

Agroforestry and Forestry in Sulawesi series:

**Agroforestry extension needs at the
community level in AgFor project sites in
South and Southeast Sulawesi, Indonesia**

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Suyanto and James M. Roshetko*



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Abstract

This agroforestry extension assessment study was conducted as part of the baseline study undertaken to support programmes implemented in the Agroforestry and Forestry in Sulawesi: Linking Knowledge with Action project (the ‘AgFor project’), which is funded by the Canadian International Development Agency (CIDA). The objectives of this study were to list and analyse existing agroforestry extension practices that have been implemented at community level, and to list community needs for potential agroforestry extension services that could be implemented under the AgFor project. Focus group discussions at community level were held to collect information on types of priority species in local livelihoods, existing and potential extension activities, demonstration plots, cross-visit programmes, needs for marketing training, gender preferences regarding extension programmes, and the potential media communications used in extension activities. The results of this baseline survey were useful for designing and implementing the extension activities in the AgFor project.

Keywords: CIDA, AgFor, farmer extension, Sulawesi, agroforestry

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1. Background

The Agroforestry and Forestry in Sulawesi: Linking Knowledge with Action project (hereafter referred to as ‘AgFor project’) is funded by the Canadian International Development Agency (CIDA). It is being implemented by the World Agroforestry Centre and partners from 2011 to 2016 (Roshetko et al. 2012). The goal of the AgFor project is to enhance equitable and sustainable agroforestry and forestry livelihood systems for rural communities in 3 provinces in Sulawesi. This addresses: improved awareness of and access to natural resources; refinement of agricultural skills; development of equitable and participatory governance mechanisms; and the development of integrated sustainable land and ecosystem management.

In the AgFor project, farmer-based agroforestry extension approaches, as reflected by specific outcomes throughout the project design, will be implemented to empower farmers of both genders in: enhancing and diversifying the productivity and profitability of their tree-based systems; strengthening the capacity of farmers to seize existing and potential market opportunities; and increasing the likelihood that the results of these activities will continue after the project ends. In other places in Indonesia, farmer-based agroforestry extension activities were used for improving local livelihood through enterprise development (Roshetko et al. 2007a), and for developing sustainable livelihood alternatives that contribute to not only enhancing the local people’s welfare, but also to improving biodiversity conservation strategies (Roshetko et al. 2007b, Martini et al. 2007).

Hence, to support the implementation of extension services in the AgFor project, an agroforestry extension needs assessment at the community level was conducted. The objectives of this needs assessment were to: list and analyse existing agroforestry extension practices that have been implemented at community level; and list community needs for potential agroforestry extension services that can be implemented in the AgFor project. The results of this baseline survey are useful for designing, implementing and analysing the effectiveness of extension approaches within the AgFor project.

2. Data collection

Assessment was conducted from March to April 2012, in four project districts—two districts in South Sulawesi (Bantaeng and Bulukumba) and two districts in Southeast Sulawesi (Konawe and Kolaka). Discussions with extension agents were conducted at the district level. In each district, current challenges and opportunities for extension activities at the government level were discussed with stakeholders at the Dinas Kehutanan dan Perkebunan (Forestry and Estate Crop Agency), the Dinas Pertanian (Agricultural Agency), the Badan Ketahanan Pangan dan Penyuluhan, in South Sulawesi (Food Security and Extension Agency), and the Badan Penyuluhan Pertanian Peternakan dan Kehutanan, in Southeast Sulawesi (Agricultural, Livestock and Forestry Extension Agency).

The agroforestry extension needs assessment was conducted through focus group discussions (FGDs) at the village level. In each village, FGDs were conducted separately for women and men, and the number of participants ranged between 5–12 people per group. Information on existing and expected agroforestry extension activities was collected during the discussions. Villages were randomly sampled from a list of project villages.

In South Sulawesi, from 13 project villages, eight villages were sampled for the survey: four villages in Bantaeng district (Kayu Loe, Bonto Karaeng, Pattaneteang and Campaga) and four villages in Bulukumba district (Balang Pesoang, Tana Toa, Tugondeng and Borong Rappoa). Surveyed villages were categorized into four groups: i) the degraded land village group (Kayu Loe and Bonto Karaeng); ii) the agroforestry(AF)-based village group in Bantaeng or AF Bantaeng (Campaga and Pattaneteang); iii) the agroforestry (AF)-based village group in Bulukumba or AF Bulukumba (Borong Rappoa and Balang Pesoang); iv) the timber-based village group (Tana Toa and Tugondeng).

In Southeast Sulawesi from 14 project villages, nine villages were sampled for the survey: four villages in Kolaka district (Tasahea, Simbune, Lamunde and Taosu) and five villages in Konawe district (Wonua Hoa, Anggawo, Ambondiaa, Unit Pelaksana Teknis (UPT) Asinua Jaya and Lawonua). These villages were grouped into four categories based on the proportion of the local migrant community in the village: i) local villages group (Taosu, Ambondiaa, Lamunde, Simbune); ii) mixed local and long-established migrant/transmigrant villages group (Anggawo, Lawonua, Wonua Hoa); iii) transmigrant and long-established migrant villages group (Tasahea); iv) new transmigrant villages group (UPT Asinua Jaya [Lasao]).

3. Site description

Bantaeng and Bulukumba districts, South Sulawesi province

There are 23 districts in South Sulawesi where communities depend on agricultural products for their livelihoods. Compared to the other provinces in Sulawesi, South Sulawesi is more developed and has more intensified agricultural systems, which tend to be more prominent in the north than in the south. Therefore, the AgFor project, which focuses on agroforestry and forestry, selected two districts as sites in the south of the province—Bulukumba and Bantaeng districts.

The capital cities of Bantaeng and Bulukumba districts are, being separated by only 30 km. The Bijawang watershed lies between them. In both districts elevations vary from 0 m to 1000 m above sea level (masl), climatic conditions are similar, and precipitation varies between 1500 and 3000 mm per year. However, soil conditions differ, particularly for the Bonto Bahari subdistrict of eastern Bulukumba which is dominated by karst topography. In the eastern part of Bulukumba and the western part of Bantaeng, diminishing water availability is becoming a significant environmental issue.

Bulukumba district has ten subdistricts with a total population of 390 543 people (based on year 2008 data) consisting of Makassar and Bugis ethnicity. Local dialects are Makassar, Bugis and Konjo. In terms of poverty, based on statistical data from 2008, 25% of the total population in Bulukumba district can be categorized as poor. Kajang and Herlang subdistricts are the poorest areas in Bulukumba district.

Bantaeng district has 8 subdistricts with a total population of 176 699 people (based on 2009 data), and it is dominated by the Makassar ethnic group in the west and the Bugis ethnic group in the east. Although Indonesian is the national language, communities in remote areas tend to use local dialects, primarily Makassar. Based on statistical data from 2010, 38% of the total population in Bantaeng can be categorized as poor. Sinoa, Uluere and Pajukukang subdistricts are the three poorest areas in Bantaeng district.

Agricultural products in South Sulawesi province vary depending on the area of production. Based on its total area, the five main estate crops in Bulukumba district are cacao, coconuts, cloves, coffee and pepper; in Bantaeng district they are maize, cacao, coffee, cloves and coconuts (Table 1). Maize predominates in Bantaeng, while pepper predominates in Bulukumba. In Bulukumba, cotton was an

important crop, but currently the cotton plantation is closed due to genetic modification issues of the cotton varieties used. Besides cotton, a rubber plantation (PT. London Sumatra) has operated in Bulukumba district since the 1970s.

Table 1. Total area and production of ten predominant estate crops in Bulukumba and Bantaeng districts, South Sulawesi, Indonesia

Crops	Total area (ha)		Total production (tonnes year ⁻¹)	
	Bulukumba	Bantaeng	Bulukumba	Bantaeng
Cacao	4 200	2 894	3 221.5	853.8
Candlenut	55	2	21.0	
Cashewnut	405	325	403.0	181.1
Cloves	2 138	636	1 435.0	287.6
Coconut	6 966	355	2 956.7	314.7
Coffee	2 084	2 847	963.6	1470
Cotton	369		19 049.0	
Kapok (<i>Ceiba petandra</i>)	17	333	10.0	292.8
Maize		15 920		93 822.0
Pepper	1 162	35	751.6	5.3
Tobacco	100	27	35.0	5.0

Sources: BPS Bantaeng (2010), BPS Bulukumba (2010)

The South Sulawesi province has the least forested area compared to other provinces in Sulawesi, owing to high human population density and intensive agricultural activities. However, in some areas, state and community forests remain, particularly in and near protection forest areas. In Bantaeng and Bulukumba districts, state forest can be found in some subdistricts, amounting to 4721.5 ha in Bulukumba and 7417.5 ha in Bantaeng (Table 2). Some subdistricts in Bulukumba (Herlang, Kajang, Ujung Bulu, Ujung Loe) produce timber from their agroforestry gardens, which is mainly used for building boats. Bulukumba is renowned for its traditional ‘phinisi’ boat-building industry. PT. Palopo Alam Lestari (PAL) also supplies timber from Bulukumba for conversion to plywood.

Table 2. Forest area and status in Bantaeng and Bulukumba, South Sulawesi, Indonesia

District	Subdistrict	Forest status (ha)				
		Protection forest	Limited production forest	Production forest	Community forest	Urban forest
Bulukumba	Kindang	2 522.70	544			
	Rilau ale			675		
	Bulukumpa	648.88				
	Kajang		331			
Bantaeng	Tompobulu	702			2 500	
	Eremerasa	14	419	355	800	
	Bantaeng			364	800	3.5
	Sinoa			710	750	

Sources: BPS Bantaeng (2010), BPS Bulukumba (2010)

Kolaka and Konawe districts, Southeast Sulawesi province

Southeast Sulawesi province is the least developed area compared to the other provinces in Sulawesi. Based on 2009 statistical data, agriculture contributed 35% of the total Gross Regional Domestic Product (GRDP). In 2010, the province was divided into ten districts. As Konawe, the largest watershed in Southeast Sulawesi, is traversing Konawe and Kolaka districts, these districts were selected as project areas in the province.

Kolaka and Konawe districts are two of the oldest districts in Southeast Sulawesi and since 2006 have been subdivided—Kolaka district was divided into South Kolaka, Kolaka and North Kolaka districts; while Konawe district divided into South Konawe, Konawe and North Konawe districts. The Kolaka area ranges in elevation from 0 to 1400 masl with precipitation of 2500 to 3500 mm per year. The soil type varies from red yellow Podsol, brown-grey Podsol, Litosol, Regosol, alluvial soil, Rendzinas and red-yellow Mediterranean soils. The elevation in the Konawe area is similar to the range of elevation in Kolaka—ranging from 0 to 1000 masl, with precipitation of 1500 to 3000 mm per year. Soil conditions in Konawe differ from Kolaka, although these two districts are adjacent.

Konawe district has 26 subdistricts with a total population of 224 345 people (based on 2007 data). The Tolaki were the original ethnic group in Konawe. However, currently, a transmigration programme (both government and voluntary) has turned Konawe into a multiethnic area with migrants from South Sulawesi (Bugis and Toraja), Java, Bali and Lombok. Thus, the Indonesian national language is used in daily conversation. Local languages are spoken only among communities

of the same ethnic group. In terms of poverty, approximately 60% of the total population can be categorized as poor. Poverty issues are also reflected by poor infrastructure (particularly roads, electricity supply and clean water), which has increased the cost of marketing agricultural products. Higher marketing costs mean lower prices for farmers' products.

Kolaka has 14 subdistricts with a total population of 269 211 people (based on 2005 data). Kolaka is also multiethnic, with migrants from Tolaki, Bugis, Toraja and Bali. Indonesian is the language used for conversation. The infrastructure in Kolaka is more advanced than in Konawe. Besides agriculture, mining also contributes to the district's GRDP. Approximately 30% of the total population can be categorized as poor.

Table 3. Total area and production of ten predominant estate crops in Kolaka and Konawe districts, South Sulawesi, Indonesia

Crop	Total area (ha)		Total production (tonnes year ⁻¹)	
	Kolaka	Konawe	Kolaka	Konawe
Cacao	61 647	14 796	21 961.7	5406.5
Pepper	1782	3653	1237.8	1179.5
Coconut	1461	7474	809.6	3226.0
Coffee	1056	1724	693.1	403.4
Cashewnut	856	11 910	51.3	5085.1
Sago	448	2081	2095.2	2004.4
Candlenut	402	456	741.9	108.9
Cloves	291	778	13.1	131.2
Vanilla	269		13.2	
Bitternut	58	203	7.1	75.8
Kapok		259		44.5

Sources: BPS Kolaka (2010), BPS Konawe (2008)

Over the past ten years in Southeast Sulawesi, cacao, cashewnut and coconut have been the three major estate crops contributing to the provincial GRDP. In both Konawe and Kolaka, cacao is the major estate crop besides pepper and coconut (Table 3). Cashewnut is not a major commodity in these districts as production is mainly the purview of Buton district. Compared to Konawe, Kolaka has the larger total area of cacao cultivation, most likely due to the land in Kolaka being better suited (with fewer swamps), and also due to the research and development focus upon cacao in Kolaka (for example the PT Haspram cacao plantation in Ladongi subdistrict). Coffee and sago are also included among the top five predominant estate crops in both districts, grown mainly for the community's own

consumption, and for retail. Sago is the staple food for the Tolaki ethnic group and also for the migrant communities.

State forest in Southeast Sulawesi is still relatively intact in areas where it has not been impacted by transmigration or illegal logging activities. State forest in Konawe covers 60% of the total area, while in Kolaka it covers 90% of the total area (Table 4). The forest products that are important for local livelihoods are timber, rattan and honey. In some sections of these districts, forest areas are claimed under community ownership ('hak ulayat') and managed by individual clans or families in the Tolaki ethnic group.

Table 4. Forest area and status in Kolaka and Konawe districts, South Sulawesi, Indonesia

Forest status	Forest area (ha)	
	Konawe	Kolaka
Protected area ('Suaka dan Pelestarian Alam')	19 096	78 524
Protection forest	214 147	325 418
Limited production forest	113 613	129 542
Production forest	84 021	78 548
Converted production forest	36 720	36 185
Conservation forest		32,289
Total	463 790	621 077

Source: BPS South East Sulawesi (2011)

4. Findings

The general agricultural extension issues at provincial, district and subdistrict levels were relatively similar in South and Southeast Sulawesi provinces. Differences between provinces were distinct at the community (village) level. Findings in this report are divided into two sections: i) general agricultural extension issues, and ii) agroforestry extension issues at the community level.

General agricultural extension issues

In general, since 2007, there has been a restructuring of national government extension institutions. Based on the national regulation UU No. 16/2006, all agriculture, fishery and forestry extension offices were merged into one independent government agency located at provincial and district levels. Based on the regulation, the government extension institution at the provincial level is Badan

Koordinasi Penyuluhan, while at the district level is formed by the head of the district into Badan Pelaksana Penyuluhan (Figure 1).

Before 2007, extension officers were employed under different departments based upon their expertise. Some extension officers in project areas disclosed that the situation for them became more difficult after the merger because each officer was urged to be polyvalent, meaning that they were required to understand other topics outside her/his main expertise, for instance forestry extension officers would need to understand agricultural issues as well. Thus intensive training on cross-sector issues was provided for extension officers at the district level. From the administrative point of view, after the merger, the administrative channels became more complex. Hence implementation of the UU No. 16/2006 regulation may need to be reviewed in order to enhance the effectiveness of extension services.

Another challenge existing in government extension activities was the dearth of extension officers. This challenge was pronounced in all AgFor project sites, particularly regarding forestry extension officers. To cope, the government employed part-time extension officers to address the needs of a specific project, for example for the Kebun Bibit Rakyat (KBR) project, a Forestry Department project to establish community-based tree nurseries for a rehabilitation programme.

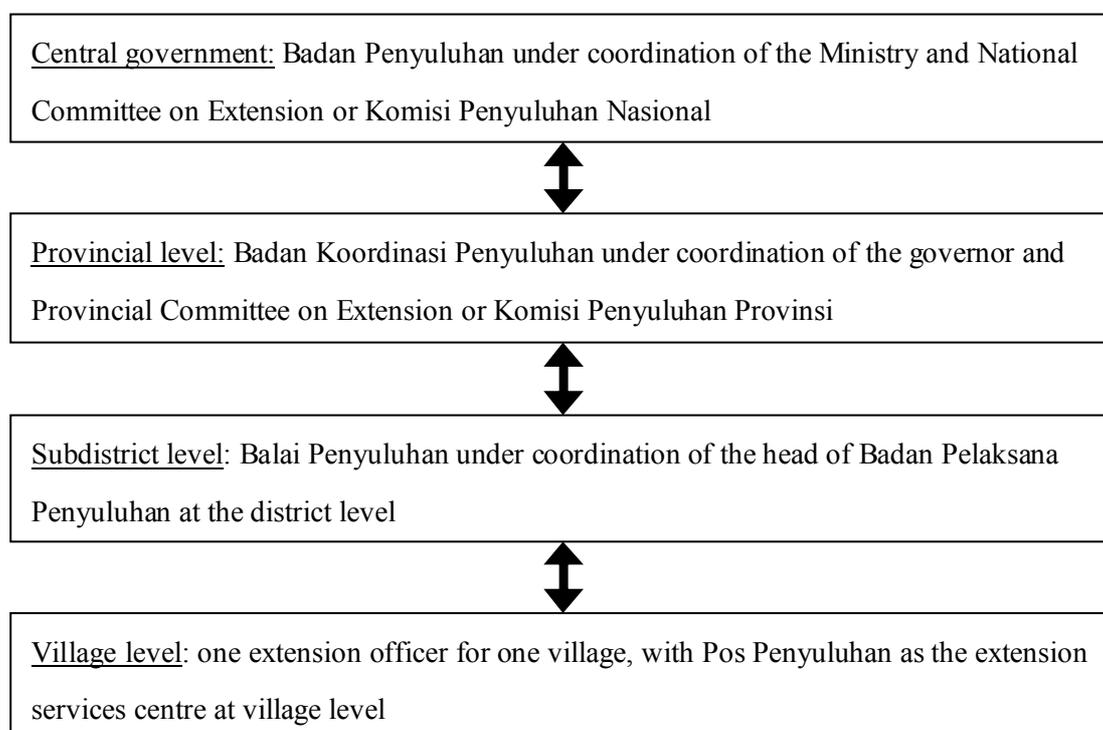


Figure 1. Structure of the Government Extension Organization based on regulation UU No. 16/2006.

Besides their limited number, extension officers also lack motivation and skills in facilitating innovation and adoption of new technology. Most of the extension activities were still based upon top-down approaches with only a few extension officers possessing sufficient initiative to provide extension services proactively to communities. Thus, to increase extension officer motivation to provide services, the government held an annual competition to select the best extension officer from the district up to the national level. Poor roads and lack of facilities were also two important aspects that impeded extension officers in providing services to communities.

Linkages between extension agents and research institutes were also inadequate. Research institutes, located at the provincial level, conducted fewer activities for disseminating research results to farmers. The main challenge in this context was the lack of coordination among research institutes (responsible for producing research results) and extension agencies (responsible for disseminating research results). However, the Balai Pengembangan Teknologi Pertanian (Government Agency for Agricultural Technology Development) was an exceptional case, carrying out research with communities, and resulting in more effective research result dissemination.

At the district level, extension officers in Bantaeng were the most active in visiting communities and were relatively well organized, whereas their counterparts in Konawe were the least active. This could be attributable to Bantaeng having the smallest area to cover compared to the other three AgFor project districts. Every Saturday, extension officers in Bantaeng regularly gathered at the extension district office to share experiences.

The subdistrict level is different from the district level, as the subdistrict extension agency does not have direct coordination line with the head of the subdistrict. Thus, extension officers were located in different offices within the subdistrict. Extension officers at subdistrict level are located in Balai Penyuluhan Pertanian (BPP) office.

Every two weeks at the least, extension officers need to visit villagers for consultation purposes, as well as to help farmers develop proposals for funding or aid from departments at the district level. However, not all extension officers interacted with farmers according to this schedule. Villages in remote areas with poor accessibility (such as in Konawe district) rarely received visits from district extension officers.

Most subdistrict heads visited during the survey were disappointed with the limited coordination between subdistrict heads and departments at the district level, particularly on issues related to

potential aid for farmers. After decentralization, aid from departments at the district level was awarded directly to farmers and the process was facilitated by an extension officer. Thus, the subdistrict head had no authority to intervene in the process. Normally departments at the district level are required to inform the subdistrict head about every programme at the department level, executed via planning meetings for subdistrict development ('musrenbang') held each year (in February or March).

Most district and subdistrict extension officers expressed the expectation that the AgFor project will assist the local government extension agents in improving their capacity to deliver extension services by involving up to two extension officers in the project villages, and asking them to participate in monitoring and training conducted by the project. Thus, it would be useful to coordinate the AgFor project extension services programme with the district office's strategic extension plan.

Agricultural extension issues at the community level

Agricultural extension issues at the community level were explored in focus group discussions with farmers at the village level. Information on crop prioritization for farmers, extension services, demonstration plots, cross-visits, marketing issues, gender issues and communication media was collected and analysed.

Prioritized crops in the AgFor project villages were analysed by disaggregating the information from three perspectives, based on:

- Marketable products—the crop had marketable products that consistently contributed to local livelihoods.
- Farmers' preferences under current conditions—the crop was preferred by farmers because it provided a source of income and could be used for own consumption.
- Farmers' expectations in project intervention programmes—a crop that in future could contribute to local livelihood enhancement. The crop can be a new species or an existing species considered to have promising prospects.

Agricultural extension services were classified into two different types—in-class activities and training. Farmers were asked to identify the type of extension services they received and the type they expected to be implemented in the AgFor project.

Information on agricultural demonstration plot (demplot) programmes was also collected, mainly because demplots have been effective in assisting the adoption of innovative technology introduced to farmers. Farmers tend to adopt technology that has been practised or proven to provide benefits. Hence, the AgFor project is interested in establishing demplots for existing gardens to highlight the advantages of improved management, and fallow gardens to demonstrate the advantage of good quality germplasm and systematic design. Participation by farmers in the demplots can be enhanced by participatory design of the plots. Thus, demplots need to be designed by farmers/landowners and extension officers, and AgFor project staff can facilitate the process.

Cross-visits are an activity in which farmers from one location visit another site to learn more from observing and interacting directly with other farmers or relevant stakeholders. Cross-visits assist farmers to develop networks with other stakeholders on subjects of mutual interest. Cross-visits are included in the AgFor project's extension agenda.

Marketing is an essential issue that affects the income of farmers and motivation for them to improve crop management. Information on the training needs of farmers to enhance their marketing knowledge and skills was collected.

Gender distribution in agricultural extension services was observed by conducting two FGDs per village—one for women and one for men—and comparing the information collected from the two groups.

Communication media such as television, radio and cell phones in agricultural extension services, are important elements that can complement personal interaction.

Farmers were requested in FGDs to rank effective communication media for agricultural extension from a list that included CD/DVD, cell phones, magazines, newspapers, radio and television.

Information that was collected from the FGDs in these contexts is tabulated in the following sections. A comparison of needs in South and Southeast Sulawesi is summarized in the concluding remarks.

Agroforestry extension issues at the community level in South Sulawesi

Crop species prioritization in South Sulawesi

Based on the market and existing conditions, crop priorities differed among village groups (Table 5). However, regardless of the undercurrent conditions, all village groups selected short-term crops (such

as chili, cabbages, vegetables, pumpkin, chayotes) as their first priority. Of all village groups, the timber-based group had the greatest difference in species priority, mainly because their area is located in lowland (50– 200 masl) compared to other villages at elevations ranging from 200–800 masl. Coconut, teak and gmelina were the prioritized species in the timber-based village group for supporting livelihoods.

Staple food crops such as paddy rice and maize were also important for the timber-based village group as sources of income and for the community’s own consumption. The degraded land village group, AF-Bantaeng village group and AF-Bulukumba village group had relatively similar priorities—cloves, cacao and coffee. The degraded land village group also selected candlenut and bamboo, which was not the case elsewhere. Maize was more important than paddy rice for the degraded land village group contrary to AF-Bantaeng village group and AF-Bulukumba village group. In comparison, in the AF-Bantaeng village group, non-timber forest products (NTFPs) as resources for fuelwood and brown palm sugar (from *Arenga pinnata*) were still utilized as income sources, as opposed to elsewhere. In AF-Bulukumba village group, pepper was the crop priority unlike other village groups.

Table 5. Crop priority in South Sulawesi by village groups based on expected intervention by AgFor (E), current market condition (M) and current priority in local livelihoods (C)

Crop	Village groups crop priorities											
	Degraded land			AF-Bantaeng			AF-Bulukumba			Timber-based		
	E	C	M	E	C	M	E	C	M	E	C	M
Cacao	1	2	3	3	2	2	4	6	5	2	5	6
Cloves	1	2	3	2	2	5	1	2	2		10	8
Short-term crops	5	1	1		1	1		1	1	6	1	4
Coffee	9	2	8		2	2	4	3	2		10	
Candlenut		5	3									
Coconut											5	1
Pepper							4	6	5			
Rubber							8			1	1	
Nutmeg				3	10		1	3				
Patchouli				7								
Gaharu				7			4	6		6		
Bamboo		10	3									
NTFPs						8						
Paddy	5	10	8	1	2	2	8	6	5	2	5	2
Maize	1	5	2	3	10	8		6		2	5	2

Timber												
Mahagony						8			6			
Gmelina										8		
Teak									5	6		
Toona						8						
Paraseri-anthes		10								10		
Fruit												
Durian	1	10		7	2		1	3	5	2	10	
Banana		7	3		8	5		6	2		1	4
Rambutan	5	10			8			6	5	6	1	8
Lansium					2	5	8	6	5			8
Avocado		7										
Pomelo										6		
Papaya		10										
Mango	5	10								6		
Mangosteen				3			8	6				
Jackfruit		7	8								10	
Longan										6		

Note: 1 = highest priority. E = expect, C = current, M = market, NTFP = non-timber forest product

According to the future potential or expectations from the AgFor project, crop priority differed slightly among village groups (Table 5). As a potential crop, only durian was prioritized in all village groups, particularly because of its high price (Rp 50 000–Rp 150 000, or USD 5–15, per fruit), which increased the motivation of farmers to plant good quality durian species on their land. Cloves were the second potential crop selected because the price of cloves had recently peaked over the past ten years, reaching up to Rp 200 000 kg⁻¹, or USD kg⁻¹, for dry flowers. However, not all groups selected cloves, such as the timber-based village group, which was located in lowlands.

Again due to its high and relatively stable price, cacao was the third potential species for AgFor project intervention requested by all village groups. Gaharu or agarwood was an interesting potential species selected by farmers, as they possessed no information or experience with its market potential. Rubber, nutmeg, rambutan and mango were the next potential tree-based species after durian, clove and cacao. The timber-based village group, which is located near the PT. London Sumatra rubber plantation, prioritized rubber for AgFor project intervention. The AF-Bulukumba village group also selected rubber, although the degraded land village group and AF-Bantaeng village group did not follow suit. Mahagony was prioritized by the timber-based village group and AF-Bulukumba village group. Paddy rice was more of a priority than maize in the AF-Bantaeng, AF-Bulukumba and timber-

based village groups, although the degraded land village group preferred maize. Maize and paddy were chosen mainly because they are staple food crops in the area.

Farmers selected these crops for AgFor project intervention because of insufficient access to good planting materials although for more than ten years the government has implemented a seedling distribution programme to address this problem. In most of the AgFor project villages, the government distributes tree seedlings based on farmers' proposals at least once a year. However, government agencies will only distribute seedlings of available species, whether it is a new or well-known species. The government agencies sometimes also have difficulty in obtaining these seedlings, due to lack of information on where to obtain good planting materials, as well as lack of sources for good quality germplasm of the species proposed by farmers. Thus, farmers still feel they lack access to sufficient quality germplasm. Dinas Pertanian, Dinas Perkebunan and Dinas Kehutanan were local government agencies at the district level that frequently distributed seedlings to farmer groups that submitted proposals to these agencies. These included vegetable, fruit, estate crop and timber tree species, depending on the requests and available resources (Annex 1).

Extension services in South Sulawesi

Over the past five years in South Sulawesi, farmers have received extension services through training (Annex 2) and in-class activities (Annex 3) on agricultural issues such as vegetable cultivation, cacao side-grafting and composting. In the past, women's participation in extension activities varied from 0–80% depending on the subject-matter. Women's participation was higher in extension activities for cottage industry, honey production and traditional textile production, but lower for fertilization and other land maintenance activities.

Table 6. Potential topics for in-class activities by AgFor extension services in South Sulawesi

Village	Topics			
	Cultivation and crop maintenance techniques	Pest and disease management	Plant variety identification	Livestock management
Degraded land village group				
Kayu Loe	Maize, cloves, onions, potatoes, cabbages			Horses, goats
Bonto Karaeng	Maize, paddy rice, cloves, poultry, vegetables, patchouli, chili, tomatoes	Cacao, cloves	Cacao	Poultry
AF-Bantaeng village group				
Campaga			Cacao	Cattle, horses, fish
Pattaneteang	Paddy, cloves, nutmeg, patchouli, durian	Cloves	How to select superior plant varieties	
AF-Bulukumba village group				
Borong Rappoa	Agarwood and nutmeg	Fruit trees, vegetables, paddy rice, maize	Paddy rice, maize, cloves, agarwood, and nutmeg	
Balang Pesoang	Cash crops, cloves	Cloves	Cloves	Cattle, poultry, fish
Timber-based village group				
Tana Toa	Rubber, paddy rice, cacao			
Tugondeng	Pruning of timber trees and cacao; garden rejuvenation	Cacao and timber trees		

The village-level FGDs revealed no significant differences in expected topics for in-class extension services by the AgFor project in South Sulawesi (Table 6). Cultivation and crop maintenance techniques were in most demand, except in Campaga which had received more in-class extension activities than other villages. Pest and disease management and plant variety identification were next in demand, and livestock management was last. There was no significant difference in preferences for in-class topics among village groups. However, each village had different species they wished to focus on for each topic. For example within in-class activities on cultivation techniques, farmers in Borong Rappoa wanted to focus on agarwood and nutmeg, while in Balang Pesoang the farmers wanted to focus on cash crops and cloves.

Priorities for types of expected training at the village level under AgFor project extension services were also not significantly different among village groups (Table 7). However, the AF-Bulukumba village group had the least number of topics compared to others, wanting to focus training only on vegetative propagation, pest and disease management, organic fertilizers and tree spacing in agroforestry. In the degraded land village group, farmers wanted to focus on vegetative propagation, pest and disease management, organic fertilizers, honey production and tree spacing in agroforestry. In the AF-Bantaeng village group, farmers selected vegetative propagation, cacao rejuvenation, pest and disease management, organic fertilizers, post-harvest cacao issues, honey production and land suitability assessment. The timber-based village group selected vegetative propagation, cacao rejuvenation, pest and disease management, organic fertilizers, rubber agroforestry, honey production, home-garden management and tree spacing in agroforestry.

Table 7. Type of training expected at the village level under AgFor extension services in South Sulawesi

Village	Topics									
	Vegetative propagation	Cacao rejuvenation	Pest and disease management	Organic fertilizer	Rubber agroforestry	Postharvest cacao	Honey Production	Homegarden mgt	Tree spacing in agroforestry	Land suitability assessment
Degraded land village group										
Total percentage	100	0	100	100	0	0	50	0	100	0
Kayu Loe	v		v	v			v		v	
Bonto Karaeng	v		v	v					v	
AF-Bulukumba village group										
Total percentage	100	0	50	50	0	0	0	0	50	0
Borong Rappoa	v			v					v	
Balang Pesoang	v		v							
AF-Bantaeng village group										
Total percentage	50	50	50	50	0	50	50	0	0	50
Campaga		v	v			v	v			
Pattaneteang	v			v						v
Timber-based village group										
Total percentage	100	50	50	50	50	0	50	50	50	0
Tana Toa	v			v	v					
Tugondeng	v	v	v				v	v	v	

Demonstration plots in South Sulawesi

Demplots were not common at the farmer level. In the past, a few demplots were established by government agencies (Table 8). Of all the villages surveyed in this study, only Balang Pesoang village did not have a demplot. The former demplots were mostly developed by Dinas Pertanian, the government agriculture agency. Crops planted in former demplots were mostly vegetables, coffee, cacao, paddy rice, maize, taro or talas and some timber species in the land rehabilitation area.

Table 8. Farmer demplots and expected demplots in AgFor project villages in South Sulawesi

Village	Former demplots in villages			Expected demplots under AgFor project	
	Year	Agency	Demplots	Garden	Nursery
Degraded land village group					
Kayu Loe	2010	Dinas Pertanian	Talas Safira	Mixed system (cloves+cacao+coffee+peanut+onion+strawberry+apple)	
Bonto Karaeng	2011	Hasanuddin University		Mixed system (maize+durian+coffee+rambutan+cacao+cloves)	
AF-Bantaeng village group					
Campaga	2011	Kelompok Tani Nelayan Andalan		Mixed system (maize+coffee+cacao+cloves)	
Pattaneteang	2006	Dinas Kehutanan	Coffee; timber trees	Mixed system (nutmeg+mangosteen+coffee)	Nutmeg, mangosteen, cacao
AF-Bulukumba village group					
Borong Rappoa	2011	Dinas Pertanian	Vegetables	Mixed system (nutmeg+agarwood+cloves+cacao+coffee+vegetables (tomato, chili, potato, onion))	Cloves, coffee, nutmeg
Balang Pesoang	None			Mixed system (cloves+pepper+mangosteen+nutmeg) Monoculture system: Rubber	Cloves, durian, pepper, mango-steen, nutmeg, lansium, cacao, rubber
Timber village group					
Tana Toa	None			Mixed system (rubber+durian)	
Tugondeng	2011	Dinas Pertanian	Paddy, maize, cacao rehabilitation	Mixed system (maize+cacao+tiber trees+rambutan)	Rubber, cacao, coconut

Cross-visit programmes in South Sulawesi

Only farmers in Balang Pesoang had not experienced cross-visits (Annex 4). Cross-visits are normally conducted by the local government at least once a year. Dinas Pertanian, Dinas Kehutanan and Dinas Perkebunan were the local government agencies that supported cross-visit activities in every district. Unfortunately, participants who attended the cross-visits were limited to 15 people per village with the participation of women varying from 0–50%. Issues studied during cross-visits in the past ten years have been: a) poultry management; b) vegetable cultivation; c) honey production; and d) cacao cultivation.

FGDs at the village level revealed that farmers were interested to learn about the cultivation of fruit trees, vegetables, rubber, cacao, cloves and agarwood during visits to other locations including Malino, Loka-Bantaeng, Enrekang, Sidrap, Tana Toraja, Takalar, Sinjai Barat, Palopo, Bulukumba, Sinjai, Soppeng and Kendari (Annex 5). Enrekang, Sidrap and Palopo were the three most interesting sites that farmers wished to visit.

Marketing training in South Sulawesi

Some farmers were highly dependent on specific traders to sell their products because they owed money to them for daily needs, particularly when the clove fruiting season was uncertain. This sensitive issue prevented farmers from requesting marketing issues to be included in AgFor project extension services. However the infrastructure development in South Sulawesi is more advanced than in Southeast Sulawesi, providing better opportunities to access markets. There was no significant difference among village groups in their demands for marketing intervention under AgFor project extension services.

Gender preferences for agricultural extension needs in South Sulawesi

In all villages in South Sulawesi, there was no difference in gender preferences regarding expected AgFor project extension services. However, female groups tended to be more interested in short-term crops (such as vegetables and other commodities that can be produced in less than three years) than long-term crops (timber and fruit trees).

In former agricultural extension activities, women's participation ranged broadly from 0–80% depending on the type of extension activities. Also, women were rarely members of farmer groups. Most of the farmer groups comprised of men, possibly because men had a stronger role of decision making in farm management than women. In all the villages that were visited, 100% of the respondents agreed that men were the decision makers in this respect.

Time allocation for farm management was an important aspect in gender preferences for extension services. Normally men spent more time in farm management activities related to plot establishment: planting; maintenance; and harvesting, thus, their capacity and skills need to be improved in these contexts. Although women are minor decision makers in farm management, they have roles, mainly in the maintenance of nurseries, harvesting and post-harvest processes. Approximately 75% of the respondents agreed that women have important roles in marketing agricultural products. Consequently, their capacity and skills need to be improved, particularly for activities related to: nursery maintenance; harvesting and post-harvest processes; and product marketing.

Communication media in South Sulawesi

All village groups considered television the most effective media tool for agricultural extension (Table 9). However, there are few agricultural extension programmes broadcast on television at the moment and in some project villages there is no electricity. Cell phones were considered the second most effective tool by all village groups (for updating information on agricultural product prices), except for the AF-Bantaeng village group which opted for CD/DVD. Radio, magazines and newspapers were deemed the least effective.

Table 9. Ranking of communication media effectiveness for agricultural extension in South Sulawesi

Village groups	Media effectiveness				
	1*	2	3	4	5
Degraded land	Television	Cell phone, newspaper		Radio, magazine	
AF-Bantaeng	Television	CD/DVD	Cell phone	Magazine	Radio
AF-Bulukumba	Television	Cell phone	Radio	Newspaper	CD/DVD
Timber	Television	Cell phone, radio		Newspaper	CD/DVD

Note: 1 = most effective.

Agroforestry extension at the community level in Southeast Sulawesi

Crop species prioritization in Southeast Sulawesi

Based on the markets and existing conditions, crop priorities differed among village groups (Table 10). Differences were apparent among the new transmigrant village group compared to other village groups. In the new transmigrant village group, short-term crops were prioritized because the farmers possessed no monetary savings and their tree-crops were not yet productive as they had only been recently planted. The group also preferred short-term crops as sources of their livelihoods needs. On the other hand, in the transmigrant village group, which are already established in the area for more than 20 years, sustained livelihoods from different crops and did not depend on short-term crops only. Cacao, pepper, durian and rambutan were become the main livelihood sources for farmers in the transmigrant village group. Both new transmigrant and transmigrant village groups also harvested NTFPs such as honey, fuelwood and brown palm sugar (from *Arenga pinnata*) to supplement income.

The local village and mixed village groups opted for cacao, pepper and durian as their crop priorities. The mixed village group also added cloves because this crop had been successfully domesticated in South Sulawesi and the migrant farmers from South Sulawesi were able to share knowledge about clove domestication with their counterparts. The mixed village group attached no particular significance to NTFPs for income generation, however the local village group considered them as a source of income.

Based on potential or expected crops for AgFor project intervention, the local village group and the new transmigrant village group both considered rubber to be important, while durian was the choice for the mixed village and the transmigrant village groups. Durian was also the second choice for the local village group and the new transmigrant village group. Cacao and pepper were the second choices for all village groups except the new transmigrant village group, which selected coconut, cloves, short-term crops (vegetables, chili, tomato, beans), maize, teak and durian as the second and third

priorities. Interestingly, patchouli was not selected as a potential species, although it has contributed to local livelihoods, due to the decreased price for patchouli leaves.

Table 10. Crop priority in Southeast Sulawesi by village groups based on expected intervention by AgFor (E), current market condition (M) and current priority in local livelihoods (C)

Crop	Village groups crop priorities											
	Local			Mixed			Transmigrant			New transmigrant		
	E	M	C	E	M	C	E	M	C	E	M	C
Rubber	1			2						1		
Cacao	2	1	1	2	1	1	3	1	2		3	2
Coffee											8	2
Coconut		3	6	9	10			1	2	2		8
Pepper	3	1	2	4	3	1	2	1	2		8	
Cloves	5			5		6				3		8
Patchouli		4	6		7	8		5	7			
Nutmeg				5								
Candlenut		7										
Short-term crops (vegetables, chili, tomato, beans)	7	4	4	9	7	5		1	1	3	1	1
Sago			6						7			8
Maize	7								7	3		
NTFPs (honey, fuelwood, arenga)		7						5			2	
Timber												
Timber	7				1						8	
Teak	5		6	8	10	6		5	7	3	8	8
Fruit												
Durian	3	7	2	1	3	1	1	5	2	3	3	2
Rambutan		7	4	5	3	4	3	5	2		3	2
Banana					7	8					3	2
Orange											3	2
Lansium		4	6		6	8		5	7			
Jackfruit									7			
Mango									7			

Note: 1 = highest priority. E = expect, C = current, M = market, NTFP = non-timber forest product

In summary, durian was the most popular choice because of the high prices reached for the fruit and the option to sell the timber if tree production declined. Rubber ranked second, however to date, only a few farmers planted rubber due to insufficient access to rubber planting materials and the absence of a local market for rubber in Southeast Sulawesi, thus exploring the market potential for rubber is urgent if this crop is to be included among the focus species in AgFor project intervention. Cacao and pepper, the two most important crops for local livelihoods were also chosen as prospective species for project intervention, particularly with regard to pest and disease management. Cloves and teak were

selected because farmers had no access to planting material or information on the cultivation of these crops. Banana and other short-term crops were chosen due to minimal harvesting time duration, although pest and disease management as well as marketing aspects still require further improvement. Lack of access to good planting materials, lack of innovation in pest and disease management and lack of innovation in marketing strategies for prospective species were the principal reasons why farmers selected the above-mentioned crops for project intervention.

However, in Southeast Sulawesi, for many years, the government has maintained seedling distribution programmes to respond to farmers' lack of access to planting materials. Government agencies that distributed seedlings were mainly Dinas Pertanian, Dinas Perkebunan and Dinas Kehutanan. Seedlings were distributed based on proposals made by farmer groups (Annex 6). Government agencies will only distribute seedlings of available species, whether new or well-known species. Additionally, local government agencies sometimes has difficulty in obtaining the seedlings due to the lack of information on where to obtain good planting materials, as well as the lack of good quality germplasm of the species proposed by farmers. Thus, the AgFor project was expected to assist the improvement of farmer and local government access to good quality planting materials.

Extension services in Southeast Sulawesi

Over the past 5 years most farmers have received training (Annex 7) and in-class activities (Annex 8) on agricultural issues such as vegetable cultivation, cacao side-grafting and composting. Farmers in Wonua Hoa (migrants) did not receive training from any organization, possibly because of poor road access from the main road to the settlement area. For the former extension services, 0–30% of the participants were women.

The FGDs at the village level revealed no significant differences in the major topics expected for in-class extension services by the AgFor project. Cultivation and crop maintenance techniques dominated extension topic requests followed by pest and disease management. Crop variety identification was next, followed by livestock management. Despite no significant difference in preferences for in-class topics among village groups, each village had different focus crops for each topic, for example regarding in-class activities on cultivation techniques, farmers in Lawonua (local village) wanted to focus on rubber, while in Wonua Hoa they wanted to focus on cacao and paddy rice (Table 11).

Table 11. Potential topics for in-class activities in AgFor project extension services in Southeast Sulawesi

Village	Topics			
	Cultivation and crop maintenance techniques	Pest and disease management	Crop variety identification	Livestock management
Local village group				
Ambondiaa	Rubber, cacao, agarwood	Cacao, durian, rambutan, coffee, patchouli	All plants suitable for planting in Ambondiaa	Cattle and poultry
Lamunde	Cacao, paddy rice, pepper	All crops in the village		Cattle and poultry
Simbune	Cacao, pepper	Pepper		
Taosu	Rubber, nutmeg	All plants in the village	Cacao	

Mixed village group				
Anggawo	Rubber, durian (fruiting season)			
Lawonua	Rubber			
Wonua Hoa- migrant	Rubber, red ginger, chili		Cacao	
Wonua Hoa-local	Cacao and paddy rice (how to utilize the ricefield during the break ('puso'))	Cacao	Cacao	
Transmigrant village group				
Tasahea	Pepper, cacao, coconut, cloves	Pepper (how to select superior pepper varieties)	Durian, cacao and pepper	Pigs and cattle
New transmigrant village group				
UPT Asinua Jaya (Lasao)	Cloves, durian, rubber	All crops in the village		

In the training context, priorities differed (Table 12). In the local village group, 100% of the villages selected vegetative propagation, 75% selected organic fertilizer, and 25% selected pest and disease handling, post-harvest cacao management and land suitability assessment. In the mixed village group, 75% of the villages selected cacao rejuvenation, 50% selected vegetative propagation and pest and disease management, and 25% selected rubber agroforestry and microhydropower. Farmers in the transmigrant village group selected pest and disease management. The new transmigrant village group selected vegetative propagation. In summary, vegetative propagation was the most demanded training topic, followed by pest and disease management, cacao rejuvenation and organic fertilizer.

Table 12. Type of expected training at the village level under AgFor project extension services in Southeast Sulawesi

Village	Vegetative propagation	Cacao rejuvenation	Pest and disease mgt	Organic fertilizer	Rubber agroforestry	Micro hydro power	Post-harvest cacao	Land suitability assessment
Local village group								
Total percentage	100	0	25	75	0	0	25	25
Ambondiaa	v							
Lamunde	v		v	v				v
Simbune	v			v			v	
Taosu	v			v				
Mixed village group								
Total percentage	50	75	50	0	25	25	0	0
Anggawo		v	v			v		
Lawonua	v	v			V			
Wonua Hoa-migrant	v	v						
Wonua Hoa-local			v					
Transmigrant village group								
Total percentage	0	0	100	0	0	0	0	0
Tasahea			v					
New transmigrant village group								
Total percentage	100	0	0	0	0	0	0	0
UPT Asinua Jaya (Lasao)	v							

Demonstration plots in Southeast Sulawesi

In most of the villages, a few demplots were established by government agencies in the past (Table 13). This did not occur for the mixed village group so farmers in Anggawo and Wonua Hoa were unable to respond when asked their expectations for demplot design in the AgFor project. The transmigrant and new transmigrant village groups were more experienced with demplots due to the intensive government programme in the first few years of the transmigration programme.

Table 13. Former demplots and potential demplots in Southeast Sulawesi AgFor project villages

Village	Demplots from previous programmes			Expected demplots under AgFor	
	Year	Agencies	Demplots	Garden demplot	Nursery demplot
Local village group					
Ambondiaa	2011	<i>Dinas Pertanian</i>	Paddy for dryland	Mixed system (rubber+ cacao+ durian)	Rubber
Lamunde			Paddy ricefield	Mixed system (cacao+ durian+pepper+rubber+ cloves)	
Simbune		University	Side-grafting	Mixed system (cacao+pepper)	
Taosu	None			Mixed system (rubber+nutmeg)	Rubber and nutmeg
Mixed village group					
Anggawo	None				
Lawonua	None			Mixed system (rubber+ durian+ pepper+fruit)	
Wonua Hoa-local	None			Mixed system of short-term crops (to be harvested in 13 years)	Durian
Wonua Hoa-migrant	None				Fruit, durian, rubber
Transmigrant village group					
Tasahea	1986		Orange monoculture	Monoculture system: pepper	
New-transmigrant village group					
UPTAsinua Jaya (Lasao)		<i>Dinas Pertanian, Dinas Tenaga Kerja dan Transmigrasi</i>	Vegetables (tomato, chili)	Mixed system (cloves+ durian+ rubber+teak+ coconut)	Cloves, rubber, durian

Designs for expected demplots in the project varied among village groups depending on the main livelihood in the area and the amount of land available. Most farmers expected demplots to focus on how to mix different species in the same plot, except for farmers in Tasahea who wanted to focus on improvement of pepper plantations in monoculture systems.

Cross-visits in Southeast Sulawesi

Five out of nine AgFor project villages have not yet experienced cross-visits (Annex 9). Formerly, cross-visit activities were supported mostly by Dinas Pertanian and Dinas Kehutanan in every district. The two agencies organized a cross-visit at least once a year. However, due to budget limitation, attendance was limited to five people per village (the participation of women varied at between 0–30%). Cross-visit frequency was uncertain. Topics studied during the cross-visits held by the government over the past ten years were cacao cultivation, vanilla cultivation and cattle management.

FGDs revealed that farmers were interested to learn more about the cultivation of cacao, rubber, durian, cloves and pepper in Bulukumba, Sinjai, Palopo, Lambandia and Maros. Lambandia and Bulukumba were considered the most interesting sites to visit (Annex 10).

Marketing in Southeast Sulawesi

Marketing issues mostly related to limited access to markets. High dependency on specific traders (the case in South Sulawesi), was not the main marketing issue. Poor road access was the major challenge in marketing agricultural products. In FGDs, the villages Tasahea and Simbune, both from the Kolaka district, specifically requested the AgFor project to facilitate the formation of marketing groups (possibly through cooperation) in Ladongi village, Lambandia subdistrict and the Kolaka district through Lembaga Ekonomi Masyarakat, which had helped the community to market cacao seeds collectively. Farmers in new transmigration areas such as UPT Asinua (Lasao) village, located in a remote area in Konawe district, requested the AgFor project to help them market bananas, and if possible, to help farmers communicate with the local government to improve the road in the area. There was no significant difference among village groups in their demands for marketing intervention under the AgFor project.

Gender preferences for agricultural extension needs in Southeast Sulawesi

There was no significant difference in gender preferences for extension services among the village groups. However women tended to expect assistance related to post-harvest handling, vegetative propagation and pest and disease management. In comparison, men opted for plot and nursery management. Women prioritized short-term crops (such as vegetables) but long-term crops (timber and fruit trees) were preferred by men.

In earlier agricultural extension activities, women's participation ranged from 10–50%. Most of the farmer group members in Southeast Sulawesi were men. Women were more active in homegardens.

All surveyed villages agreed that men were the decision makers in land management. Men allocated more time to plot establishment—planting, maintenance and harvesting, thus their capacity and skills need to be improved in these contexts. Capacity building for women should address nursery maintenance—harvesting/postharvest management and product marketing.

Communication media in Southeast Sulawesi

Ranking of media effectiveness differed among village groups (Table 14). The local village group selected television as the most effective medium for agricultural extension, while the mixed village group selected magazines. The transmigrant village group opted for DVD while the new transmigrant village group chose radio. In the latter group, only two media types were selected because other forms were not available in the area due to its remoteness and lack of electricity. However, cell phones and

radio were common in all villages, so they have higher potential as effective tools for agricultural extension in Southeast Sulawesi.

Table 14. Ranking of communication media effectiveness for agricultural extension in Southeast Sulawesi

Village groups	Media effectiveness				
	1	2	3	4	5
Local	Television	Radio	Cell phone	Newspaper	CD/DVD
Mixed	Magazine	Radio	Television	Cell phone	Newspaper
Transmigrant	CD/DVD	Cell phone, television		Radio	Newspaper
New transmigrant	Radio	Cell phone			

Note: 1 = most effective.

5. Conclusion

Agroforestry extension needs at the community level in AgFor project sites in South and Southeast Sulawesi were analysed by observing issues relevant to the agriculture, forestry and estate crops sectors, with a stronger focus on agriculture which has a larger extension agenda. Currently in Indonesia, there are no separate agroforestry extension agencies. Current agricultural extension conditions and future potential extension activities were described.

In general, in both provinces the agricultural extension agents have the most important roles in improving access to information and technology for farmers, as well as translating research results into reality on the ground. Thus good coordination between extension agents and research agencies is expected to improve the dissemination of new research results for increasing farmers' land productivity. However coordination between institutions is currently weak. Moreover, government agricultural extension agencies are currently struggling to cope with major challenges in service improvement. The main issues faced by agricultural extension agencies for enhancing their services are:

- Lack of government extension officers. Farmer specialists or the farmer-to-farmer approach is recommended to overcome this problem; the farmer-to-farmer approach is acknowledged to have the potential to sustain information transfer and innovation dissemination at the community level.
- Lack of technical capacity and motivation to facilitate innovation. The government has tried to enhance the technical capacity of extension officers with training. Motivation for extension officers to improve services may be enhanced via reward schemes for effective extension officers.
- Barriers such as vehicle availability for cross-visits and lack of research facilities to test and create innovative techniques for improving crop productivity.

At the community level in both provinces agricultural extension issues varied, due to socioeconomic disparities such as levels of education and income ethnicity and infrastructure status. Socioeconomic and biophysical incongruities also resulted in different community crop prioritization. Infrastructure conditions affected marketing potential and the access of farmers to information.

In South Sulawesi, for villages in the highland areas such as the degraded land village group, AF-Bantaeng village group and AF-Bulukumba village group, clove was the most important tree crop, while in lowland areas (the timber village group), coconut was the most important tree species.

Besides tree species, short-term crops (vegetables, beans, chayote, cassava, peanut, chili, cabbage, carrot) were also important for local livelihoods in all village groups. For AgFor project intervention in South Sulawesi, durian was the most important crop. In comparison, in Southeast Sulawesi, cacao was the most prioritized crop as it had contributed to improving local livelihoods for many years, except in newly established areas (new transmigrant village group), which depended on short-term crops and NTFPs. As in South Sulawesi, AgFor project intervention needs were the same in Southeast Sulawesi—durian was the most demanded crop, particularly because of the high price of improved durian varieties such as durian monthong or durian otong.

Lack of access to information and innovative technology for improving land productivity has motivated farmers to participate in extension activities. Training on vegetative propagation was the most requested extension service by farmers in both provinces (Table 15), followed by pest and disease management and production of organic fertilizer. Besides crops, in both provinces, farmers also wanted to learn more about livestock management, as livestock has a significant role in livelihoods in both provinces.

Table 15. Priority topics for AgFor project training requested by farmers in South and Southeast Sulawesi

Topic for training	Number of villages per provinces	
	South Sulawesi (n total = 8 villages)	Southeast Sulawesi (n total = 10 villages)
Vegetative propagation	7	7
Pest and disease management	5	4
Organic fertilizer	5	3
Tree spacing	4	0
Honey production	3	0
Cacao garden rejuvenation	2	3
Rubber cultivation	1	1

Besides training and in-class activities, establishing demplots is also expected to enhance farmers' knowledge and skills in improving garden and tree management. In this study, potential demplots were identified. Improved plot management was prioritized by communities in both provinces. Crops planned for planting in each demplot, in line with AgFor project intervention, varied among villages. In both provinces, farmers were unfamiliar with the demplot concept because formerly this was not a common activity. Thus, within AgFor project intervention, it is important to reconfirm demplot design with each community before they are established.

Agricultural extension demands by gender were similar in both provinces. However, in both provinces, in former agricultural extension activities, women's participation ranged broadly from 0–80% depending on the type of extension activity. Thus, agricultural extension needs by gender can be identified through time allocation for plot management. Normally, men allocate more time for plot management activities—plot establishment, planting, maintenance and harvesting, thus in these contexts their capacity and skills need to be improved. Meanwhile, women have roles in plot maintenance, harvesting, post-harvest management, and product marketing, so likewise their capacity and skills need to be improved in these activities.

Communication media utilization has yet to be optimized in current agricultural extension services. In Southeast Sulawesi, farmers' priorities for optimal communication media varied among village groups—the local village group ranked television highest, while the mixed village group opted for magazines and the transmigrant village CD/DVD, and the new transmigrant village group considered radio as the most effective communication medium. In South Sulawesi, all villages ranked television as the most effective communication medium for agricultural extension. However, currently the frequency of agricultural extension programmes broadcast on television is decreasing. Thus, CD or DVD could be potential alternatives if produced and distributed regularly to farmers. Cell phones have potential for providing updated information on agricultural commodity prices.

In conclusion, most communities tended to expect some improvements in the extension services they currently receive. Thus, through the AgFor project, communities are expected to receive improved agricultural extension services through a) introduction of innovative knowledge or technology that can improve crop productivity, and b) regular practical or technical assistance to enhance their livelihoods.

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Annexes

Annex 1. Seedling distribution from former government programmes to farmers in AgFor project villages in South Sulawesi (receivers are members of farmer groups)

Village	Year	Frequency per year	Gov. agency	Crop
Degraded land village group				
Kayu Loe	2011	23	Dinas Pertanian; Dinas Kehutanan	Maize, potato; KBR—cloves, coffee, durian
Bonto Karaeng	2011	1	Dinas Pertanian	Maize (1520 kg per HH); cloves, 50 seedlings per HH; cacao, 50 seedlings per HH; paddy (1520 kg perHH)
AF-Bantaeng village group				
Campaga	2007 to 2008	1	Dinas Pertanian; Dinas Perkebunan	Paddy, maize, cacao
Pattaneteang	2011	12	Dinas Kehutanan dan Perkebunan	Cloves, lansium, suren, durian
AF-Bulukumba village group				
Borong Rappoa	2007, 2012	1 per 5 years	P2BM, Dinas Pertanian	Paddy, maize, durian, onion, mahoni, nutmeg, Afrika timber, gmelina
Balang Pesoang	2005– 2012	1	Dinas Pertanian	Mangosteen, surian, teak, pepper, clove, durian, coffee, rambutan
Timber-based village group				
Tana Toa	2012	1		Maize, paddy, surian, teak, cacao, candlenut, rubber, gmelina, mahoni, enterolobium (colo)
Tugondeng	2011	1	Dinas Pertanian, Dinas Kehutanan	Paddy, maize, teak, coconut, mahoni, gmelina, kayu sengon

Note: HH = household.

Annex 2. Former training events in agricultural-based activities in AgFor project villages in South Sulawesi

Village	Year	Frequency per year	Extension agency	Topic	Female participation (%)
Degraded land village group					
Kayu Loe	2011	1 per 3 years	Dinas Pertanian	Vegetable cultivation	20
Bonto Karaeng	2011	1	Extension officer at district level	Home industry (chair making)	20
AF-Bantaeng village group					
Campaga	2010	2	Extension officer at district level	Honey production	50
Pattaneteang	2011	1	Dinas Pertanian; Dinas Kehutanan	Fertilizing	10
AF-Bulukumba village group					
Borong Rappoa	2011		Dinas Pertanian	Vegetable cultivation	20
Balang Pesoang	2011	1	Dinas Pertanian	Side-grafting for cacao	0
Timber-based village group					
Tana Toa	2011	1	Dinas Pariwisata, Dinas Pertanian	Home industry, plant spacing management	50
Tugondeng	2010	1	Dinas Pertanian, Dinas Kehutanan	Cacao cultivation	30

Annex 3. Former in-class activities as part of extension services by government agencies in AgFor project villages in South Sulawesi

Village	Year	Frequency per year	Extension agency	Topics	Female participation (%)
Degraded land village group					
Kayu Loe	None				
Bonto Karaeng	2011	2	Extension officer at district level	Paddy and maize cultivation; livestock management	30
AF-Bantaeng village group					
Campaga	2011	2	Unhas, Dinas Pertanian, Dinas Perkebunan	Staple food crop and estate crop cultivation; protection forest; ecotourism	30
Pattaneteang	200–2010	1	Dinas Pertanian; Dinas Kehutanan	Cultivation	30
AF-Bulukumba village group					
Borong Rappoa	2011	1 per 5 years	Dinas Pertanian	Vegetable and paddy cultivation	30
Balang Pesoang	None				
Timber-based village group					
Tana Toa	2011, 2012	4 per 3 years	Lapesda-UGM	Organic fertilizer industry, traditional textile industry	80
Tugondeng	2010	1	Dinas Pertanian, Dinas Kehutanan	Cacao side-grafting; coconut sugar production	30

Annex 4. List of former cross-visit activities hosted by government and non government agencies in South Sulawesi

Village	Year	Frequency per year	Agency	Destination/agenda	Female participation (%)
Degraded land village group					
Kayu Loe	2011	2	Dinas Pertanian dan Hortikultura	Bali and Bulukumba	30
Bonto Karaeng	2011	1	Dinas Pertanian	Poultry management	?
AF-Bantaeng village group					
Campaga	2010	1	Dinas Pertanian dan Hortikultura; Kelompok Tani Nelayan Andalan		50
Pattaneteang	2011	1	Dinas Kehutanan; Universitas Hasanuddin	Honey production	0
AF-Bulukumba village group					
Borong Rappoa	2009	1 per 10 years	Dinas Pertanian	Enrekang and Tana Toraja to study vegetable cultivation (27 participants, 4 female)	20
Balang Pesoang	None				
Timber-based village group					
Tana Toa	1996, 2003, 2006			Meeting for National Customary Group	0
Tugondeng	2010	1 per 5 years	Dinas Kehutanan dan Perkebunan	Cacao in Banyuwangi, East Java	0

Annex 5. Cross-visits requested by South Sulawesi farmers in the AgFor project

Village	Topics	Location for cross-visits										
		Malino (coffee, vegetables, fruits)	Bantaeng- Loka (vege- tables, apple, strawberry)	Enrekang (vegetables, cattle, snakefruit)	Sidrap (paddy, poultry)	Tator (coffee)	Takalar (maize)	Sinjai Barat (passion fruit)	Palopo (cacao, sagu)	Bulu- kumba (rubber, fruits)	Sinjai (durian)	Soppeng (agarwood)
Degraded land village group												
Kayu Loe	Cabbage; onion; durian; mango; poultry; sagu; rambutan; lansium; maize; cloves; cacao			V	v				v	v		
Bonto Karaeng	Vegetables; cattle; poultry; fruits	v		V	v							
AF-Bantaeng village group												
Campaga	Paddy;cacao;cow; snakefruit; maize; passion fruit			V	v		V	v	v			
Pattaneteang	Nutmeg; mangosteen; paddy; cattle; goats; agarwood; cloves; cacao								v		v	v

AF-Bulukumba village group						
Borong Rappoa	Coffee;vegetables; poultry; cloves	v	v	V	v	v
Balang Pesoang	Rambutan, durian, apple, strawberry	v	v			
Timber-based village group						
Tana Toa	Rubber, durian					v v
Tugondeng	Cacao, coconut, rubber				v	

Annex 6. Seedling distribution from former government programmes to farmers in AgFor project villages in Southeast Sulawesi (receivers are members of farmer groups)

Village	Year	Frequency	Gov. agency	Crop
Local village group				
Ambondiaa	2009, 2010, 2011	Not sure	Dinas Perkebunan; Dinas Pertanian; Dinas Kehutanan	Cacao, rambutan, paddy, teak
Lamunde	2004, 2008	Not sure	Dinas Pertanian; Dinas Perkebunan	Paddy, durian, cacao, pepper, patchouli, teak
Simbune	2009	Not sure	Gernas, Dinas Perkebunan	Cacao seedlings for budwood garden with cacao variety of Sulawesi 1 and Sulawesi 2
Taosu	1997	Not sure		Teak, paraserianthes, oilpalm, coconut hybrid
Mixed village group				
Anggawo	None			
Lawonua		1 per 10 years	?	Cacao
Wonua Hoa-local	2009– 2010	Not sure	Dinas Pertanian	Paddy
Wonua Hoa-migrant	2011	Not sure	Dinas Pertanian	Durian otong (100 seedlings)
Transmigrant village group				
Tasahea	1994, 2011	Not sure	Dinas Perkebunan; Dinas Kehutanan	Cacao, gmelina, teak, mango, vitex, rambutan aceh
New transmigrant village group				
UPT Asinua Jaya (Lasao)	2011	Not sure	Dinas Tenaga Kerja dan Transmigrasi	Paddy, maize, soybeans, rambutan, orange, mango, durian (all died, eaten by pigs), cacao, vegetables, banana, jackfruit

Annex 7. Former training in agricultural-based activities in AgFor project villages in Southeast Sulawesi

Village	Year	Frequency	Extension agency	Topic	Female participation (%)
Local village group					
Ambondiaa	2004, 2011	Not sure	Gernas, SL	Cacao rehabilitation and maintenance; side-grafting	30
Lamunde	2009–2010	Not sure	Gernas	Cacao side-grafting; composting	25
Simbune	2009	Not sure	Gernas, Dinas Perkebunan	Side-grafting cacao (20 oculators, all male); cacao pruning; farmer field school (25 participants, 7 participants per farmer group)	10
Taosu	2004, 2009	Not sure	Dinas Pertanian	Orange grafting	10
Mixed village group					
Anggawo	2011		Dinas Kehutanan	Nursery for timber tree species (KBR)	30
Lawonua	2008–2009	1 per 4 years	?	Composting	50
Wonua Hoa-local	2008–2012	1 per 2 years	Dinas Perkebunan	Side-grafting cacao	15
Wonua Hoa-migrant	None				
Transmigrant village group					
Tasahea	2007	Not sure	Gernas, Dinas Perkebunan, Farmer Field School (SL-PAT)	Side-grafting cacao, organic fertilizer production, biogas management for energy alternative	30
New transmigrant village group					
UPT Asinua Jaya (Lasao)	2010–2011	not sure	Dinas Tenaga Kerja dan Transmigrasi provinsi Sulawesi Tenggara	Home industry (food making); organic fertilizer industry; organic pest and disease management	30

Annex 8. Former in-class activities as part of extension services by government agencies in AgFor project villages in Southeast Sulawesi

Village	Year	Frequency	Extension agency	Topics	Female participation (%)
Local village group					
Ambondiaa	2004, 2011	Not sure	Gernas, Sekolah Lapang	Cacao rehabilitation, maintenance, side-grafting	30
Lamunde	2009–2010	Not sure	Dinas Pertanian	Paddy ricefield	50
Simbune	2007, 2009, 2011	Not sure	Gernas, Dinas Perkebunan	Cacao side-grafting and pruning; farmer field school	10
Taosu	2008, 2011	Not sure	Gernas	Cacao side-grafting	10
Mixed village group					
Anggawo	2011	Not sure	Dinas Pertanian; Dinas Kehutanan	Integrated pest and disease management; nursery for timber tree species (KBR)	30
Lawonua	2009–2011	1 per year	?	Side-grafting	20
Wonua Hoa-local	1998	2 per year	Dinas Pertanian Kendari	Paddy cultivation	15
Wonua Hoa-migrant	None				
Transmigrant village group					
Tasahea	2011	Not sure	Dinas Peternakan	Cattle management	40
New-transmigrant village group					
UPT Asinua Jaya (Lasao)	2009, 2011	Not sure	TKPMP, DepNaKerTrans, Balai Transmigrasi Makassar	Cacao and vegetablescultivation	30

Annex 9. List of former cross-visit activities hosted by government and non-government agencies in Southeast Sulawesi

Village	Year	Frequency	Agency	Destination/agenda	Female participation (%)
Local village group					
Ambondiaa	None				
Lamunde	2008	Not sure	BUMDES	Village governance	0
Simbune	2004	Not sure	Decentralization programme	In Sinjai to learn about vanilla cultivation	30
Taosu	None			HKm socialization in Bogor	
Mixed village group					
Anggawo	2011		<i>Gernas</i>	In Kolaka to learn about cacao cultivation	0
Lawonua	2011	Not sure	Not sure	In Ladongi to learn about cacao cultivation	10
Wonua Hoa-local	None				
Wonua Hoa-migrant	None				
Transmigrant village group					
Tasahea	2011	Not sure	Dinas Peternakan	In Ladono, South Konawe, to learn about cattle management	0
New transmigrant village group					
UPT Asinua Jaya (Lasao)	None				

Annex 10. Cross-visits requested by farmers in Southeast Sulawesi

Village	Topic	Location for cross-visit						
		Bulukumba (cloves, rubber, durian)	Ladongi (marketing group)	Sinjai (durian)	Palopo (durian)	?? (pepper)	Lambandia (cacao)	Maros (paddy)
Local village group								
Ambondiaa	Cacao, rubber	v					v	
Lamunde	Rubber, cloves, cacao, pepper	v			v	v	v	
Simbune	Cacao and marketing group (Lembaga Ekonomi Masyarakat)		v					
Taosu	Cacao						v	
Mixed village group								
Anggawo	Cacao, durian			v	v		v	
Lawonua	Rubber	v		v				
Wonua Hoa- migrant	Cloves, durian, rubber, cacao	v		v	v		v	
Wonua Hoa-local	Paddy rice, fisheries, cacao						v	v
Transmigrant village group								
Tasahea	Cacao, pepper, durian	v	v	v	v	v	v	
New transmigrant village group								
UPT Asinua Jaya (Lasao)	Rubber, cloves, durian, teak, coconut	v		v	v		v	

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58. Assessing the Hydrological Situation of Talau Watershed, Belu Regency, East Nusa Tenggara.
59. Kajian Kondisi Hidrologis DAS Talau, Kabupaten Belu, Nusa Tenggara Timur.
60. Kajian Kondisi Hidrologis DAS Kapuas Hulu, Kabupaten Kapuas Hulu, Kalimantan Barat.
61. Lessons learned from community capacity building activities to support agroforest as sustainable economic alternatives in Batang Toru orang utan habitat conservation program (Martini, Endri et al.)
62. Mainstreaming Climate Change in the Philippines.
63. A Conjoint Analysis of Farmer Preferences for Community Forestry Contracts in the Sumber Jaya Watershed, Indonesia.
64. The highlands: a shared water tower in a changing climate and changing Asia
65. Eco-Certification: Can It Deliver Conservation and Development in the Tropics.
66. Designing ecological and biodiversity sampling strategies. Towards mainstreaming climate change in grassland management.
67. Towards mainstreaming climate change in grassland management policies and practices on the Tibetan Plateau
68. An Assessment of the Potential for Carbon Finance in Rangelands
69. ECA Trade-offs Among Ecosystem Services in the Lake Victoria Basin.
69. The last remnants of mega biodiversity in West Java and Banten: an in-depth exploration of RaTA (Rapid Land Tenure Assessment) in Mount Halimun-Salak National Park Indonesia

70. Le business plan d'une petite entreprise rurale de production et de commercialisation des plants des arbres locaux. Cas de quatre pépinières rurales au Cameroun.
71. Les unités de transformation des produits forestiers non ligneux alimentaires au Cameroun. Diagnostic technique et stratégie de développement Honoré Tabuna et Ingratia Kayitavu.
72. Les exportateurs camerounais de safou (*Dacryodes edulis*) sur le marché sous régional et international. Profil, fonctionnement et stratégies de développement.
73. Impact of the Southeast Asian Network for Agroforestry Education (SEANAFE) on agroforestry education capacity.
74. Setting landscape conservation targets and promoting them through compatible land use in the Philippines.
75. Review of methods for researching multistrata systems.
76. Study on economic viability of *Jatropha curcas* L. plantations in Northern Tanzania assessing farmers' prospects via cost-benefit analysis
77. Cooperation in Agroforestry between Ministry of Forestry of Indonesia and International Center for Research in Agroforestry
78. "China's bioenergy future. an analysis through the Lens if Yunnan Province
79. Land tenure and agricultural productivity in Africa: A comparative analysis of the economics literature and recent policy strategies and reforms
80. Boundary organizations, objects and agents: linking knowledge with action in agroforestry watersheds
81. Reducing emissions from deforestation and forest degradation (REDD) in Indonesia: options and challenges for fair and efficient payment distribution mechanisms

2009

82. Mainstreaming climate change into agricultural education: challenges and perspectives
83. Challenging conventional mindsets and disconnects in conservation: the emerging role of eco-agriculture in Kenya's landscape mosaics
84. Lesson learned RATA garut dan bengkuntat: suatu upaya membedah kebijakan pelepasan kawasan hutan dan redistribusi tanah bekas kawasan hutan
85. The emergence of forest land redistribution in Indonesia
86. Commercial opportunities for fruit in Malawi
87. Status of fruit production processing and marketing in Malawi
88. Fraud in tree science
89. Trees on farm: analysis of global extent and geographical patterns of agroforestry
90. The springs of Nyando: water, social organization and livelihoods in Western Kenya
91. Building capacity toward region-wide curriculum and teaching materials development in agroforestry education in Southeast Asia
92. Overview of biomass energy technology in rural Yunnan (Chinese – English abstract)
93. A pro-growth pathway for reducing net GHG emissions in China
94. Analysis of local livelihoods from past to present in the central Kalimantan Ex-Mega Rice Project area
95. Constraints and options to enhancing production of high quality feeds in dairy production in Kenya, Uganda and Rwanda

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96. Agroforestry education in the Philippines: status report from the Southeast Asian Network for Agroforestry Education (SEANAFE)
97. Economic viability of *Jatropha curcas* L. plantations in Northern Tanzania- assessing farmers' prospects via cost-benefit analysis.
98. Hot spot of emission and confusion: land tenure insecurity, contested policies and competing claims in the central Kalimantan Ex-Mega Rice Project area
99. Agroforestry competences and human resources needs in the Philippines
100. CES/COS/CIS paradigms for compensation and rewards to enhance environmental Services
101. Case study approach to region-wide curriculum and teaching materials development in agroforestry education in Southeast Asia

102. Stewardship agreement to reduce emissions from deforestation and degradation (REDD): Lubuk Beringin's Hutan Desa as the first village forest in Indonesia
103. Landscape dynamics over time and space from ecological perspective
104. Komoditisasi atau koinvestasi jasa lingkungan: skema imbal jasa lingkungan program peduli sungai di DAS Way Besai, Lampung, Indonesia
105. Improving smallholders' rubber quality in Lubuk Beringin, Bungo district, Jambi province, Indonesia: an initial analysis of the financial and social benefits
106. Rapid Carbon Stock Appraisal (RACSA) in Kalahan, Nueva Vizcaya, Philippines
107. Tree domestication by ICRAF and partners in the Peruvian Amazon: lessons learned and future prospects in the domain of the Amazon Initiative eco-regional program
108. Memorias del Taller Nacional: "Iniciativas para Reducir la Deforestación en la region Andino - Amazónica", 09 de Abril del 2010. Proyecto REALU Peru
109. Percepciones sobre la Equidad y Eficiencia en la cadena de valor de REDD en Perú – Reporte de Talleres en Ucayali, San Martín y Loreto, 2009. Proyecto REALU-Perú.
110. Reducción de emisiones de todos los Usos del Suelo. Reporte del Proyecto REALU Perú Fase 1
111. Programa Alternativas a la Tumba-y-Quema (ASB) en el Perú. Informe Resumen y Síntesis de la Fase II. 2da. versión revisada
112. Estudio de las cadenas de abastecimiento de germoplasma forestal en la amazonía Boliviana
113. Biodiesel in the Amazon
114. Estudio de mercado de semillas forestales en la amazonía Colombiana
115. Estudio de las cadenas de abastecimiento de germoplasma forestal en Ecuador
116. How can systems thinking, social capital and social network analysis help programs achieve impact at scale?
117. Energy policies, forests and local communities in the Ucayali Region, Peruvian Amazon
118. NTFPs as a Source of Livelihood Diversification for Local Communities in the Batang Toru Orangutan Conservation Program
119. Studi Biodiversitas: Apakah agroforestry mampu mengkonservasi keanekaragaman hayati di DAS Konto?
120. Estimasi Karbon Tersimpan di Lahan-lahan Pertanian di DAS Konto, Jawa Timur
121. Implementasi Kaji Cepat Hidrologi (RHA) di Hulu DAS Brantas, Jawa Timur.
122. Kaji Cepat Hidrologi di Daerah Aliran Sungai Krueng Peusangan, NAD, Sumatra
123. A Study of Rapid Hydrological Appraisal in the Krueng Peusangan Watershed, NAD, Sumatra.

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124. An Assessment of farm timber value chains in Mt Kenya area, Kenya
125. A Comparative financial analysis of current land use systems and implications for the adoption of improved agroforestry in the East Usambaras, Tanzania
126. Agricultural monitoring and evaluation systems
127. Challenges and opportunities for collaborative landscape governance in the East Usambara Mountains, Tanzania
128. Transforming Knowledge to Enhance Integrated Natural Resource Management Research, Development and Advocacy in the Highlands of Eastern Africa
129. Carbon-forestry projects in the Philippines: potential and challenges The Mt Kitanglad Range forest-carbon development
130. Carbon forestry projects in the Philippines: potential and challenges. The Arakan Forest Corridor forest-carbon project
131. Carbon-forestry projects in the Philippines: potential and challenges. The Laguna Lake Development Authority's forest-carbon development project
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136. Performance of three rambutan varieties (*Nephelium lappaceum* L.) on various nursery media

137. Climate change adaptation and social protection in agroforestry systems: enhancing adaptive capacity and minimizing risk of drought in Zambia and Honduras
138. Does value chain development contribute to rural poverty reduction? Evidence of asset building by smallholder coffee producers in Nicaragua
139. Potential for biofuel feedstock in Kenya
140. Impact of fertilizer trees on maize production and food security in six districts of Malawi.

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141. Fortalecimiento de capacidades para la gestión del Santuario Nacional Pampa Hermosa: Construyendo las bases para un manejo adaptativo para el desarrollo local. Memorias del Proyecto
142. Understanding rural institutional strengthening: A cross-level policy and institutional framework for sustainable development in Kenya
143. Climate change vulnerability of agroforestry
144. Rapid assesment of the inner Niger delta of Mali
145. Designing an incentive program to reduce on-farm deforestation in the East Usambara Mountains, Tanzania
146. Extent of adoption of conservation agriculture and agroforestry in Africa: the case of Tanzania, Kenya, Ghana, and Zambia
147. Policy incentives for scaling up conservation agriculture with trees in Africa: the case of Tanzania, Kenya, Ghana and Zambia
148. Commoditized or co-invested environmental services? Rewards for environmental services scheme: River Care program Way Besai watershed, Lampung, Indonesia.
149. Assessment of the headwaters of the Blue Nile in Ethiopia.
150. Assessment of the uThukela Watershed, Kwazulu.
151. Assessment of the Oum Zessar Watershed of Tunisia.
152. Assessment of the Ruwenzori Mountains in Uganda.
153. History of agroforestry research and development in Viet Nam. Analysis of research opportunities and gaps
154. REDD+ in Indonesia: a Historical Perspective.
155. *Agroforestry and Forestry in Sulawesi series*: Livelihood strategies and land use system dynamics in South Sulawesi
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