercializing bush meat)	X	
Collecting building materials for building houses and boats	X	
Collecting raw materials and crafting (weaving baskets, making wood handicrafts and cultural items, making tools for hunting and gathering)	X	
Gathering medicinal plants in the forest	X	
Farming coca and making <i>mambe</i> <sup>‡</sup>	X	
Slashing and burning for making a new <i>chagra</i>	X	
Planting crops in the <i>chagra</i>	X	X
Maintaining the <i>chagra</i> <sup>‡</sup>	X	X
Harvesting products from the <i>chagra</i>	X	X
Collecting firewood	X	X
Gathering medicinal plants in the home garden or agricultural field	X	X
Gathering wild fruits	X	X
Collecting water		X
Preparing and processing food		X

<sup>‡</sup> *Mambe* is a powder that is chewed by men, prepared with roasted coca leaves (*Erythroxylum coca* Lam) and ashes of *yarumo* (*Cecropia* sp.) leaves that are added to activate the alkaloids.

<sup>‡</sup> This mainly refers to weeding and taking care of the crops.

327  
 328  
 329 *4.2. Gender differences in frequency of mention of ES*

330  
 331 The focus group participants from indigenous communities in La Pedrera listed a total of 26 ES that  
 332 they received from the surrounding landscape, including 19 provisioning, five regulating and two  
 333 supporting services. Focus groups mentioned an average of ten different ES (range = 5-15). There  
 334 was no substantial difference in the mean number of ES mentioned by men (12) and women (11). A  
 335 total of 20 ES were mentioned by both men and women, including the provision of bush meat, fish  
 336 (from ravines, river and water bodies), products from *chagras*, wild fruits, water (from water  
 337 bodies), firewood, hardwood (for building own houses and for selling), *puy* leaves (*Lepidocaryum*  
 338 *tenue*), materials for household tools, materials for cultural activities, medicinal plants, coca, air  
 339 quality, maintenance of soil fertility, and land for *chagras* (from the forest, fallow fields and river  
 340 banks). Three ES were mentioned exclusively by women (provision of *charapa* (*Podocnemis*  
 341 *expansa*), building materials, soil types); and another three exclusively by men (provision of fruits  
 342 from home gardens, water from rain, land for *chagras* (from *islas*)) (Table 2). Different focus  
 343 groups varied in the specificity they gave to some types of ES. For example, while some listed  
 344 'inputs for building' (which included hardwood, *puy* leaves for roofing and fibers for building  
 345 houses), others specified hardwood for building houses, hardwood for selling, and *puy* leaves as  
 346 separate ES. The 26 ES listed by local communities were grouped into 15 mutually exclusive ES

347 types (Table 2). These services were related to various household activities including hunting,  
 348 fishing, gathering, farming, crafting and collecting raw materials.

349  
 350 The most frequently mentioned ES – including provision of fish, firewood, building materials, wild  
 351 fruits, bush meat, medicinal plants and materials for household tools, water and land for agricultural  
 352 fields – were similar for men and women (Table 3). In contrast, the provision of materials for  
 353 cultural activities was more frequently mentioned by women than by men, whereas the provision of  
 354 coca leaves was more frequently mentioned by men.

355  
 356 **Table 3.** Ecosystem services (ES) listed by representatives of indigenous men and women in La  
 357 Pedrera, Colombia, grouped according to category and type (from 12 focus groups with a total of 61  
 358 participants, including men and women).

ES listed by communities	Description of ES listed by local communities and the ecosystems that provide these services	ES categories (according to TEEB 2015)*	ES types (as grouped by the researchers)**	Frequency of mention of ES types in focus groups	
				Men (N=6 focus groups)	Women (N=6 focus groups)
Fish (from ravine)	Fish are a major component of the daily diet in the study site. Fish are also commercialized. Local people specified from which type of water body they get fish. This ES refers to fish from ravines.	Provisioning (food)	Provision of fish	6	6
Fish (from river)	Fish are obtained from the Caquetá river and river banks.				
Fish (from water bodies)	Fish are obtained from the Caquetá river, river banks and ravines.				
Firewood	Firewood is collected from multiple ecosystems with the main purpose of cooking.	Provisioning (raw materials)	Provision of firewood	6	6
Hardwood for building own houses	Hardwood is mainly collected in the forest. This category exclusively refers to hardwood for building the houses of the community.	Provisioning (raw materials)	Provision of building materials	6	5
Hardwood for selling	Hardwood is exclusively collected for sale				
Puy leaves	Leaves of the <i>Lepidocaryum tenue</i> Mart. palm are used for weaving roofs.				
Building materials	Hardwood, puy leaves, fiber and other types of provisioning services are needed for building houses. Sometimes participants also refer to making canoes.				
Fruits from home garden	Fruits from trees and palms, mainly wild, are gathered from home gardens ( <i>patios</i> ).	Provisioning (food)	Provision of wild fruits	5	6
Wild fruits	Wild fruits are gathered from agricultural fields, fallow fields and forests.				
Bush meat	Wild animals are mainly hunted in the forest but can also be found in agricultural fields, fallows and <i>salados</i> (sacred sites within the forest that attract animals for their high concentrations of salt). They are locally consumed and commercialized.	Provisioning (food)	Provision of bush meat	5	5
Charapa	<i>Charapa</i> is a turtle <i>Podocnemis expansa</i> (Schweigger 1812). <i>Charapas</i> are hunted and their eggs are collected mainly from river banks, usually for own consumption.				

Medicinal plants	Medicinal plants are gathered from different ecosystems, including forests and home gardens.	Provisioning (medicinal resources)	Provision of medicinal plants	5	5
Materials for household tools	Raw materials collected from forests and other ecosystems are used for weaving baskets, making domestic utensils, and tools for productive activities.	Provisioning (raw materials)	Provision of materials for household tools	4	3
Water (from rain)	Rain water is collected in receptacles for domestic use. It is also the only source of water for the <i>chagras</i> .	Provisioning (fresh water)	Provision of water	4	3
Water (from water bodies)	Water from ravines and rivers is collected in buckets and is mainly for domestic use.				
Land for <i>chagras</i> (from the forest)	This land is obtained after slashing and burning forest areas. According to villagers, produce from this type of <i>chagra</i> is of better quality.	Supporting (habitat)	Land for agricultural fields ( <i>chagras</i> )	3	3
Land for <i>chagras</i> (from fallow fields)	This land is obtained after slashing and burning fallows (or <i>rastrajos</i> ). According to villagers, <i>chagras</i> on former fallows are easier to clear but have lower productivity than <i>chagras</i> cleared from forest.				
Land for <i>chagras</i> (from river banks)	This land is located in areas close to river banks. It is only used during the summer (dry season). In the rainy season river banks are flooded.				
Land for <i>chagras</i> (from <i>islas</i> )	This land is located in small islands ( <i>islas</i> ) formed in the middle of the river when the water level decreases in the dry season. They are only productive during this period.				
Products from <i>chagras</i>	Products (mainly cassava and plantain) are harvested from agricultural fields. They are mainly for self-consumption, and the surplus is commercialized.	Provisioning (food)	Provision of products from agricultural fields	3	2
Coca	Men chew <i>mambe</i> (see definition of <i>mambe</i> in Table 1) when they get together for socializing and during traditional activities. <i>Coca</i> is also used by traditional healers.	Provisioning (medicinal resources)	Provision of coca	3	1
Materials for cultural activities	Raw materials collected from the forest or other ecosystems are used for making masks, dresses, musical instruments and other objects used during traditional activities and dances	Provisioning (raw materials)	Provision of materials for cultural activities	1	3
Oxygen	Oxygen refers to 'having pure air', which is related to air quality.	Regulating (air quality)	Air quality	1	1
Soil fertility	Soil fertility is necessary for farming in agricultural fields.	Regulating (maintenance of soil fertility)	Maintenance of soil fertility	1	1
Soil types	Soil types refer to having different types of soils, which support different activities such as farming, crafting and painting. For instance, participants explained the importance of having different soil types for growing different types of crops. Particular soil types are good for making handicrafts, and others for painting materials for cultural activities.	Supporting	Soil types	0	1

\* ES categories according to TEEB (2015)

\*\* The ES types used for the analysis of frequency of occurrence explained in this section of the article.

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#### 4.3. Gender differences in criteria used to assess ES importance

Representatives from local communities in La Pedrera listed a total of 20 different criteria for scoring the importance of different ES. Both men and women listed an average of seven criteria per focus group. Eleven criteria of ES importance were mentioned by both men and women, whereas five were mentioned exclusively by women and another four only by men. The 20 criteria listed by informants were grouped into 14 mutually exclusive thematic groups (Table 3).

The frequency of mention of some criteria differed between genders (Table 4). Men frequently mentioned availability and accessibility as key criteria. Conversely, the contribution of ES to health and income generation were more commonly mentioned by women. Both men and women emphasized the importance of ES as food and support for having food.

It might be surprising from the results of the previous section that informants did not list any cultural ES (although raw materials for cultural activities were mentioned by several focus groups). However, cultural importance – as a criterion – was attributed to all provisioning, regulating and supporting ES listed by men and women.

**Table 4.** Criteria of ES importance as listed by representatives of indigenous men and women in La Pedrera, Colombia, also indicating groups of related criteria (from 12 focus groups with a total of 61 participants, including men and women).

Criteria listed by communities	Description of the criteria listed by local communities	Criteria group (as grouped by researchers)	Frequency of mention of criteria in focus groups	
			Men (N=6)	Women (N=6)
Food and support for having food*	Related to provision of food products only: importance of provisioning ES to be consumed as food by local families	Food	6	6
	Related to provision of food products and support for food production: importance of ES to be consumed as food, and for growing food			
	Related to provision of food products, support for food production and supplies for food preparation: importance of ES to be consumed as food, for growing food, and for the preparation of food			
Nutrition	Quality of ES to nourish and give physical strength to perform daily tasks			
Diversity of dishes	Quality of ES to be prepared in different ways for consumption			
Availability	Availability of ES throughout the year	Availability	6	3
Source of income	Possibility to sell ES to generate an income	Household economy	5	6
For exchange	Possibility to use ES in exchange for other products needed (non-monetary)			

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**Commented [CH3]:** Gisella- do these numbers only relate to food and support for having food, or are they for all three? If the numbers are for all three groups, then please center the numbers.

If not, then you should add zeros to the 'nutrition' and 'diversity of dishes' so it's clear what the frequency of mention of criteria was for these two criteria.

Low cost	Acquisition of ES at no cost in monetary terms ('it is for free'), or at very low cost (e.g. when the only monetary cost is to buy the tools needed to get it)			
Cultural importance	Intrinsic cultural importance of ES related to the maintenance of indigenous knowledge, traditions and culture; possibility to use ES as raw materials to craft tools, masks and clothes that are used during culturally important activities (e.g. traditional dances and celebrations)	Cultural importance	5	4
Ease to obtain	Acquisition of ES with low physical effort	Accessibility	5	3
Short time effort	Acquisition of ES investing a short period of time			
Health	Quality of ES that directly and indirectly contribute to health, including those that help to be strong, and cure or prevent diseases	Health	3	5
For construction	Quality of ES to be used for the construction of mainly houses and canoes	Construction	3	3
Wellbeing	Quality of ES to contribute directly and indirectly to the overall wellbeing of the families	Wellbeing	2	1
Abundance	Abundance of ES in the territory, during the season when it is available	Abundance	1	0
Allows the natural regeneration of other resources	Quality of ES to promote the natural regeneration of other resources	Ecology	1	0
For hosting visitors	Possibility to use ES to provide food for visitors, <i>mambe</i> to share, and raw materials for building a house to receive them	Hospitality	1	0
Multiple benefits	Quality of ES to have multiplicity of uses and capacity to provide various benefits (e.g. fish is consumed as food and is also sold)	Variety	0	3
Variety of products	Quality of ES to provide a variety of products (e.g. provision of fish includes different types fish)			
For enjoyment	Ability of ES to bring joy, including the fun that people have when obtaining them, and providing the materials needed for enjoyment. For instance, when gathering ES is a collective activity full of fun shared by a group of people, or when ES provide the raw materials needed to craft objects that are used during traditional celebrations	Enjoyment	0	2
For transport	Quality of ES to provide raw materials for building canoes, and water from rivers as main means of local transport	Transport	0	1

\* Although local communities called the criterion 'food and support for having food', different focus groups referred to different things. For instance, sometimes they only referred to the importance of providing food products (e.g. fish, bush meat), whereas other groups also referred to importance of support for food production, land for food production

(e.g. maintenance of soil fertility and land for agricultural fields) and supplies for preparing food (e.g. firewood and raw materials for making cooking utensils).

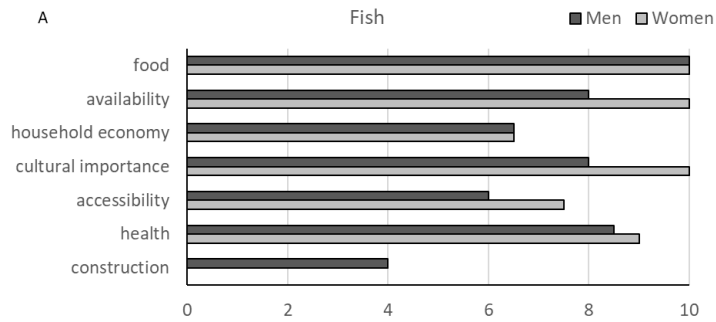
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#### 4.4. Gender differences regarding criteria of importance for each type of ES

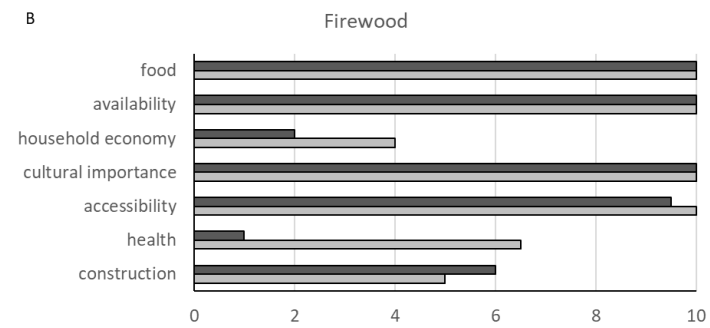
There were no statistically significant differences between men's and women's scores regarding the importance given to each type of ES, with the exception of wild fruits (Wilcoxon's  $z = 0.05$ ). Women gave higher scores than men to the cultural importance of wild fruits, their availability, importance for health, value for income generation (household economy), and their use for construction (the wood of some fruit trees is used for construction) (Fig. 2D). Women explained that some wild fruits, particularly palms like *chontaduro* (*Bactris gasipaes* Kunth) and *canangucho* (*Mauritia flexuosa* L.f.), played a central role in their traditional dances, where they were used to prepare *chicha*, a fermented drink. Women from Curare explained that *milpesos* (*Oenocarpus bataua* (Mart.)) was not only eaten as fruit, but also used to extract oil for cooking. Women also explained that they prepared fruit juices and sold them to have an extra income.

In addition, there were marginally significant differences (Wilcoxon's  $z = 0.10$ ) between men's and women's scores given to fish (Fig. 2A) and materials for cultural activities. For instance, women gave higher scores to the availability of fish, its cultural importance and accessibility, whereas men gave higher scores to the importance of fish for construction. The latter referred to the fact that indigenous communities usually build houses using a reciprocal labor system (*minga*) in which the owner of the house offers food (including fish) and drinks to the persons who come to help. As men are responsible for building houses, they consider fish to play an important role in feeding those who help in the construction of a house.

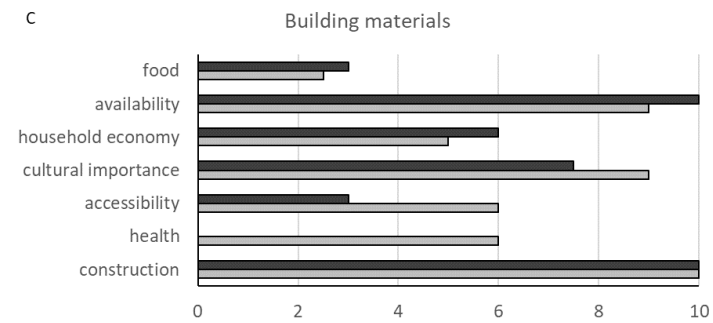
Both men and women gave high scores to firewood (Fig. 2B), the only source of cooking energy in the communities, for preparing food, accessibility, availability throughout the year, and cultural importance. They both scored firewood low as source of income (household economy). Both emphasized the importance of building materials in construction (Fig. 2C). Both men and women gave high scores to bush meat for cultural importance, but gave it low scores for accessibility, arguing that it was becoming scarcer and men had to spend more time in the forest to be successful with hunting (Fig. 2E). All groups gave high scores to the importance of medicinal plants for their availability, culture and health (Fig. 2F). Water was given a high score by both men and women for both food and health (Fig. 2H). Men and women scored materials for household tools (Fig. 2G) and land for agricultural fields (Fig. 2I) highly with respect to cultural importance, and highlighted the role of land for cultivating their food.



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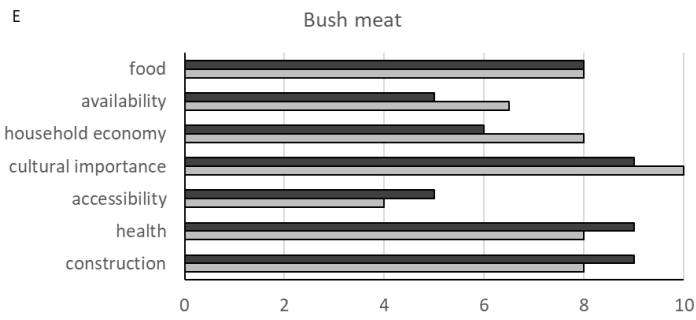
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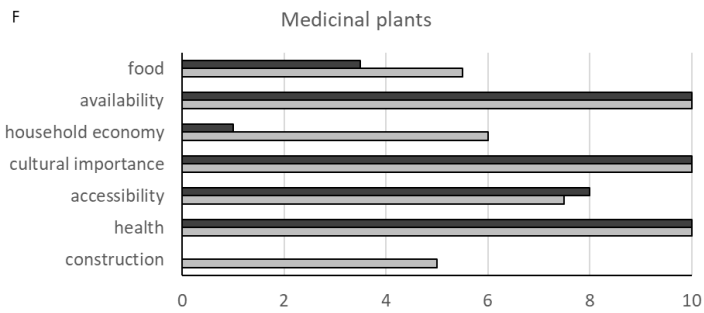
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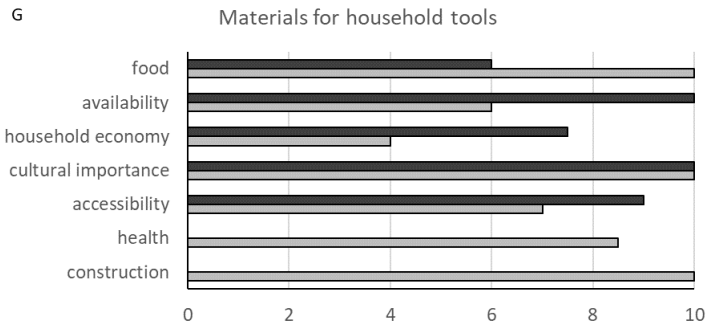


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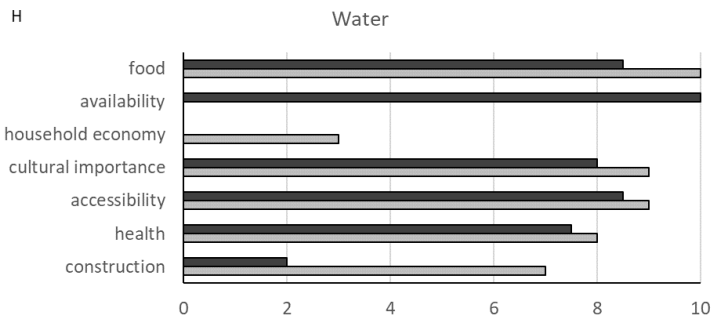


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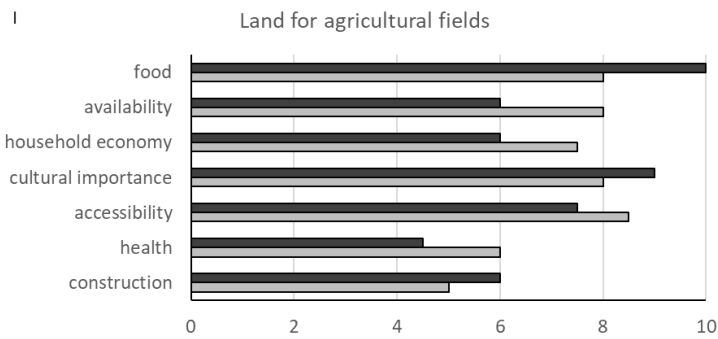




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**Fig. 2.** Median of men's and women's criteria of importance (based on thematic criteria groups) per ES type. Results for ES types and thematic criteria groups that were mentioned in 50% or more of men's and women's focus groups are presented. Scores range from one to ten, where ten is the highest and one the lowest. Data represent the median of 12 focus groups with a total of 61 participants, including men and women. A=fish, B=firewood, C=building materials, D=wild fruits, E=bush meat, F=medicinal plants, G=materials for household tools, H=water, and I=land for agricultural fields. Full results are presented in Appendix 1.

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Also, you need to add a label to the X axis.

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447 **5. Discussion and conclusions**

448

449 *5.1. Do men and women prioritize ES differently?*

450

451 Our case study adds to the growing evidence that ES and benefits are not gender neutral (Brown and  
452 Fortnam, 2018; Fisher et al., 2013; Martín-López et al., 2012; Tadesse et al., 2014). The results  
453 show that representatives of both indigenous men and women in the Colombian Amazon identify a  
454 similar number of ES, value similarly many of the same services, and share some of the criteria for  
455 prioritizing ES. However, there are important gender differences, with men and women mentioning  
456 different ES, identifying different criteria for valuing ES importance, and ascribing different values  
457 to different ES. In addition, men and women may agree that a particular ES is important but  
458 disagree on the reasons why it is important. These findings highlight the importance of taking a  
459 gender approach to ES valuation and priority setting, as men and women do not identify or value ES  
460 identically; and suggest that assessments of ES or projects designed to maintain ES provision need  
461 to take these gender differences into account.

462

463 Other studies also report that men and women value different ES and use different criteria of  
464 importance, but their specific findings do not necessarily mirror ours. For instance, Martín-López et  
465 al. (2012) report that in Spain men give a higher relative importance to provisioning services, while  
466 women do so for regulating services. A similar division is found in coastal fisheries in Kenya  
467 (Brown and Fortnam, 2018). In contrast, in La Pedrera, we found no major differences across  
468 genders regarding ES categories, although this may be related to the methodology applied (as  
469 mentioned in Section 3.1, the definition of ecosystem services provided to the indigenous  
470 communities might have biased the results in favor of provisioning services). Tadesse et al. (2014)  
471 document that women in southwestern Ethiopia have greater appreciation for firewood, whereas  
472 men privilege construction materials. In our site, while there were no significant differences in how  
473 men and women value firewood and construction materials, women emphasized the importance that  
474 both ES have for health, in contrast to men. Conversely, research carried out in Limpopo province,  
475 South Africa (Anthony and Bellinger, 2007), suggests that women value recreation (as ES type)  
476 more than men, a finding that echoes our results (regarding enjoyment, which is a criteria of  
477 importance only mentioned by women). These results suggest that the similarities and differences in  
478 the way men and women value ES are specific to the context; and also that the criteria used by men  
479 and women to value different ES may vary across socio-cultural settings.

480

481 The results of our study provide further evidence to support recommendations that gender should be  
482 a major component of ES assessments and valuation studies (Brown and Fortnam, 2018; Calvet-Mir  
483 et al., 2016; Yang et al., 2018), and gender considerations should be included in environmental  
484 practice on the ground (Arora-Jonsson, 2014; Ravera et al., 2016). Gender roles are known to  
485 influence the collection of forest products around the world (Sunderland et al., 2014). For instance,  
486 in our study area wild fruits were mainly gathered and highly valued by women. However, it is also  
487 important to recognize that ES are a co-production of natural and social systems, requiring inputs of  
488 various capitals (labor, finances, knowledge and education, etc.) to transform ecosystem structures  
489 and processes into the final 'benefits' we enjoy (Fisher et al., 2009; Lele et al., 2013; Palomo et al.,  
490 2016). Our study emphasizes the importance of paying attention to the gendered nature of the  
491 multiple activities involved in deriving benefits from ecosystems. In the La Pedrera communities,  
492 fishing and hunting were mainly carried out by men, but the preparation of food was done by  
493 women: this means that bush meat and fish as 'food' were co-produced between nature, men  
494 (hunters) and women (cooks). This co-production process appeared to be implicitly recognized by  
495 male and female participants who each gave similar scores to fish, bushmeat and firewood in  
496 relation to the 'food' criterion. Without delving deeper into such co-production processes, it would  
497 be easy for an ES assessment to overlook the gender roles embedded in the different activities that  
498 lead to the production of benefits. This could result in valuations which miss the different roles of

499 men and women (for example, in terms of their labor input, skills or power) and thus misjudge who  
500 will win and lose (and by how much) from different development interventions, particularly if the  
501 production process of ecosystem benefits relies on the marginalization or exploitation of vulnerable  
502 populations (Leach et al., 2016).

503  
504 In the case of indigenous communities, it is particularly necessary to take into account the  
505 intersectional nature of gender and power relations, where intersectionality is “the interaction of  
506 multiple identities and experiences of exclusion and subordination” (Davis, 2008: 67). For instance,  
507 women’s views might often not be heard outside the community because (a) they are women, and  
508 (b) they are also from an indigenous group, so they are potentially doubly disadvantaged. Thus, we  
509 highlight the need to ensure ES valuations do not overlook vulnerable populations and so perpetuate  
510 or worsen their vulnerability by producing a biased valuation and, subsequently, biased policy  
511 measures.

## 512 513 *5.2. Methodological reflections*

514  
515 There are several methodological caveats to our study which should be considered. First, focus  
516 group discussions are particularly useful methods for capturing the everyday use of language and  
517 culture of socio-cultural groups, while trying to explore the degree of consensus on a given topic  
518 (Morgan and Kreuger, 1993). Focus groups have been recommended for the assessment of ES  
519 priorities and values (Poppy et al., 2014) in a way that is less extractive than household surveys.  
520 However, focus groups are not statistically representative samples of the population, so the results  
521 cannot be generalized to the study site.

522  
523 Second, while the researchers tried to ensure that the focus group facilitators built rapport with  
524 indigenous communities, and thoroughly understood the cultural, economic and social settings (i.e.  
525 facilitators were living in each community while they were conducting the exercises in this  
526 particular study, and other exercises corresponding to the broader project), the results might have  
527 been different if the facilitators had had an indigenous background. Likewise, it is important to  
528 ensure that focus groups with women are facilitated by women and focus groups with men by men,  
529 in order to have an optimal accuracy in the results.

530  
531 Third, this study provided a working definition of ES to the study communities, which was  
532 previously pilot tested with indigenous peoples in the Amazon. Nonetheless, it is important to  
533 highlight that ES – as a term – is not a cultural domain of the studied indigenous communities. For  
534 instance, indigenous peoples do not have the word ES within their local languages, they might not  
535 think in terms of ‘services’ (but in terms of ‘nature’s gifts’), and they may conceptualize ‘the  
536 benefits by the surrounding environment’ differently according to their knowledge systems and  
537 ways they interact with nature (Díaz et al, 2014). Although the working definition we used was the  
538 most accurate for the study, it might have biased the results towards provisioning services.

539  
540 A final caveat of our work is that the prioritization of some ES (e.g. provision of bush meat and  
541 fish) might be affected by their seasonal availability at the time of data collection. Therefore, we  
542 recommend that future ES valuations compare men’s and women’s prioritizations in different  
543 seasons in order to address any potential effect of seasonality on ES identification and prioritization.

## 544 545 *5.3. Recommendations for future research*

546  
547 Our study provides novel information – based on focus group discussions with indigenous men and  
548 women in the Colombian Amazon – on how they value and prioritize ES. Our study also provides  
549 useful insights into how future conservation and development projects could incorporate these  
550 gender differences. Future studies could delve deeper into understanding how indigenous

551 communities build gender roles or how their existing gender roles condition the access and use of  
552 ES. In particular, there is a need to understand how these ES-related gender issues support or  
553 enhance power differentials between men and women in material and symbolic terms. For instance,  
554 with informal rules making fishing and hunting (including the commercialization of fish and bush  
555 meat) ‘male’ activities, what are the prospects for single women to live on their own? Certainly,  
556 rural women often lack control of or access to land and are therefore discriminated against in terms  
557 of using the associated ES (Brown and Fortnam, 2018). In our study site, although there are no  
558 formal norms that limit the access of women to administrative positions at any level, it is unusual  
559 for women to achieve such positions at either the community or Indigenous Reserve level. Future  
560 studies could further investigate how gendered access to land and decision-making influence ES  
561 use, prioritization and co-production in La Pedrera and other regions in the Amazon.

562  
563 The degradation of the natural resource may also affect gender roles differently. For instance, a  
564 major problem in La Pedrera is the decline of fish and bushmeat (Ramirez-Gomez et al., 2015).  
565 Both fishing and hunting activities are mainly carried out by men. This decline can make men’s  
566 roles harder: men have to go farther afield to hunt/fish successfully (Torres-Vitolas et al.,  
567 unpublished results). Future research might investigate how gender roles – and their influence on  
568 ES prioritization – are affected and adjusted in the face of social and environmental change.

569  
570 Future studies might also explore synergies and trade-offs associated with ES (not only those  
571 related to income, land areas or natural resource stocks, but also to lifestyle and domestic roles)  
572 from a gender perspective. For instance, what are the potential trade-offs between men and women  
573 when conservation projects are designed to favor ES that are valued differently across genders?  
574 How can associated negotiations and processes of consensus be managed and developed? It would  
575 also be important to assess how – and to what extent – cultural, institutional and political contexts  
576 influence the ways in which men and women value ES, and trade-off negotiations take place. Since  
577 men and women play different roles, they often face very different cultural, institutional and  
578 economic constraints, many of which are rooted in systematic biases and discrimination (Jost et al.,  
579 2014).

580  
581 Finally, in order to have more gender sensitive research on ES, it is necessary to identify which  
582 dimensions of gender – in addition to gender roles and prioritization – should be addressed. Based  
583 on our wider work in the La Pedrera area (e.g. Ramirez-Gomez et al., 2015; Torres-Vitolas et al.,  
584 unpublished results), where livelihoods are highly and very directly dependent on natural resources,  
585 the gender dimensions of environmental governance deserve particular attention, as well as power  
586 relations and rights to land. Furthermore, it might be useful to take an intersectional approach,  
587 which captures the diversity of perspectives and views of women within the society. Certainly, it  
588 has been widely recognized in the literature on gender and the environment that “different gender  
589 identities, associated with other identities, are co-produced through power relations, shaped in  
590 everyday life, in a dynamic and negotiation space, explaining different interactions with land, water,  
591 trees or other natural resources” (Ravera et al., 2016: S240).

#### 592 593 *5.4. Conclusions*

594  
595 Our study suggests that there is a need to incorporate a gender-based analysis in the assessment and  
596 valuation of ES in both conservation and sustainable development projects that aim to ensure the  
597 continued provision of these services over time. Applying a gender lens to ES research would help  
598 us to understand which ES men and women depend on, which services they value and which  
599 services contribute to their wellbeing. In some cases, these services will be similar across genders  
600 and projects can be developed to focus on those services that are most important to the overall  
601 wellbeing of the whole community. But in cases where there are gender-specific differences,  
602 knowing how men and women depend and value different services will allow projects to better

603 target their interventions to promote the wellbeing of all. For example, in the La Pedrera landscape,  
604 efforts to promote wellbeing of women could include improving the commercialization channels for  
605 locally-made fruit juice, while efforts to promote the wellbeing of men could emphasize the  
606 sustainable management of fish populations. Including both men and women in ES assessments and  
607 valuations also ensures that all services that play a key role for ensuring local livelihoods and  
608 community wellbeing are considered. ES conservation and valuation efforts (related to SDG 15)  
609 have a policy mandate to ensure gender equity (related to SDG 5), and it is crucial to work towards  
610 achieving both goals synergistically. Non-gender sensitive processes, in contrast, may result in  
611 prioritization or conservation objectives that do not include men's or women's perspectives, which  
612 in turn may impact ES management, communities' livelihoods, and the sustenance of the provision  
613 of services into the future.

614

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616

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624

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630 Council (NERC).

631

#### 632 **Note**

633

634 <sup>1</sup> The criteria used to define better-off and worse-off socio-economic groups – i.e. landholding  
635 areas, health and age of family members and access to cash income – alongside their respective  
636 ranges, were locally delineated during a focus group exercise conducted with community members.  
637 In this exercise, mixed groups of men and women from different ethnic groups and residing in  
638 different parts of the community, established a list of (non)economic indicators that characterized  
639 different local socioeconomic groups and described the village's socioeconomic composition (see  
640 exercise D in Schreckenberget al., 2016). The families belonging to each socio-economic group  
641 were defined in another focus group exercise, i.e. wellbeing ranking, where a pile of cards with the  
642 households' names was evaluated by focus group participants in relation to the criteria listed in the  
643 previous exercise (see exercise E in Schreckenberget al., 2016).

644

645

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## 780 781 **Figures**

782  
783 **Fig. 1.** La Pedrera *corregimiento*, Colombia, indicating the location of the nine communities that  
784 took part in the study

785  
786 **Fig. 2.** Median scores of men's and women's criteria of importance (based on thematic criteria  
787 groups) per ecosystem services types. Results for ecosystem service types and thematic criteria  
788 groups that were mentioned in 50% or more men's and women's focus groups are presented. Scores  
789 range from one to ten, where ten is the highest and one the lowest. Data represent median score  
790 from 12 focus groups with a total of 61 participants, including men and women). A=fish,  
791 B=firewood, C=building materials, D=wild fruits, E=bush meat, F=medicinal plants, G=materials  
792 for household tools, H=water, and I=land for agricultural fields. Full results are presented in  
793 Appendix 1.

## 794 795 **Tables**

796  
797 **Table 1.** A summary of the number of persons per community that participated in the focus group  
798 exercises.

799  
800 **Table 2.** Main gender productive roles in the study site (from 11 focus groups with a total of 57  
801 participants, including men and women). The number indicates whether an activity is conducted by  
802 men and/or women (an activity was conducted only by women or only by men when all focus  
803 groups indicated that; an activity was carried out by both when focus groups either differed in their  
804 answers or when they indicated that both conducted the activity).

805  
806 **Table 3.** Ecosystem services listed by representatives of indigenous men and women in La Pedrera,  
807 Colombia, grouped according to category and type (from 12 focus groups with a total of 61  
808 participants, including men and women).

809



810 **Table 4.** Criteria of ecosystem service importance as listed by representatives of indigenous men  
811 and women in La Pedrera, Colombia, also indicating groups of related criteria (from 12 focus  
812 groups with a total of 61 participants, including men and women).  
813

## Appendices

**Appendix 1.** Men's and women's frequency of mention across focus groups (count), highest and lowest value (max and min), median and mode for each criteria of importance group per ecosystem service type (from six focus groups conducted with men and six with women, with a total of 61 participants).

	Building materials										Bush meat									
	Men					Women					Men					Women				
	Count	Max	Min	Median	Mode	Count	Max	Min	Median	Mode	Count	Max	Min	Median	Mode	Count	Max	Min	Median	Mode
Abundance	1	8	8	8																
Accessibility	5	8	1	3	1	3	8	2	6	6	4	7	4	5	4	3	7	3	4	4
Availability	6	10	5	10	10	2	10	8	9		5	7	4	5	5	2	9	4	6,5	
Construction	3	10	8	10	10	3	10	10	10	10	1	9	9	9		1	8	8	8	
Cultural importance	5	10	2	7,5	8	4	10	5	9	10	5	10	8	9	10	4	10	9	10	10
Ecology	1	7	7	7							1	4	4	4						
Enjoyment						2	9	4	6,5							1	10	10	10	
Food	3	9	1	3		2	3	2	2,5		5	10	4	8	8	5	10	7	8	8
Health						5	8	2	6	4	3	9	2	9	9	4	10	3	8	
Hospitality	1	10	10	10																
Household economy	5	9	1	6	9	5	7	1	5	5	4	9	4	6	6	5	10	6	8	6
Transport				4		1	9	9	9											
Variety				3		3	10	8	9,5	10						3	8	5	6,5	
Wellbeing	2	10	8	9		1	10	10	10		2	10	10	10	10	1	8	7	7,5	
Number of criteria	10					11					9				10					

	Coca					Firewood														
	Men			Women		Men			Women											
	Count	Max	Min	Median	Mode	Count	Max	Min	Median	Mode	Count	Max	Min	Median	Mode					
Abundance											1	10	10	10						
Accessibility	2	9	7	8		1	10	10	10		5	10	8	9,5	10	3	10	9	10	10
Availability	3	10	10	10	10	1	10	10	10		6	10	10	10	10	3	10	10	10	10
Construction											1	6	6	6		2	7	3	5	
Cultural importance	2	10	10	10	10	1	10	10	10		5	10	1	10	10	4	10	8	10	10
Ecology											1	2	2	2						
Enjoyment																1	9	9	9	
Food	1	5	5	5							3	10	10	10	10	5	10	10	10	10
Health	1	10	10	10		1	10	10	10		1	1	1	1		4	8	5	6,5	
Hospitality	1	10	10	10							1	10	10	10						
Household economy	3	10	5	7	7	1	5	5	5		4	10	2	2	2	6	10	1	4	1
Transport																				
Variety																2	10	5	7,5	
Wellbeing											2	10	10	10	10	1	10	10	10	
Number of criteria	7					5					11					10				

	Fish					Land for agricultural fields														
	Men					Women					Men					Women				
	Count	Max	Min	Median	Mode	Count	Max	Min	Median	Mode	Count	Max	Min	Median	Mode	Count	Max	Min	Median	Mode
Abundance	1	7	7	7																
Accessibility	5	8	4	6	8	3	10	4	7,5		2	10	5	7,5	10	2	10	5	8,5	10
Availability	6	10	3	8	10	3	10	8	10	10	3	10	5	6	10	2	9	7	8	
Construction	1	4	4	4							2	8	4	6		3	10	0	5	
Cultural importance	5	10	2	8	8	4	10	8	10	10	3	10	1	9	10	4	10	7	8	8
Ecology	1	7	7	7																
Enjoyment						2	8	8	8	8						2	10	8	9	
Food	6	10	7	10	10	6	10	6	10	10	3	10	5	10	10	3	10	5	8	8
Health	4	10	4	8,5		5	10	2	9	9	2	8	2	4,5	2	5	7	5	6	6
Hospitality	1	10	10	10																
Household economy	5	10	0	6,5	0	6	10	0	6,5	6	3	9	4	6	6	3	10	4	7,5	6
Transport																				
Variety						3	10	8	10	10						2	10	4	8,5	
Wellbeing	2	10	5	10	10	1	10	10	10		2	10	8	9	10					
Number of criteria	11					9					8					9				

	Materials for cultural activities										Materials for household tools												
	Men					Women					Men					Women							
	Count	Max	Min	Median	Mode	Count	Max	Min	Median	Mode	Count	Max	Min	Median	Mode	Count	Max	Min	Median	Mode			
Abundance																							
Accessibility						1	8	4		6	3	9	5	9	9	2	9	4		7			
Availability	1	10	10		10	1	5	5		5	4	10	5	10	10	1	6	6		6			
Construction											3	8	0	0	0	1	10	10		10			
Cultural importance	1	10	10		10	2	10	10		10	10	4	10	6	10	10	1	10	10		10		
Ecology																							
Enjoyment						2	10	10		10	10												
Food	1	4	4		4						2	7	5		6	2	10	10		10	10		
Health	1	10	10		10	2	5	2		3,5						2	9	8		8,5			
Hospitality																							
Household economy	1	7	7		7	7	3	8	0		4	4	3	9	3	7,5	9	3	6	3		4	3
Transport																							
Variety						2	4	4		4	4						1	10	10		10		
Wellbeing						1	2	2		2	2	9	2		5,5								
Number of criteria	5					8					7					8							

	Medicinal plants										Oxygen									
	Men					Women					Men					Women				
	Count	Max	Min	Median	Mode	Count	Max	Min	Median	Mode	Count	Max	Min	Median	Mode	Count	Max	Min	Median	Mode
Abundance	1	10	10	10																
Accessibility	4	9	4	8	9	3	8	6	7,5	8										
Availability	5	10	7	10	10	2	10	10	10	10	1	10	10	10						
Construction						1	5	5	5											
Cultural importance	4	10	5	10	10	4	10	10	10	10										
Ecology																				
Enjoyment						2	10	3	6,5											
Food	2	4	3	3,5		2	7	4	5,5											
Health	3	10	10	10	10	5	10	5	10	10	1	10	10	10						
Hospitality	1	2	2	2																
Household economy	2	10	1	1	1	3	10	0	6	0										
Transport						1	2	2	2											
Variety						3	10	8	9											
Wellbeing	1	10	10	10		1	9	9	9											
Number of criteria	9					11					2				9					

	Products from agricultural fields										Soil fertility									
	Men					Women					Men					Women				
	Count	Max	Min	Median	Mode	Count	Max	Min	Median	Mode	Count	Max	Min	Median	Mode	Count	Max	Min	Median	Mode
Abundance																				
Accessibility	2	10	10	10	10	1	9	8	8,5		1	4	2	3		1	10	10	10	
Availability	3	10	10	10	10	1	10	10	10		1	7	7	7		1	10	10	10	
Construction																				
Cultural importance	2	10	10	10	10						1	9	9	9		1	10	10	10	
Ecology											1	6	6	6						
Enjoyment																				
Food	2	10	10	10	10	2	10	10	10	10	1	8	8	8		1	10	10	10	
Health	2	10	4	7		1	10	10	10							1	5	5	5	
Hospitality	1	10	10	10																
Household economy	2	6	5	5	5	2	7	5	5	5	1	10	9	9,5		1	3	3	3	
Transport																				
Variety																				
Wellbeing																				
Number of criteria	7					5					6					6				

	Soil types					Water					Wild fruits																			
	Women					Men					Women					Men					Women									
	Count	Max	Min	Median	Mode	Count	Max	Min	Median	Mode	Count	Max	Min	Median	Mode	Count	Max	Min	Median	Mode	Count	Max	Min	Median	Mode					
Abundance																														
Accessibility						3	10	4	8,5	10	1	9	9	9	9	4	10	5	8,5	9	3	8	4	6	6					
Availability						4	10	5	10	10						5	10	5	5,5	5	3	10	7	9	9					
Construction	1	4	4	4		1	2	2	2	2	1	7	7	7	7	3	4	3	4	4	3	7	4	6	6					
Cultural importance	1	7	7	7		4	9	8	8	8	3	10	3	9	9	5	10	5	8	10	4	10	8	10	10					
Ecology																1	2	2	2	2										
Enjoyment	1	6	6	6							2	10	5	7,5	7,5						2	10	8	9	9					
Food	1	10	10	10		4	10	4	8,5	10	3	10	7	10	10	5	8	2	7	7	6	10	5	7	7					
Health	1	7	7	7		3	8	5	7,5	8	3	9	8	8	8	3	8	2	3	3	5	8	3	7	8					
Hospitality																4	10	1	5	5	6	9	3	7,5	7					
Household economy	1	4	4	4							3	5	0	3	3															
Transport	1	2	2	2							1	9	9	9	9															
Variety	1	10	10	10							3	10	2	10	10						3	9	5	8	8					
Wellbeing	1	8	8	8		2	10	10	10	10	1	10	10	10	10	2	8	6	7	7	1	9	9	9	9					
Number of criteria	9					7					10					9					10									