Working Paper

Agroforestry and Forestry in Sulawesi series:

Women's participation in agroforestry: more benefit or burden?

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Elok Mulyoutami, Desi Awalina, Endri Martini, Noviana Khususiyah, Isnurdiansyah, Janudianto, Duman Wau and Suyanto

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PO Box 161, Bogor 16001
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Tel: +62 251 8625415
Fax: +62 251 8625416
Email: icraf-indonesia@cgiar.org
Website: http://www.worldagroforestry.org/regions/southeast_asia

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About the authors

Elok Mulyoutami began her research at the ICRAF Southeast Asia Regional Office in 2003, focusing on local ecological knowledge and farming systems. She has a Bachelor of Anthropology degree from Padjadjaran University in Bandung, Indonesia, and Master of Rural Sociology degree at Bogor Agricultural Institute, Indonesia. Her current research focuses on the wider social issues of demography, population and gender issues.

Desi Awalina has worked as a Research Assistant at ICRAF in November 2013. She has a Bachelor degree from the Chemistry deparment of Bogor Agricultural University, Indonesia.

Endri Martini has a Master of Science degree in Natural Resources and Environmental Management from the University of Hawaii, Manoa. She is currently working for ICRAF as an agroforestry extension specialist based in Sulawesi, Indonesia. Her research focus is community-based natural resource management.

Noviana Khususiyah is a socioeconomics and livelihood specialist at the ICRAF Southeast Asia Regional Office. Her focus is household surveys of socioeconomic data: education, land use, poverty, income equity, labour use, profit, community livelihood strategies, the environment and gender. She has a Master of Economics degree, majoring in Regional and Rural Development Planning concentrating on Environmental Economics, from Bogor Agricultural University, Indonesia.

Isnurdiyansyah has a Bachelor degree in Agribusiness Economics from Bogor Agricultural University, Indonesia. He first joined ICRAF in 2009 and then moved to the Indonesian Ministry of Agriculture, where he worked until 2011. He returned to ICRAF in 2012 to work as a research assistant in the Economic Policy Unit, working on socioeconomics and livelihood.

Janudianto has a Bachelor degree in Soil Science from Bogor Agricultural University, Indonesia. He has been working for ICRAF since 2005, focusing on agroforestry, garden management and farmer capacity development. He currently is working as an agroforestry management specialist, improving rubber agroforestry systems and agrobiodiversity assessments in Sumatra, Kalimantan and Sulawesi.

Duman Wau has a Master of Philosophy in International Development from University of Birmingham, UK. He is currently working for ICRAF as the Gorontalo AgFor Project Provincial Coordinator. Prior to joining ICRAF in 2014, he worked on various advocacy and community development projects, before focusing on his research into sustainability, with particular reference to coffee and cocoa production.

Suyanto has a PhD in Economics from Tokyo Metropolitan University, Japan. He is currently the principal scientist working on poverty, environmental services and property rights at the ICRAF Southeast Asia Regional Office, Bogor, Indonesia. He has over 15 years' experience in natural resource management and institutional analysis and has worked for ICRAF since 1994. He has managed several research projects related to climate change and environmental services rewards and is currently leading the economic and policy analysis unit at ICRAF, Indonesia.

Abstract

Women and men have different understandings of and knowledge about the natural resources in their environment. These differing knowledge bases influence their practices in managing and extracting natural resources, leading to different results and impacts. This study assesses the respective roles of women and men in households with agroforestry-based livelihoods in Gorontalo Province, Sulawesi, and seeks to show which gender receives the greatest benefits and which faces the greatest challenges in such partnerships. It also seeks to show how couples adapt and coexist in these households and in the wider community. The research findings provide guidance for designing equitable and effective development programmes that ensure that agroforestry livelihoods create more benefits than burdens for both women and men.

Keywords

Gender; Land-use; Market, Extension; Farming practices

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Acronyms

AF	Agroforestry
APL	*Area Penggunaan Lain*/Forest for Other Land Uses
BPS	*Biro Pusat Statistik*/Bureau of Statistics
ES	Environmental Services
FGD	Focus Group Discussion
GDI	Gender Development Index
GEM	Gender Empowerment Measurement
HDI	Human Development Index
HKM	*Hutan Kemasyarakatan*/Community forest
HL	*Hutan Lindung*/Protected Forest
HTR	*Hutan Tanaman Rakyat*/Community Plantation Forest
NTFP	Non Timber Forest Products
TKI	*Tenaga Kerja Indonesia*/Indonesian Labour Force

1. Introduction

Understanding the respective roles and responsibilities of women and men is critical for linking knowledge with action for sustainable development. Women and men have different understandings of and knowledge about the natural resources in their environment. Their knowledge base may influence their practices in managing and extracting natural resources, leading to different results and impacts. Considering women and men as distinct actors in natural resource management, and taking into account the gendered differences in their social and economic status in communities, is key to promoting sustainability.

In her study of rural communities in Malaysia, Hart (2011) noted that women tend to show greater resistance when responding to outside pressures, in comparison with men. As men tend to be employed within the strictures of a patronage relationship outside the home, women who work within the household economy are at greater liberty to assert their aspirations in collective actions. The authors of this study agree with Hart's position, noting that women and men have different understandings and experiences of their social situation and environment which in turn influences their respective strategies for managing their environment and maintaining quality of life. While these strategies vary widely, they tend to be complementary. However, in many cases women face more challenges and difficulties–in terms of socio-cultural, religious and/or political constraints–than men.

A study by Mulyoutami (2012) suggests that gender roles in South and Southeast Sulawesi are complementary, due to the relatively egalitarian social structure. Nonetheless, a gender gap in the level of public participation, as described by Colfer et al (2015a and 2015b), still applies. In the present study, the authors propose that women and men have different areas and levels of knowledge that informs their activities and capacity to extract, manage and protect their natural resources, but that women face greater challenges in their efforts to do so. The study begins with an assessment of gendered livelihood activities inside households, analysing the relationship between women and men (wives and husbands, in most cases). This study seeks to show who receives the greater benefits and who faces the greatest challenges in such partnerships, and how couples adapt and coexist in the household relationship.

Using Gorontalo Province as the community case study, the research team sought to examine gender relations in a range of agroforestry practices. The key research objectives were to:

1. Assess the gendered nature of the household relationship;
2. Understand the interactions between female and male knowledge and resource management practices;

3. Assess whether these practices are equitable or, if not, ascertain which gender benefits most from the status quo.

By providing data on the roles of both women and men, the results of this study will be useful as a basis for policymaking and programme development, as well as better-informed project implementation.

2. Site selection and research methodology

This gender study was conducted in September 2014 as part of a livelihood baseline survey for the 'Agroforestry and Forestry in Sulawesi: Linking Knowledge to Action' project in the early phases of ICRAF's Gorontalo programme. The study is focused on gender relations in managing land-based livelihood practices and gendered control over and access to resources. Using both qualitative and quantitative analysis, this study will explore gender differences in resource management practices, and identify whether it is women or men who experience the greatest benefit and/or disadvantage from these practices.

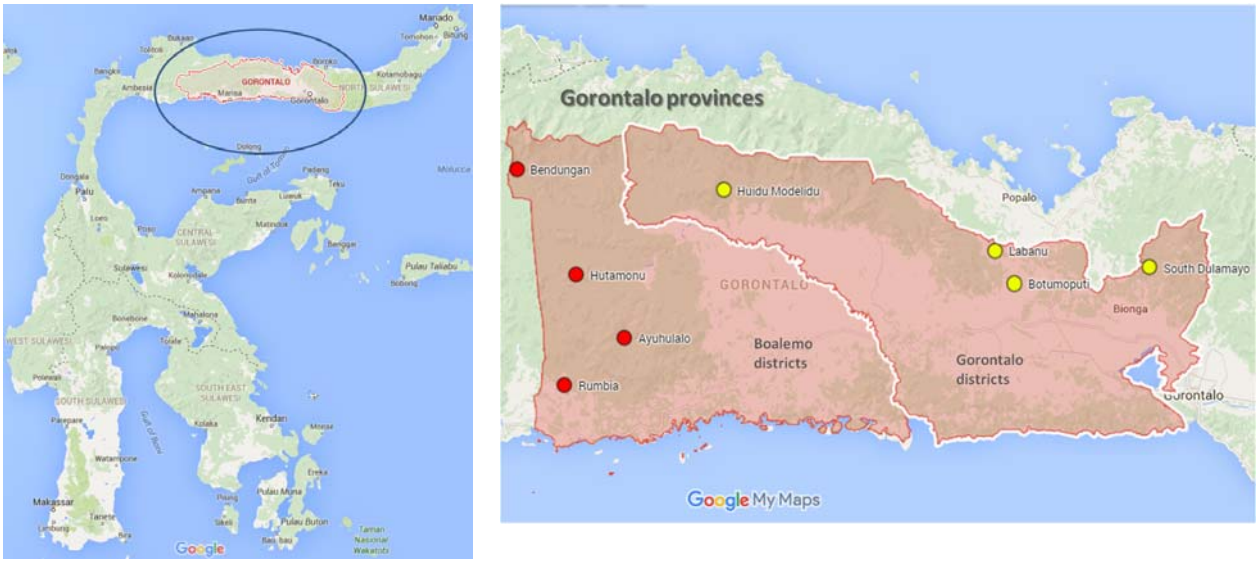

Figure 1 Study location

The study was conducted in two districts in Gorontalo Province: Gorontalo and Boalemo districts. Located in North Sulawesi, Gorontalo Province is a young province, formed in 2000 as part of the regional autonomy reforms; it is Indonesia's 32nd province.

The selected village study sites were all located in Boalemo and Gorontalo districts. The eight villages were categorised according to land type, forest cover, major land use systems, smallholder farming

practices, as well as land and resource management preferences, all of which are representative of Gorontalo Province but also provide scope for comparison. The primary consideration was the state of agroforestry and forest cover in each village site; these varied from very simple (a few trees and many ground crops) to complex (many varieties of commodity trees). Other important criteria include the status of the land in areas with potentially overlapping stakeholder interests, and potential issues around environmental services (ES). Detailed information on the characteristics of each village's typology is described in Table 1.

Table 1 Village typologies, detailed information on focus group discussions (FGD) and household survey implementation

District Village	Forestry and AF practices	Land status	FGD	Household survey
Gorontalo District				
Labanu	Medium Agroforestry (AF)	Bordering with natural reserve	3 per village (Men only, women only, combination of women and men)	30 households per village
Botumoputi		Limited production forest		
Dulamayo Selatan	Complex AF	Bordering with protected forest		
Modelidu				
Boalemo District				
Rumbia	Coconut based practices Simple AF Maize farm	Land for other usage – Community forest plantation	3 per village (Men only, women only, combination of women and men)	30 households per village
Bendungan		Land for other usage – Maize areas		
Ayuhulalo		Protected forest – Community forest		
Hutamanu				

Using an adaptation of the Harvard Analytical Framework (also known as the Gender Roles Framework) for data capture, this study aims to make women's roles and work more visible (Overholt et al 1985; Rao et al 1991). In prior project implementation, the Harvard Analytical Framework provided a portrayal of real conditions in the field. It was therefore important to develop criteria and indicators for assessing the changing situation over time and registering any differences before and after project implementation. Together with the Moser Gender Planning Framework (Moser 1993), the Harvard Framework acknowledges the input of women as well as men. These methodological tools therefore help in the development of more strategic and efficient projects. In the present study, descriptive statistical analysis enriched the captured information regarding gender access to and control over resources.

The primary data collection method employed was a series of full-day mini-workshops or focus group discussions with village representatives. Separate discussions were held with all-female and all-male

groups, using the same set of questions for each to compare the different points of view. There were 16 discussions, consisting of eight discussions with groups of female villagers (6–10 people per village) and eight discussions with groups of male villagers (6–10 people per village). The FGD used three types of question or method to elicit data: 1) ranking analysis using pebble games (Mulyoutami et al 2014), 2) analysis of decision making and preferences using analytical hierarchical process (Janudianto et al 2014), and 3) group interviews using qualitative or semi-ethnographic methods. In addition, a further set of FGDs, designed to glean a fuller picture of the history, conditions, main livelihood sources and land use changes, was carried out with mixed groups (6-10 people per village). Some individual interviews were also undertaken to gain general views of conditions in the village and community. One or two informants were drawn from each village for this purpose.

Household surveys were conducted in all the villages. The total number of respondents from both districts was 320 people, with about 30 representing each village. The questionnaires were designed using disaggregated data, which considered all variables that had gender implications within the family. Data from Badan Pusat Statistik (Indonesian Bureau of Statistics) and selected reports from the Human Development Index (HDI), Gender Development Index (GDI) and Gender Empowerment Measurement (GEM) were used to illustrate gender issues at district and provincial levels.

All the information gathered was classified as qualitative and quantitative data. Quantitative data gathered through household surveys and focus group discussions was primarily analysed using descriptive statistics. The Mann-Whitney *U* test was employed to check the differences between women's and men's preferences and opinions. Multivariate factor analysis was employed to visually describe the relative positions of some observed objects and their variables in flat field.

3. General overview of the site

Gorontalo Province is located in the northern part of Sulawesi Island, at 0°19' - 1°15' LU and 121°23' - 123°43' BT, with Tomini Bay to the south and the Sulawesi Sea to the north. Established in December 2000, Gorontalo Province has a total area of 12 435 km2. The province has six districts with a total population of approximately 1 097 660 people at a density of 88 people/km2 in 2012 (BPS Provinsi Gorontalo 2013).

Gorontalo District has a larger area (2 143.48 km2) than Boalemo District (1 736.61 km2). As of 2013, the population density in Gorontalo District is relatively high at about 171 people per km2, more than twice that of the average in neighbouring Boalemo (82 people per km2) and in the province (88 people per km2) as a whole. Population growth is rising relatively fast in Boalemo (at 2.88 percent per year), while the growth rate is lower in Gorontalo (0.80 per year). (Bappenas et al 2011, BPS Kabupaten Boalemo 2014, BPS Kabupaten Gorontalo 2014, BPS Provinsi Gorontalo 2013)

In 2011, agricultural activities contributed nearly 30 percent of the total economic growth of Gorontalo Province, as indicated in Mopangga (2011) and Baharuddin (2013). The data also shows that the growth rate of agricultural economic sectors is relatively low, on average 4.85 percent per year. Since the province relies heavily on agriculture, this is an area that needs further development. Coconut/copra production is an important source of income for almost 70 percent of people in the province. Smallholder coconut (*Cocos nucifera*) plantations make up 80 percent of the total crop plantation area, with 63 386 t of coconut produced from a total area of 66 800 ha in 2013 (Indonesia Investment Coordinating Board).

Boalemo District is dominated by areas of annual crops, consisting of maize farming, some irrigated and rainfed paddy areas, and simple mixed garden practices based on hybrid and local coconut trees. In Gorontalo District, there are also annual crops, primarily ginger (*Zingiber officinale Roscoe*), curcuma (*Curcuma longa*), chilli (*Capsicum annuum L*), tomato (*Solanum lycopersicum*) and more diverse tree crops grown with mixed garden practices ranging from very simple to complex agroforestry. Coconut and clove (*Syzygium aromaticum*) are particularly important trees in these mixed gardens. Data from Gorontalo and Boalemo districts shows that coconut, clove, nutmeg (*Myristica fragrans*) and coffee (*Coffea liberica*, *Coffea canephora*) production is slightly more prevalent in Gorontalo District than in Boalemo. Coconut production in Gorontalo totals about 22 672 t from a 21 348 ha area, while in Boalemo production totals about 7 416 t from an 8 678 ha area. Clove production in Gorontalo District totals 209 t from a 3048 ha area, with about 13 t from 837 ha in Boalemo.

The majority ethnic group in both Gorontalo and Boalemo districts is Gorontalo (previously known as Holundalo). The Gorontalo people are closely linked with the Mangondow (in Boolang Mongondow, North Sulawesi), the Buol (in Buol, Central Sulawesi) and the Bolango (in Bone Bolango, part of Gorontalo Province) (Sneddon 1989). Ethnic Gorontalo people are predominantly Muslim (97 percent), though many still hold local animistic beliefs. Other ethnic groups residing in the province include the Minahasa (mainly in the north of the province), some Bugis (spontaneous migrants from South Sulawesi), and some Javanese and Balinese, who arrived via government-sponsored transmigration programmes in the late 1970s.

The Gorontalo, like most ethnic groups in Indonesia, traditionally have a bilateral or parental descent system (Rahman 2014). In this type of system property rights are transmitted through both the maternal and paternal lineage, without one lineage taking prominence over the other (Mitchell 1979). However, Islamic cultural values and patriarchal ideology dominate many aspects of community and family decision-making (Sahi 2012). The majority of community members follow traditional Islamic inheritance practices, whereby a daughter is only allocated half the sum of inheritance that would be received by a son.

In 2011, a report developed in cooperation between the Ministry of National Development Planning (BAPPENAS), the provincial government of Gorontalo and UNDP indicated that the HDI of

Gorontalo had improved steadily following the expansion of administrative regions (*pemekaran wilayah*) during the regional autonomy reforms (Bappenas et al 2011). However, as shown Figure 2, Gorontalo Province, with the exception of Gorontalo City, remains underdeveloped relative to the other provinces of Sulawesi, and also below national levels.

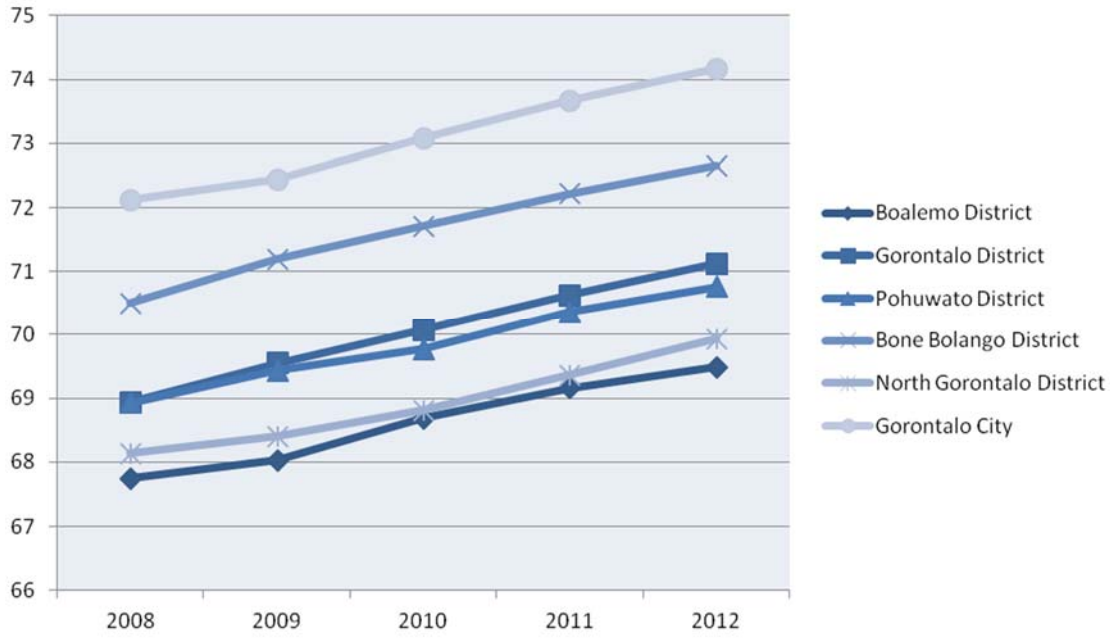

Figure 2 HDI on Sulawesi Island

Source: Bappenas et al 2011

The same report examined the levels of human development in 40 of Gorontalo's subdistricts, and found that 25 percent had a low HDI. These subdistricts included Tibawa (Labanu and Botumoputi villages) and Telaga Biru (Dulamayo Selatan and Modelidu) in Gorontalo District, and Botumoito (Rumbia and Hutamanu villages) in Boalemo District. The report concluded that the low level of HDI in these subdistricts was mainly due to poor education and low household income.

4. Understanding gender disparity through HDI

GDI is a composite index with the same indicators as HDI, but using disaggregated data relating to gender. This index shows what the development process means for women and men, respectively. A low GDI level indicates an inequity between the development of one gender (either women or men) and the other. A disparity between HDI and GDI levels indicates uneven development between genders. A high HDI level indicates successful development, while a low GDI score suggests that the development process has not yet integrated gender considerations. The Gender Empowerment

Measurement (GEM) is an index that measures the relative participation of women and men in economic and political decision-making. Low GEM indicates that the participation levels are uneven.

Figure 3 shows the gender disparity situation in Gorontalo Province in 2012, locating all the districts across four quadrants, which each indicate a different level of HDI, GDI and GEM. A national level index was used as the cut-off point for dividing the four quadrants. Quadrant 1 shows areas with high gender disparity (large gaps between HDI and GDI, above the national level), and with low participation of women in economic and political aspects (GEM) (above the national level). Most of the districts in Gorontalo, as well as Gorontalo Province as a whole, fall within this quadrant, which suggests that efforts are needed to improve the gender awareness of development programmes. Quadrant 2 designates high gender disparity levels with a high GEM, which means that while women's economic and political participation is higher relative to Quadrant 1, further work is needed in terms of their education and income levels. No districts fall inside this quadrant. Quadrant 3 shows areas with low gender disparity with a high GEM, which is the desired situation. Only Pohuwato District falls within Quadrant 3. Quadrant 4 shows areas with low gender disparity and relatively low GEM. No areas fall inside this quadrant.

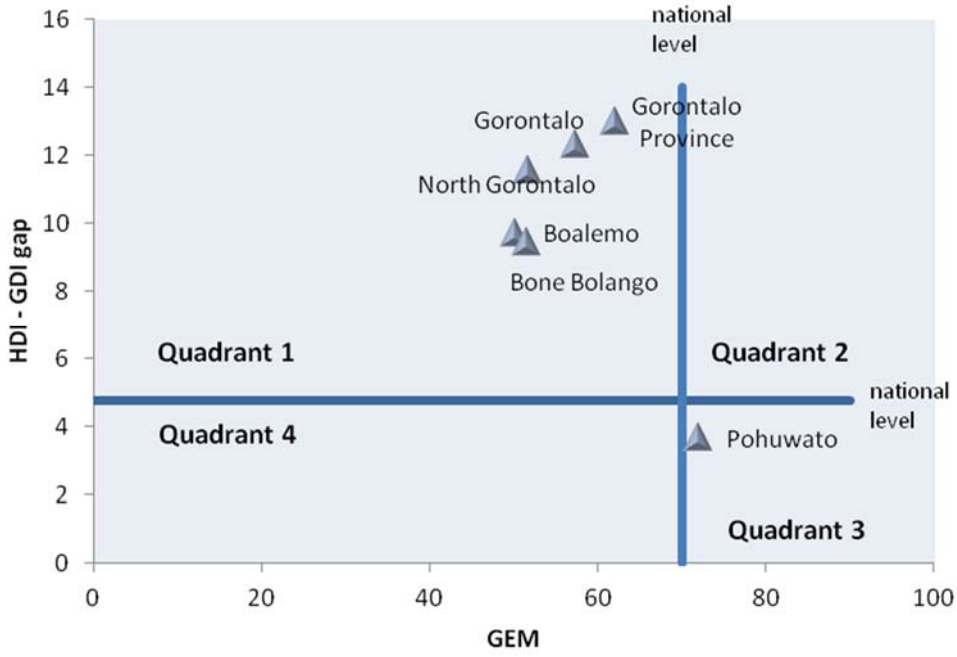

Figure 3 Quadrant positions of Gorontalo Province and its districts showing GEM and HDI-GDI gaps

Source: Bappenas et al (2011)

The GDI levels of Gorontalo Province and all its districts remain below the national average (68.52). Pohuwato performs best with the highest GDI, followed by Gorontalo City. The more detailed data in

Table 2 reveals that the key indicator contributing to these low GDI levels is income. Women's contribution to household income was very low, amounting to just 28.28 percent of the total. The length of schooling and illiteracy rates did not show a significant gender disparity, and in some cases women scored higher than men in these areas.

Table 2 Composite indices of GDI in Gorontalo Province

	GDI		Life expectancy (years)		Illiteracy rate (%)		Schooling (years)		Contribution to income (%)	
Districts	2011	2012	L	P	L	P	L	P	L	P
Boalemo	59.19	59.77	66.37	70.36	96.64	95.45	5.90	6.82	73.14	26.86
Gorontalo	58.10	58.82	67.15	71.14	94.57	95.11	6.71	7.22	75.03	24.97
Pohuwato	66.40	67.09	65.94	69.91	97.80	96.61	6.57	6.97	64.30	35.70
Bone Bolango	62.53	63.22	66.97	70.96	97.86	97.32	7.53	8.20	71.90	28.10
North Gorontalo	57.46	58.40	65.27	69.22	94.69	96.05	6.14	6.81	75.01	24.99
Gorontalo City	63.88	64.67	64.89	68.82	99.38	99.75	10.11	10.45	70.93	29.07

Source: Bappenas, Pemerintah Gorontalo, UNDP (2011). Pembangunan Provinsi Gorontalo: Perencanaan dengan Indeks Pembangunan Manusia

5. Gendered issues in some important livelihood sources

The main sources of livelihood in almost all the villages in the surveyed areas are maize farming, mixed garden and coconut based agroforestry practices. The majority of maize is grown for the market, with a smaller amount for subsistence. Maize is the most important commodity for most of Gorontalo Province. Mixed garden or simple agroforest were the main land use practices in almost all the surveyed villages. Coconut, clove, nutmeg and vanilla (*Vannili planifolia*) are the main commodity crops produced in these mixed gardens. Local people also stated that their mixed gardens also contained some annual crops including ginger, curcuma, chilli, tomatoes and some vegetables. Table 3 gives a more detailed description of the main livelihood sources in each of the surveyed villages.

Women's primary involvement with livelihood sources is through horticultural work, mixed-garden growing, off-farm growing, palm sugar production, fruit-based practices, poultry raising and handicrafts. Horticulture–such as growing chilli, tomatoes, onions and some medicinal plants (curcuma and ginger)–is usually practiced in homegardens or in mixed gardens near the home. This means that women can be concurrently involved in both horticultural work and household tasks, without travelling far from the house. However, despite the market potential of their produce, the low

production levels mean that this horticultural work only contributes a small portion to household income.

Table 3 Main livelihood practices per village

<table>
<tr><th>District/Village</th><th colspan="4">Land based livelihood</th><th>Non-land based livelihood</th></tr>
<tr><td></td><td colspan="2">Annual crops</td><td colspan="2">Tree based commodities</td><td>Irrigated paddy</td><td>Temporary migration</td></tr>
<tr><td colspan="7">Gorontalo District</td></tr>
<tr><td>Labanu</td><td rowspan="3">Maize farm
Chilli production</td><td rowspan="3">Curcuma and ginger production</td><td rowspan="3">Mixed garden: clove and nutmeg</td><td>No</td><td rowspan="3">No</td><td>Mining work in other villages</td></tr>
<tr><td>Botumoputi</td><td>Teak</td><td></td></tr>
<tr><td>Modelidu</td><td>Fruit trees Damar (Agathis dammara Lamb.)</td><td>No</td></tr>
<tr><td>Dulamayo Selatan</td><td></td><td></td><td></td><td></td><td></td><td>Mining work in other villages</td></tr>
<tr><td colspan="7">Boalemo District</td></tr>
<tr><td>Rumbia</td><td rowspan="3">Maize farm
Coconut
Veterinary</td><td>No</td><td colspan="2" rowspan="3">Mixed garden: clove and nutmeg</td><td rowspan="2">No</td><td>No</td></tr>
<tr><td>Ayuhulalo</td><td rowspan="2">Chilli production</td><td></td><td></td></tr>
<tr><td>Hutamanu</td><td></td><td>Off-farm work in the city</td></tr>
<tr><td>Bendungan</td><td>No</td><td></td><td>Irrigated paddy</td><td>No</td></tr>
</table>

Data source: FGD

Farm labour is an important source of household income for people at the lower economic strata of the communities in most of the selected villages in both districts.

Table 4 shows that the proportion of women engaged in farm labour is higher than the proportion of men. However, the more detailed data presented in Annexes

Annex *1* shows that the male proportion working in farm labour is actually higher across the villages, with the exception of Labanu Village, where a far higher proportion of women than men are involved in this type of work (a differential of almost 60 percent). This disparity may be due to differences in Labanu's farming methods. While South Dulamayo and other villages focus on mixed garden production–for example, the production of clove, nutmeg and vanilla–Labanu focuses more on the homegarden crops of ginger and curcuma.

Most of the FGD data indicated that women and men were work together in most of the livelihood sources though, in general, men have greater involvement in some farming and land-based activities. Large gender gaps were seen in NTFP and timber production from forest areas, as well as in fishing (Table 4).In the discussions, women explained that they have little interest in forest and river/sea activities because they have greater responsibility for childrearing and need to stay close to home.

Table 4 Gendered roles in livelihood sources

Livelihood sources	Man	Women	n-discussion
Fishing	3.50*	0.67	4
NTFP - Forest	3.55*	1.27	7
Handcrafting	3.86	6.29*	7
Temporary migration	4.17*	1.50	4
Poultry	5.00	6.33*	3
Timber - Forest	5.00*	0.33	3
Off-farm	5.05	5.73*	8
Teak Farm	5.50*	3.75	3
Tenant	6.75*	5.25	4
Palm sugar (Arenga Pinnata)	7.43	8.00*	6
Fruit based systems	7.75	8.00*	4
Horticulture	7.75	9.80*	7
Livestock	7.91*	4.73	7
Coconut based garden	8.64*	6.45	7
Mixed garden	9.84	11.13*	8
Farm labour	9.94	12.19*	8
Irrigated paddy	12.25*	9.25	2
Maize farming	18.92*	18.00	7

Note: * indicates greater involvement. Data source: FGD

Gendered involvement in land management

Across the board, women and men have different levels of involvement in each of the land use practices, though men are more greatly involved. Looking at several major land use practices in each village, the groups discussed how much each gender contributed to six key activities: land preparation, nursery growing, planting, land maintenance, harvesting and post harvest activities. The researchers asked discussants to weight their contribution for each of these activities and then compared the results between the single sex FDGs.

The patterns that emerge in Gorontalo are slightly different than those in South and Southeast Sulawesi, where men still make the largest contribution to household income generating activities, but women make a greater contribution to the harvest and post-harvest work (Mulyoutami et al 2012; Roshetko 2015). In Gorontalo, men were more dominant in almost all activities, with the exception of maize harvesting activities and the farming of annual crops. As the harvest only lasts a short time, women and men work together, either as family or hired labour. Harvesting crops in mixed gardens can be carried out over longer periods, which means that women's involvement is less necessary and hired labour is only needed at certain times.

There is a consistent disparity in female and male involvement in land preparation practices. The manual work of land preparation is mostly done by men, using simple mechanical tools known as *bajak* (or *pajeko* in the local language). Women may be involved in some light work and provision of food.

Nursery and land maintenance (weeding, clearing, etc.) is mostly carried out by men. The growing and harvesting of coconuts is also generally carried out by men because the work is quite heavy and physically challenging. A man may climb up to 20-30 coconut trees per day, earning approximately

Rp 4000 per tree. Women often collect the fallen coconuts. The coconuts are then split and peeled, again mostly by men. The payment for peeling coconuts is about Rp 40 000 per 100 coconuts. Drying the coconut flesh is usually shared between women and men, with women focusing on the drying process and men carrying the dried flesh. Dried coconut (copra) is taken to market by both women and men.

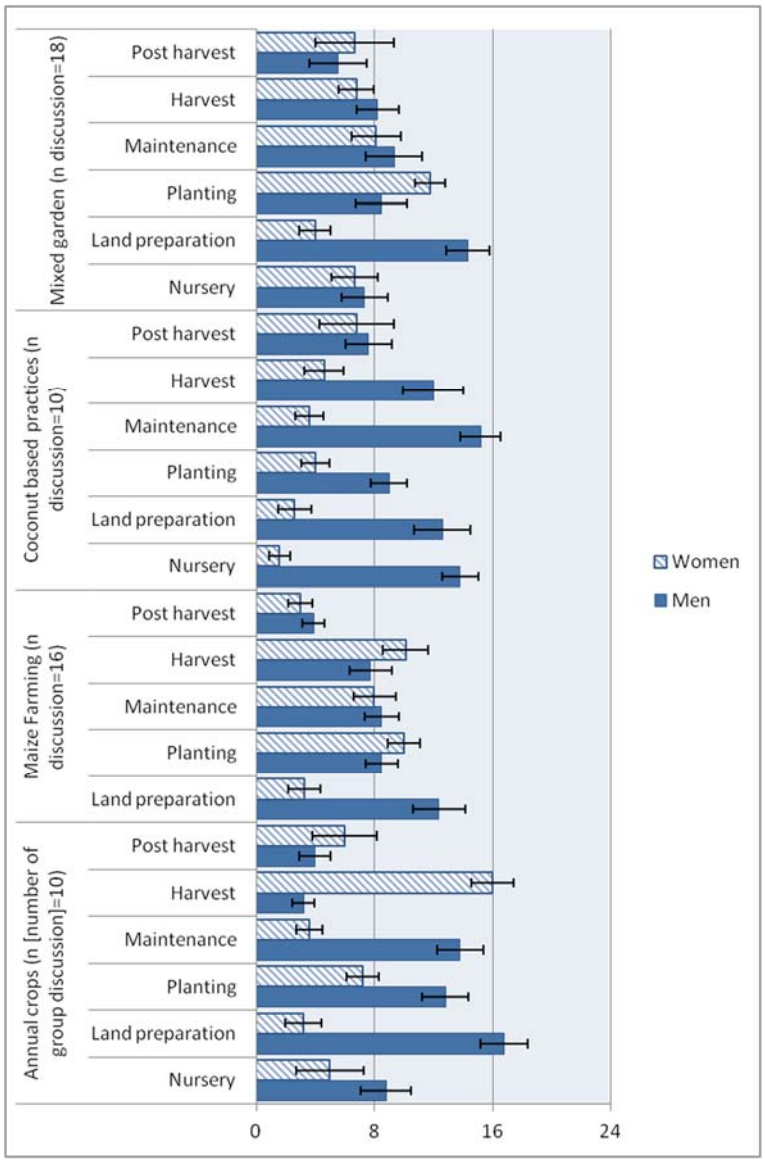

Figure 4 Gendered participation in each land use system

Data source: FGD

Gendered perceptions of land use and its functions

Gendered perceptions of the value of ecosystem services for each main livelihood surveyed were elicited using single sex FDGs. The pebble distribution method (PDM) was also employed during these discussions.

We classified ecosystem services–including provisioning, regulating, cultural and support services (Pagiola et al 2005)–according to two main functions: environmental services (ES) and livelihood. ES functions include water and soil protection, microclimate regulation and biodiversity preservation. Livelihood functions include cultural (ritual) issues, subsistence and marketable use of land. The villagers' understandings of land use function were closely associated with their livelihood patterns, cultural background and social life, as well as the physical characteristics of their particular area.

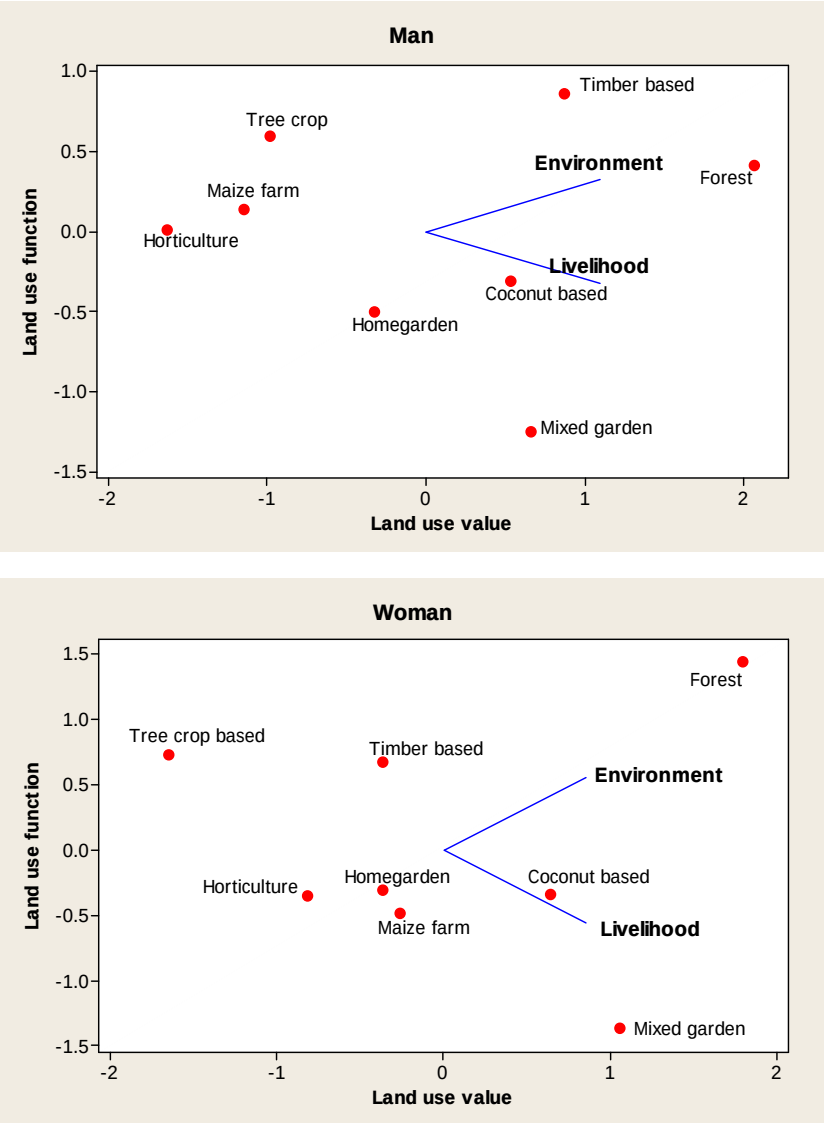

Figure 5 Gendered perceptions of land use values based on function

Data source: FGD

Both women and men stated that forest, coconut based land, and mixed garden had the highest value for them when considering the two land use functions (presented in Figure 5). While women acknowledged its importance, the men ascribed higher value to timber-based land. Men thought that horticulture plots had the lowest value, while women thought that tree-based crops like cacao and clove had the lowest value.

Both women and men agreed that tree-based crops and timber-based practices in forest have a high ES function. In terms of livelihood function, men thought that maize farms and horticulture plots were less valuable than coconut based practices, homegarden and mixed garden. They reasoned that although maize farms are an important source of income for many people in Gorontalo Province, their value is limited because they only produce a single type of crop. Conversely, women argued that maize farms were of high value, as maize both fulfilled their subsistence needs and provided a major source of income. The women ascribed almost equal value to maize farms and homegardens and it was clear that women rely more directly on homegarden, maize and horticulture products.

Figure 6 is a more detailed illustration of women and men's respective perceptions of the relative ES function value of each land use practice. Their perceptions are almost the same. Both groups agreed that forest has a high ES function, particularly in terms of land, soil and water conservation. They also agreed that the main function of forest land use is subsistence and income (livelihood). Timber practices and tree crop practices were also ascribed high values for land, soil and water conservation, as well as livelihood.

Both women and men agreed that homegardens are important for meeting subsistence needs, particularly for the preservation of medicinal plants and for cultural use. While women pointed out the high value of biodiversity in homegardens, men perceived that forest land had a higher biodiversity preservation value.

Figure 6 shows that women and men share similar perceptions about the value of the various land use systems and their functions, albeit with slightly different emphases. The most obvious difference between the genders is the way each perceived biodiversity function. Men appeared to be more knowledgeable of biodiversity function in forest and mixed garden land, while women were more knowledgeable of biodiversity in the areas near the house, primarily the homegarden. Women prioritised this land use as fulfilled not only their livelihood needs through income from tree crop commodities, but also their household subsistence needs through medicinal plants and other annual crops. The FGDs produced practical evidence of how gender influences perceptions of land use function.

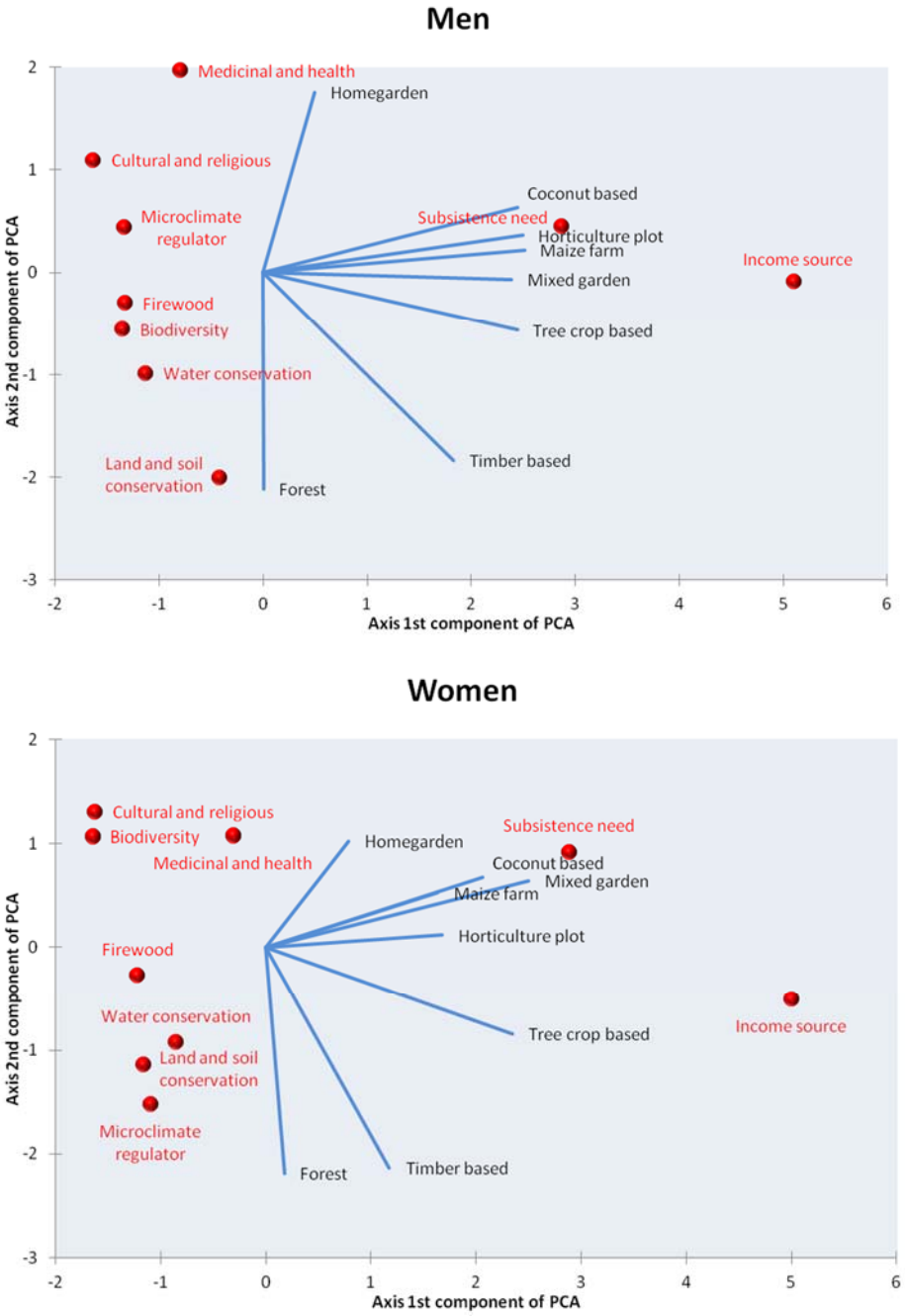

Figure 6 Gendered perceptions of land use values based on ES function

Data source: FGD

Gendered preferences in land use

Discussion groups using analytical hierarchical process with the community were undertaken to capture the preferences of each gender regarding land use: what types of land use they want to maintain and what practices they would like to change. The results are presented in Figure 7. Discussion using principal component analysis showed that both women and men assume that 'available' forested and shrub land ought to be converted to other land uses as a priority. This

available forest land does not refer to forest area status (*kawasan*), but to land densely covered in mature trees; shrub land is covered with smaller trees and pioneer plants. Predictably, given the previously raised issues regarding to proximity to the home, women focused on shrub land whereas men focused on forest. The Mann-Whitney *U* statistical test was employed to quantify the respective gender positions. The results showed that women indicated a strong preference for converting shrub rather than forested areas, while men would consider converting either shrub or forest, depending on the condition and status of the land. For women, converting shrub is considered easier work, while men thought that converting forest would produce a higher long-term economic return due to the fertility level of forest land. The women seemed more focused on the short term while men focused on the longer term.

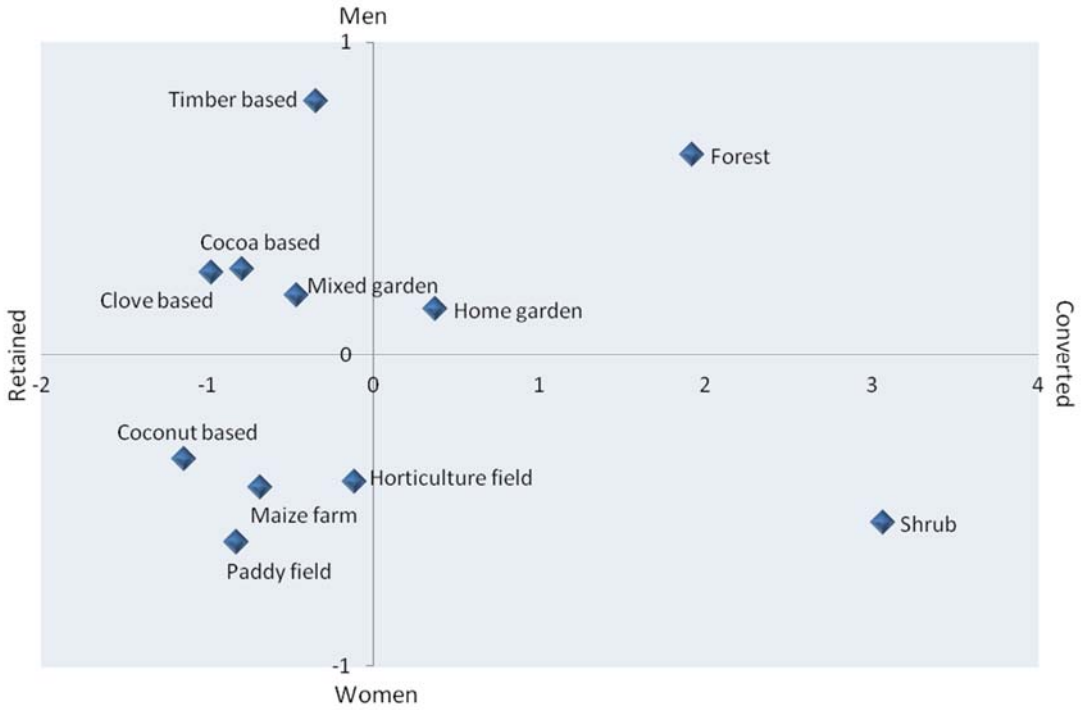

Figure 7 Gendered preferences regarding land use/conversion to more lucrative land use

Data source: FGD

Figure 7 also shows that men value timber based, cocoa based, mixed garden, and home garden practices, but that they prefer to convert these farmlands to more lucrative commodity land uses. Men argue that converting paddy area requires a large and immediate outlay of labour and capital while planting commodity crops is a gradual process. Women prioritise maize farm, paddy fields and horticulture areas. Unlike the men, they are more likely to prioritize to convert land used for annual crops (rather than trees) if they want to plant lucrative tree crops. They argued that since commodity crops like cocoa, homegarden and mixed garden agriculture are lucrative sources of income they take priority over annual crops.

The Mann-Whitney *U* test picked up significant differences between women and men's attitudes towards mixed garden and maize farm. Women preferred to convert maize farm while men preferred to change mixed garden. This may reflect the stereotype of men working land with commodity trees, while women tend to work in more open areas, such horticulture and paddy. In short, women in Gorontalo were more focused on high income returns in the short term, while men focused on both high profitability and long-term productivity.

The men showed a significantly stronger tendency to convert timber based systems to other land uses. Figure 7 also indicated that men are also keener to convert timber land to other land use practices, while woman preferred to retain the timber land. However, during in-depth discussions with the men, it became clear that men were not prejudiced against timber land; instead, they said that once the timber is harvested they can both sell the wood and convert the land to more a lucrative system. If the timber crop is sufficiently productive and lucrative, they will consider maintaining the land. Coconut and clove are the main tree commodities in Gorontalo, and they are recognised as the best livelihood sources by both women and men.

Gendered preferences towards agroforestry crops

Using the Analytic Hierarchy Approach (AHP) to data collection, the identified agroforestry crops species were classified into (i) annual crops: maize, ginger and chilli; (ii) fruits: banana (*Musa sp*), citrus, coconut, duku (*Lansium domesticum*), jackfruit (*Artocarpus heterophyllus*), lansium (*Lansium domesticum*), mango (*Mangivera sp*), mangosteen (*Garcinia mangostana*), matoa (*Pometia pinnata*), papaya (*Carica papaya*), rambutan (*Nephelium lappaceum*); (iii) timber: jabon (*Anthocephalus cadamba*), gmelina (*Gmelina celebica*), mahogany (*Swietenia macrophylla*), *nyatoh* or palaquium (*Palaquium obtusifolium Burck*), and teak (*Tectona grandis*); and (iv) sugarpalm (*Arenga pinnata*). Women showed a preference for fruits, sugar palm and timber, while men prioritised estate or tree crops such coffee, cocoa and nutmeg and other more lucrative plant crops (Figure 8).

In South and Southeast Sulawesi, annual crops are favoured by both women and men. Mulyoutami (2015) indicates that paddy and maize are the most highly favoured annual crops in South Sulawesi, while people in the southeast prefer paddy and sago as their staple food. Interestingly, although maize is currently the main source of livelihood in Gorontalo, only a few of the male group and none of the female group discussants mentioned it as a high preference crop. In keeping with the research results on land use preferences, women were keen to convert land used for maize production into other lucrative crops. Women indicated that maize cultivation consumes too much time and energy.

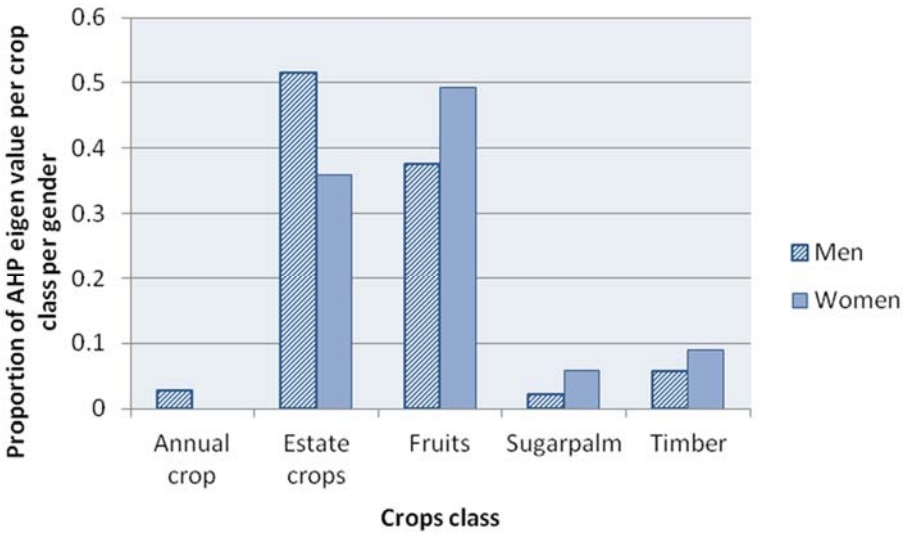

Figure 8 Crop class preferences by gender

Data source: FGD

6. Decision-making: farming practices and household

In common with the governance of most other areas of public life in Indonesia, decision-making about farming and land use practices is dominated by men (Colfer et al 2015a, Colfer et al 2015b, Mulyoutami et al 2012). In contrast, women tend to take far greater responsibility for household finances. The data shown in Figure 9 was gathered during single sex FGDs in Gorontalo Province. More detailed data on women's contribution to decision-making in each village is presented in Annex 2.

According to a study by Mulyoutami (2012), women in Gorontalo have greater control over household financial management than they do in other parts of Sulawesi. In the women's FGDs many discussants stated that while men tended to put bank accounts and credit schemes in their own names, women actually had full control of the finances. This point was also reiterated in the men's FGDs, where they said that women usually keep the household income and spend it on household consumption, and men request money from the budget when they need to buy farm or plantation supplies. These supplies are considered to be men's responsibility.

As men are often busy with productive activities (in the forest, fields, etc.), women often represent their family in village or social activities, such as training or community work. However, if important decisions need to be made, women will first discuss the issue with men and meetings will often be repeated so that the men can attend. Thus, women take a supporting or substituting role but men are the main decision-makers. According to Martini et al (2014) in their study of South and Southeast

Sulawesi, men tend to have better access to extension services and consequently greater knowledge and skills; they therefore have greater responsibility for decision-making.

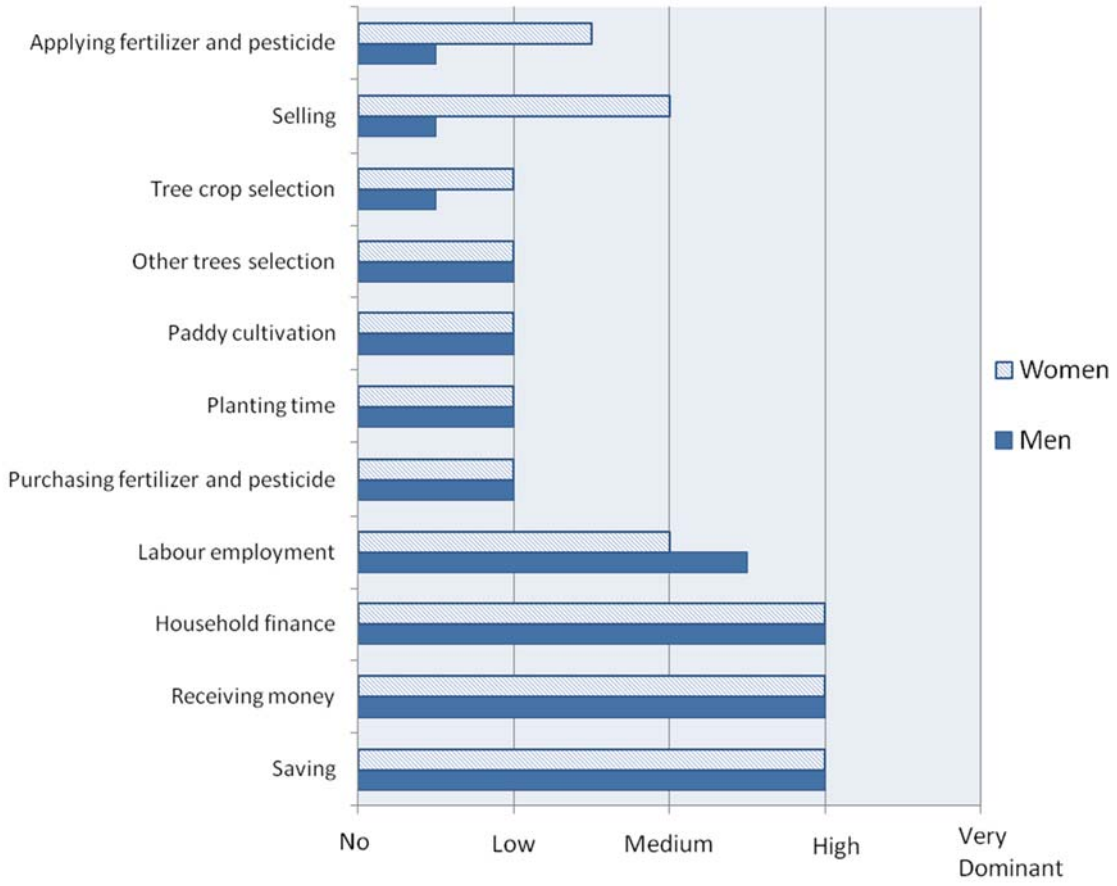

Figure 9 Women's role in decision-making

Note: Higher value indicating higher role of women

Data source: FGD

7. Gender roles in the market

The market is an important aspect of land-based livelihoods in rural communities. The unit of analysis is the household level, consisting of women and men: in a marriage, or as father–daughter or mother–son.

Men are the key players in market work, while women may assist the men if they are not available. However, women play an important role in the sale of craft products, an important source of income for the community. Products such as rice, chilli, tomatoes, arenga sugar (*Arenga pinnata*), pepper (*Piperaceae*) and coffee are also usually sold by women, while cacao, nutmeg, coconut/copra, clove, medicinal plants and other tree crops products are usually sold by men (Figure 11).

On this basis, it seems that women are more responsible for the sale of products with a high subsistence value. For example, rice, chilli, tomatoes, pepper and coffee are all important for household consumption. Women are well placed to determine exactly how much of this products can be sold and how much needs to be kept back for household consumption.

In Southeast and South Sulawesi, it is believed that women have superior negotiating skills and they therefore have an important role in the sale of coffee, cacao, clove and other high value commodities (Mulyoutami 2012). However, smallholder farmers of either sex struggle to determine prices as the market is controlled by higher-ranking collectors. Women in Gorontalo do not have such an extensive role in sales (see Figure 10). Greater emphasis is placed on women's management of household finance, including allocations of cash for farming expenses.

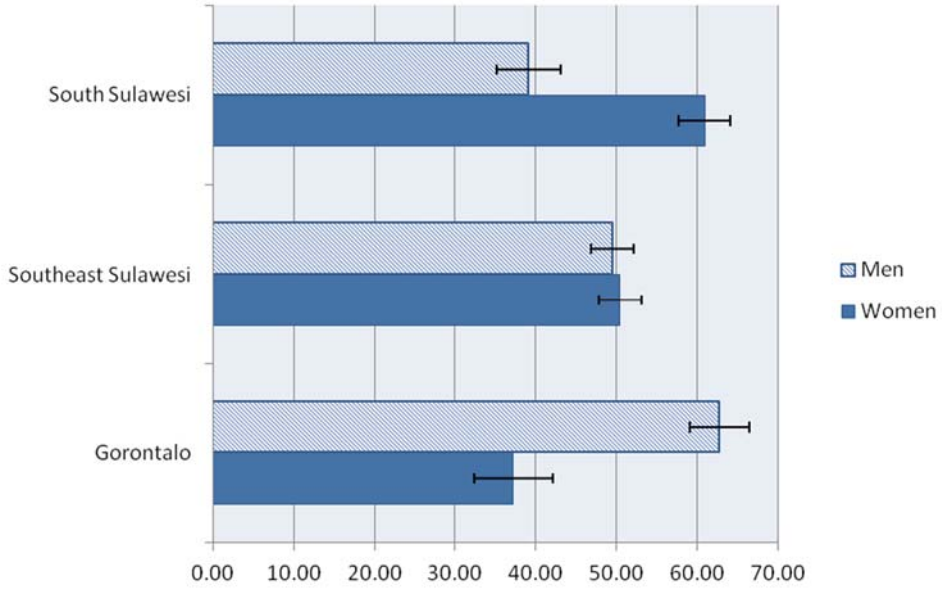

Figure 10 Women and men involved with selling produce in three provinces in Sulawesi

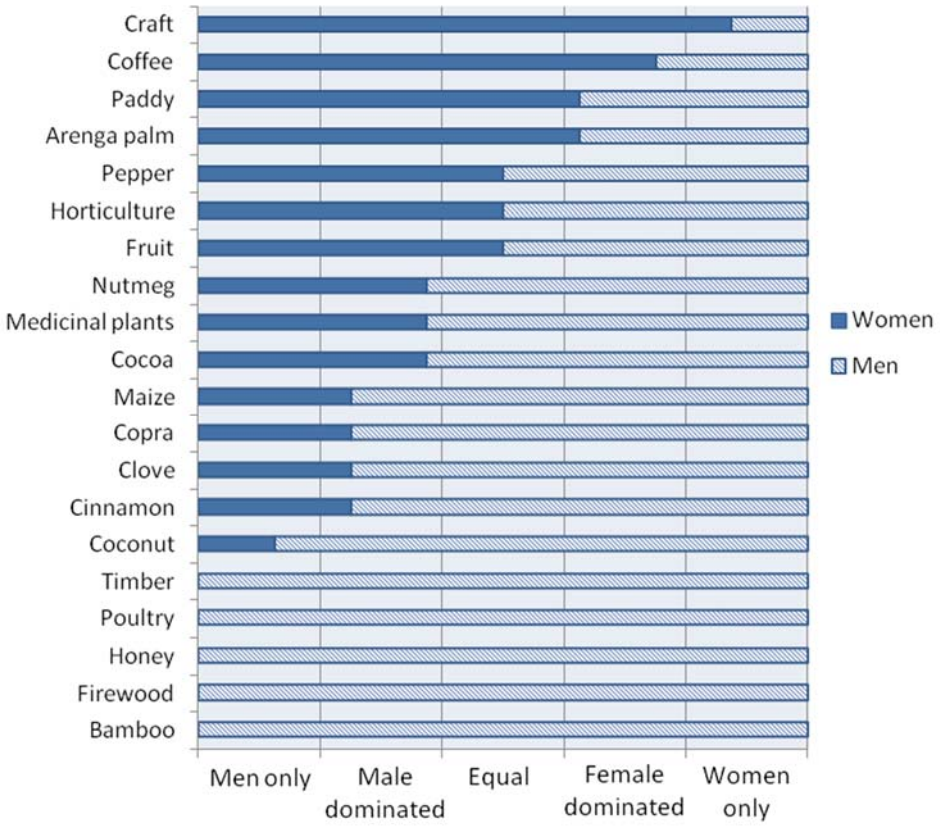

Figure 11 Gender roles in sales of common commodities

Data source: FGD

8. Gendered access to information and extension services

Access to communication media

Overall, access to communication media is no different between women and men in Gorontalo Province (Figure 12). Both women and men tend to own or have access to mobile phones, television, radio, CD/DVD players, internet (usually through mobile phones, internet cafes or public internet services in village offices) and newspapers for communication and information. Men tend to have better access to magazines than women, and a small portion of men also prefer to have magazines as their main source of information. There are differences across districts. For example, in Boalemo District, television is preferred over mobile phones, and not many people listen to the radio. In Gorontalo District, mobile phones are preferred over television, and radio is more popular.

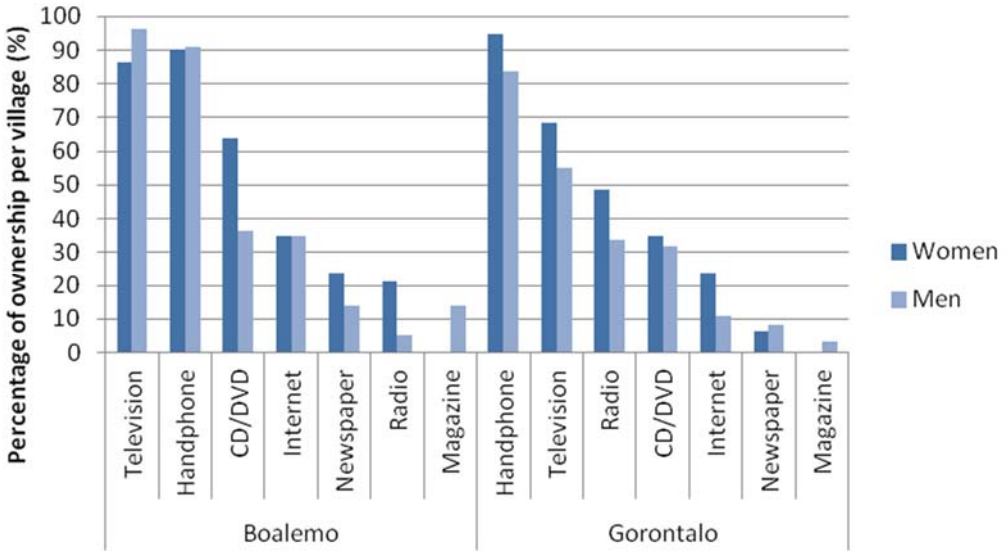

Figure 12 Communication media ownership per gender per district (%)

Data source: FGD

Access to agricultural extension services

In recent years, the frequency of agricultural extension services activity has increased in Gorontalo Province (Table 1 and Table 5). Women and men have similar access to agricultural extension services. Farmers from both the surveyed districts received similar types of extension services, although demonstration trials are more frequently observed in Gorontalo than in Boalemo.

Table 5 Frequency of different types of agricultural extension services

District	Type of agricultural extension	Men				Women			
		N.A	1-2 /year	3-6 /year	6+ /year	N.A.	1-2 /year	3-6 /year	6+ /year
Boalemo	Practical tools	1	4	2	1	1	4	2	1
	Demonstration trial	7	1			7	1		
	Training	2	3	1	2	2	3	1	2
	Discussion	1	4	2	1	1	4	2	1
	Field visit	2	6			2	6		
Gorontalo	Practical tools	2	6			2	6		
	Demonstration trial	4	4			4	4		
	Training	1	4	2	1	1	4	2	1
	Discussion	1	5	1	1	1	5	1	1
	Field visit	2	5	1		2	5	1	

Data source: FGD

In Gorontalo, women and men have had similar access to all the types of agricultural extension services available over the past 5 years (2010-2015). This differs from the situation in South and Southeast Sulawesi, where women are less likely to access such services (Martini et al 2012). However, as shown in Figure 13, women and men's level of participation varies according to the type of activity on offer. Men tend to participate more in field visits and activities using practical tools, while women attend more demonstration trials, training activities and discussions. Women are far less likely to go on field visits due to their domestic commitments, which don't allow much scope for travelling away from the home.

In general, the women of Gorontalo Province have a good level of access to agricultural extension services, which is similar to that available to men. This situation differs considerably from the situation in South and Southeast Sulawesi provinces, where women have less access to these services, mostly to due to the Bugis and Makassarese culture in which garden management activities are primarily the responsibility of men, while women are more focused on domestic household activities.

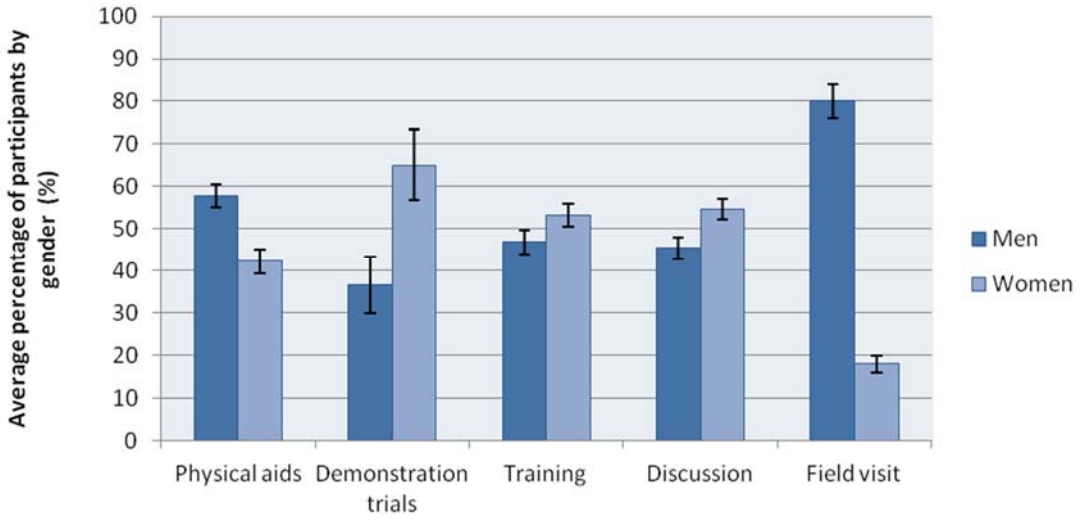

Figure 13 Participation by gender in different types of agricultural extension received between 2010 and 2015 in Gorontalo Province

Data source: FGD

Potential extension activities

The FGD participants in Gorontalo were asked to propose the types of agricultural extension activities they would like to have in the future. Their proposals are divided into four main types: requested seedlings, demonstration trials, discussion groups and training (Table 6).

With the requested seedlings, there was clear distinction between districts. In Boalemo, the priority was estate crops and fruit trees like cacao, clove, nutmeg and durian. In Gorontalo, the priority was annual crops, fruit trees and clove. There was no clear preference by gender, though in Boalemo

women were keener on fruit tree species than the men, and in Gorontalo women were keener on fruits and vegetables than the men. Species that were prioritised by respondents in each district also reflected the types of demonstration trials that they hoped would be designed and maintained.

Table 6 Types of agricultural extension activities proposed by participants in each district

Topic	Activities	Boalemo		Gorontalo	
		Men	Women	Men	Women
Seedlings	Annual crops			V	V
	Cacao	V			
	Cacao, clove		V		
	Durian		V		
	Durian, apple, clove, strawberry			V	
	Durian, clove				V
	Fruits			V	
	Nutmeg, clove	V	V		
	Nutmeg, clove, maize			V	
	Vegetables and fruits				V
Demonstration trials	Cacao	V			
	Cacao, durian, pepper		V		
	Clove		V		
	Clove, cacao, nutmeg, chilli	V			
	Clove, nutmeg, durian		V		
	Clove, nutmeg, durian, jackfruit			V	
	Durian		V		
	Durian, apple, clove, strawberry			V	
	Fruits			V	
	Maize, coconut, cacao				V
	Nutmeg, clove	V			
	Nutmeg, clove, pepper			V	
	Papaya				V
	Vegetables				V
Discussion	Cultivation	V	V	V	V
	Cultivation and Market			V	
	Nursery		V		
	Vegetative propagation	V		V	
Training	Cultivation	V	V	V	V
	Fertilizing				V
	Nursery	V			
	Organic fertilizer		V		
	Tree maintenance		V		
	Vegetative propagation	V		V	V

Data source: FGD

Both women and men agreed on the types of information and training they wanted from agricultural extension services (demonstration trials, discussion groups and training). These were: cultivation, vegetative propagation, fertilizer, nursery work and tree maintenance.

In addition to these four main types, the respondents also expressed a desire to have field visits to other places outside Gorontalo Province. They asked to learn about clove cultivation in successful growing areas like Tolitoli (Central Sulawesi) or Manado (North Sulawesi), or to visit successful cacao growing regions in Central Sulawesi. There were no notable differences between women and men's preferences in the locations that were proposed for field visit activities.

9. Concluding comments. Agroforestry for women: benefit or burden?

The research has shown that women and men have specific forms of knowledge and different productive strategies, but that these tend to be complementary and even synergistic. In farming households in Gorontalo Province, we tried to assess the varying levels of gender equity across various socio-economic household types.

In households that rely primarily on land based livelihood practices, women and men usually do the farming together, with a clear division of labour. Women contribute to the physically lighter work, such as harvesting and post-harvest processing, while men usually take more responsibility for land management, preparation and maintenance. This is in line with the gendered knowledge data elicited through the FGDs and surveys that show that men are more concerned with land with trees and women are more focused on land with fewer trees. The division of labour is quite proportional. Women tend to work in areas closer to the home, to ensure that they retain sufficient time for fulfilling domestic responsibilities. Although this avoids an excessive burden of travel and physical labour, it also means that women's access to information, training and other extension services is limited.

In poorer households, women may have a heavier burden of labour, reflected in the physically heavier agricultural tasks they need to carry out combined with domestic responsibilities. In this socio-economic group, there may be no time left over training or extension services activities and the household may be focused solely on meeting their economic needs. This lack of involvement in extension services activities applies to both women and men.

In households that do not rely on land-based livelihood practices, women usually have greater choice about whether they are involved in economic activities. Again, the level of household affluence will determine the level of gender equity with regard to work. In poorer non-farming households, women may face a double burden: responsible for both domestic and economic activities.

In more affluent households, families may not need to rely on land-based livelihood practices or they may be engaged in less heavy physical labour and more management or supervisory roles. Gender roles are also somewhat different in his socio-economic group, with men doing more lucrative work outside of the home. Women may still contribute to farming activities, but have the option to focus on lighter work or focus entirely on domestic work in the home.

Women's roles can be empowered by providing educational extension services to expand agricultural knowledge and skills, as well as guidance on marketing and selling produce. However, it is important to balance the benefit this provides against the burden it creates on women's schedule of work. The research team recommends that women from poor farming households with land-based livelihoods should be invited to participate in projects and training activities. As these projects should avoid creating an unnecessary burden on women's work capacity, it is also recommended that their participation with such extension services is not only measured in terms of frequent attendance, but also by the level of contribution and knowledge shared. It is also noted that gender equity will only be achieved if there is more effective communication within households and communities. Men also need to make a firm commitment to acknowledging and valuing women's work and agricultural knowledge if women are to have a stronger voice in decision-making and enjoy the full benefits of agroforestry.

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Annexes

Annex 1. The respective roles of men and women in the surveyed livelihood sources (Numbers presenting percentage of men or women involve in eahc livelihood sources)

	Ayuhulalo		Bendungan		Butumoputi		Dulamayo Selatan		Hutamonu		Labanu		Modelidu		Rumbia		Total	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Timber - Forest	4.00	0.00	4.00	1.00					7.00	0.00							5.00	0.33
Fishing	2.00	0.00			1.00	0.00			5.00	0.00					4.00	2.00	3.50	0.67
NTFP - Forest	3.67	0.00	5.00	1.00	2.00	3.00	4.00	4.00	4.00	0.00	1.00	1.00			3.50	2.00	3.55	1.27
Temporary migration					4.50	1.00	8.00	0.00	4.00	4.00	2.00	1.50					4.17	1.50
Wage labour - off farm	3.50	2.00			6.00	4.33	8.00	0.00	6.00	0.00	7.00	0.00	12.00	0.00			6.40	1.70
Teak Farm					5.00	5.00					8.00	1.00	4.50	4.50			5.50	3.75
Cattle	10.00	4.50	11.00	10.00	7.50	8.00			12.00	2.00	4.00	3.50	4.00	4.00	8.50	2.00	7.91	4.73
Tenant	5.00	5.00	8.00	2.00	9.00	11.00					5.00	3.00					6.75	5.25
Handcrafting	0.00	7.00	0.00	3.00	7.00	3.00	10.00	12.00	0.00	11.00	2.00	0.00			8.00	8.00	3.86	6.29
Poultry					7.00	7.00					2.00	5.00	6.00	7.00			5.00	6.33
Coconut farming/Coconut tree management	9.50	6.50	8.00	0.00	6.00	5.00			15.00	9.00	5.50	7.50	6.50	4.00	11.50	10.50	8.64	6.45
Off farm	4.67	13.33	0.50	4.50	3.43	4.14	7.67	7.67	5.75	13.50	3.17	3.50	6.75	5.50	2.00	7.00	4.65	6.91
Fruit based systems					7.00	5.00	10.00	14.00			4.00	6.00	10.00	7.00			7.75	8.00
Palm sugar (Arenga pinnata)	8.00	9.00	1.00	1.00					4.50	3.00	3.00	4.00	18.00	23.00	13.00	13.00	7.43	8.00
Irrigated paddy			18.50	12.00	6.00	6.50											12.25	9.25
Horticulture	8.50	5.50	6.00	7.67	8.00	8.50	18.00	14.00	11.00	24.00	4.20	4.80	9.50	16.50			7.75	9.80
Mixed garden	10.00	14.33	6.71	6.57	8.00	6.50	15.80	17.60	20.50	21.00	3.00	4.25	5.25	6.25	13.80	16.40	9.84	11.13
Farm labour	11.50	6.00	12.50	14.00	6.50	13.00	8.50	11.00	7.50	7.00	8.50	27.50	11.50	6.50	13.00	12.50	9.94	12.19
Maize farming	20.00	23.50	15.00	25.50	11.00	9.00			18.50	17.00	38.00	19.00	8.00	12.00	12.50	12.50	18.92	18.00

Source: FGD

Annex 2 Women's participation in decision-making in Gorontalo

Activity	Village	n	Active role in decision-making by gender			
			Men		Women	
			n	%	n	%
Type of perennials to be planted	Bendungan	30	29	97	1	3
	Rumbia	30	29	97	1	3
	Ayuhulalo	30	30	100	0	0
	Hutamonu	30	28	93	2	7
	Modelidu	30	30	100	0	0
	Dulamayo	30	29	97	1	3
	Labanu	30	30	100	0	0
	Botumoputi	30	30	100	0	0
Type of crop to be planted	Bendungan	30	27	90	3	10
	Rumbia	30	27	90	3	10
	Ayuhulalo	30	29	97	1	3
	Hutamonu	30	25	83	5	17
	Modelidu	30	29	97	1	3
	Dulamayo	30	28	93	2	7
	Labanu	30	24	80	6	20
	Botumoputi	30	27	90	3	10
Time to start planting	Bendungan	30	29	97	1	3
	Rumbia	30	29	97	1	3
	Ayuhulalo	30	30	100	0	0
	Hutamonu	30	28	93	2	7
	Modelidu	30	30	100	0	0
	Dulamayo	30	29	97	1	3
	Labanu	30	29	97	1	3
	Botumoputi	30	28	93	2	7
Planting other plants	Bendungan	30	29	97	1	3
	Rumbia	30	28	93	2	7
	Ayuhulalo	30	27	90	3	10
	Hutamonu	30	27	90	3	10
	Modelidu	30	29	97	1	3
	Dulamayo	30	29	97	1	3
	Labanu	30	28	93	2	7
	Botumoputi	30	30	100	0	0
Adding fertilizer and other chemicals	Bendungan	30	29	97	1	3
	Rumbia	30	28	93	2	7
	Ayuhulalo	30	30	100	0	0
	Hutamonu	30	26	87	4	13
	Modelidu	30	30	100	0	0
	Dulamayo	30	29	97	1	3

Activity	Village	n	Active role in decision-making by gender			
			Men		Women	
			n	%	n	%
	Labanu	30	28	93	2	7
	Botumoputi	30	30	100	0	0
Marketing agricultural yield	Bendungan	30	27	90	3	10
	Rumbia	30	29	97	1	3
	Ayuhulalo	30	29	97	1	3
	Hutamonu	30	27	90	3	10
	Modelidu	30	29	97	1	3
	Dulamayo	30	28	93	2	7
	Labanu	30	27	90	3	10
	Botumoputi	30	27	90	3	10

Source: Household survey

Annex 3 The role of women in maize farming system activities in Gorontalo Province

Activity	Villages	n	The role of women in farming system activities							
			Women > men		Women = men		Women < men		No female role	
			n	%	n	%	n	%	n	%
Land Preparation	Bendungan	27	1	4	0	0	11	41	15	56
	Rumbia	22	0	0	2	9	19	86	1	5
	Ayuhulalo	22	0	0	3	14	12	55	7	32
	Hutamonu	29	0	0	1	3	12	41	16	55
	Modelidu	16	0	0	0	0	15	94	1	6
	Dulamayo	0	0	0	0	0	0	0	0	0
	Labanu	15	0	0	2	13	6	40	7	47
	Botumoputi	15	0	0	3	20	8	53	4	27
Planting	Bendungan	27	4	15	9	33	9	33	5	19
	Rumbia	22	1	5	9	41	12	55	0	0
	Ayuhulalo	22	0	0	11	50	11	50	0	0
	Hutamonu	29	2	7	5	17	14	48	8	28
	Modelidu	16	0	0	8	50	8	50	0	0
	Dulamayo	0	0	0	0	0	0	0	0	0
	Labanu	15	1	7	5	33	7	47	2	13
	Botumoputi	15	0	0	7	47	8	53	0	0
Cultivation	Bendungan	27	1	4	2	7	16	59	8	30
	Rumbia	22	0	0	4	18	16	73	2	9
	Ayuhulalo	22	1	5	4	18	15	68	2	9
	Hutamonu	29	2	7	2	7	16	55	9	31
	Modelidu	16	0	0	1	6	14	88	1	6
	Dulamayo	0	0	0	0	0	0	0	0	0
	Labanu	15	0	0	3	20	10	67	2	13
	Botumoputi	15	1	7	6	40	8	53	0	0
Harvesting	Bendungan	27	3	11	6	22	13	48	5	19
	Rumbia	22	2	9	10	45	10	45	0	0
	Ayuhulalo	22	1	5	12	55	8	36	1	5
	Hutamonu	29	5	17	7	24	10	34	7	24
	Modelidu	16	1	6	4	25	11	69	0	0
	Dulamayo	0	0	0	0	0	0	0	0	0
	Labanu	15	2	13	3	20	8	53	2	13
	Botumoputi	15	2	13	6	40	7	47	0	0
Post-harvesting	Bendungan	27	1	4	5	19	14	52	7	26
	Rumbia	22	0	0	4	18	12	55	6	27
	Ayuhulalo	22	0	0	5	23	9	41	8	36
	Hutamonu	29	0	0	2	7	16	55	11	38
	Modelidu	16	2	13	0	0	14	88	0	0
	Dulamayo	0	0	0	0	0	0	0	0	0

Activity	Villages	n	The role of women in farming system activities							
			Women > men		Women = men		Women < men		No female role	
			n	%	n	%	n	%	n	%
	Labanu	15	0	0	4	27	9	60	2	13
	Botumoputi	15	1	7	4	27	9	60	1	7
Marketing	Bendungan	27	2	7	3	11	9	33	13	48
	Rumbia	22	1	5	1	5	4	18	16	73
	Ayuhulalo	22	1	5	1	5	5	23	15	68
	Hutamonu	29	1	3	4	14	9	31	15	52
	Modelidu	16	2	13	0	0	8	50	6	38
	Dulamayo	0	0	0	0	0	0	0	0	0
	Labanu	15	0	0	2	13	4	27	9	60
	Botumoputi	15	3	20	1	7	2	13	9	60

Source: Household survey

The World Agroforestry Centre is an autonomous, non-profit research organization whose vision is a rural transformation in the developing world as smallholder households increase their use of trees in agricultural landscapes to improve food security, nutrition, income, health, shelter, social cohesion, energy resources and environmental sustainability. The Centre generates science-based knowledge about the diverse roles that trees play in agricultural landscapes, and uses its research to advance policies and practices, and their implementation that benefit the poor and the environment. It aims to ensure that all this is achieved by enhancing the quality of its science work, increasing operational efficiency, building and maintaining strong partnerships, accelerating the use and impact of its research, and promoting greater cohesion, interdependence and alignment within the organization.

United Nations Avenue, Gigiri • PO Box 30677 • Nairobi, 00100 • Kenya
Telephone: +254 20 7224000 or via USA +1 650 833 6645
Fax: +254 20 7224001 or via USA +1 650 833 6646
Email: worldagroforestry@cgiar.org • www.worldagroforestry.org

Southeast Asia Regional Program • Sindang Barang • Bogor 16680
PO Box 161 • Bogor 16001 • Indonesia
Telephone: +62 251 8625415 • Fax: +62 251 8625416
• Email: icraf-indonesia@cgiar.org
www.worldagroforestry.org/regions/southeast_asia
blog.worldagroforestry.org