

Existing Conditions, Challenges and Needs in the Implementation of Forestry and Agroforestry Extension in Indonesia

Riyandoko, Endri Martini, Aulia Perdana, Amirah Yumn, James M Roshetko



**World
Agroforestry
Centre**

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Abstract

Timber and non-timber forest products (NTFPs) are forest and agroforestry products and potential livelihood sources for farmers. If managed in a sustainable manner, these products can increase the income of farmers. To achieve sustainable management, farmers require access to appropriate information. However, in remote areas, farmers have limited access to such information. Therefore, this study was conducted in order to understand the effective forestry extension practices that support the development of timber and NTFPs as a source of income for farmers in Indonesia. Interviews were conducted with 500 farmers, and six FGDs were held to discuss the forestry extension approach implemented both by the government and the private sector. In addition, field observations on forestry extension practices were conducted in order to collect supported qualitative and quantitative data. This study was conducted in three districts of three provinces in Indonesia: Gunungkidul, Daerah Istimewa Yogyakarta; Sumbawa, West Nusa Tenggara; and Timor Tengah Selatan, East Nusa Tenggara. The result shows that current forestry extension practices are not optimum, mainly because of a) the inadequate number of government field extension agents specialized in forestry issues; b) inadequate learning material given to farmers; and c) inadequate budget allocation for forestry extension activities at the district level. In several remote study areas, private extension agents play a major role in helping the dissemination of forestry information. Implementation of forestry extension programs cannot depend solely on government extension agents. Collaboration between government and private extension agents is necessary to support the effectiveness of information dissemination and the capacity building of farmers for a sustainable forest management.

Keywords: Gunungkidul, Sumbawa, Timor Tengah Selatan, private extension agent, voluntary extension agent.

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1. Background

Timber and non-timber forest products (NTFPs) are forestry and agroforestry products with the potential to contribute to the livelihoods of farmers. According to Rohadi et al (2012), the sale of teak planted in agroforestry gardens by farmers in Gunungkidul, Daerah Istimewa Yogyakarta, contributed around 12% of the household income. NTFPs are important short- and mid-term income sources. The report on the Smallholder Agribusiness Development Initiative (SADI) research from the Australian Centre for International Agriculture Research (ACIAR) stated that in Timor Barat, honey is still underdeveloped as source of farmer income. The research agencies felt that honey is a potential NTFP and should be developed through research, and should be sourced from local bees (Nimwegen et al, 2009).

The cultivation of teak with NTFPs in Gunungkidul district was initiated by smallholder farmers in the mid-1960s. Household survey data conducted by the ACIAR Teak Project in 2008 in Gunungkidul showed that most farmers planted teak on less than one hectare of land (63%), and 37% of farmers planted teak on less than 0.5 hectare of land. Only 12% planted teak on land larger than two hectares. Farmers in Gunungkidul also planted teak on land that was mainly used for food crop cultivation (Rohadi et al 2012). Food crops that are often intercropped with teak include maize, rice, cassava and root plants (ginger, turmeric, *kencur* [*Kaempferia galanga*], *temulawak* [*Curcuma zanthorrhiza*]).

Timber and NTFP management, if conducted in a sustainable manner, will secure higher income for farmers. Knowledge on timber and NTFP production, processing, marketing and policy aspect is a necessity for farmers in a sustainable and profitable management. Many farmers in Gunungkidul have not yet applied silviculture techniques (forest cultivation) which resulted in low-quality timber production from their garden. The lack of motivation in farmers to apply silviculture techniques was due to limited knowledge, capital and market information (Roshetko et al 2013). Therefore, it is expected that access to accurate and reliable information will improve sustainable management.

Extension is a way for farmers to access accurate and reliable information. It is stated in Indonesia's Law No. 16/2006 that extension is a means of learning for farmers and other market players so that they are willing and capable to help and organize themselves in accessing information on market, technology, capital and other resources as an effort to increase productivity, business efficiency and welfare, and also to increase awareness in the preservation of environmental services.

This study is a part of a research project titled 'Development of timber and non-timber forest products' production and marketing strategies for improvement of smallholders' livelihoods in Indonesia', implemented by the World Agroforestry Centre (ICRAF), the Center of International Forestry Research (CIFOR) and partners with fund from the Australian Centre for International Agriculture Research (ACIAR). This study addresses the characteristics of extension programs related

to the management, production and marketing of timber and NTFPs. The purpose of this study is to understand the system of forest and agroforestry extensions that support the development of timber and NTFPs as an alternative source of income for farmers in Indonesia. It is expected that the study will contribute to mapping the needs and challenges of developing effective forestry and agroforestry extension in Indonesia.

2. Methodology

2.1 Time and study locations

Data collection was conducted in two phases, i.e. in September–October 2013 with the objective to identify farmers' perceptions of the received forestry extension, and in January–March 2015 to identify the perception of forestry extension institutions in the study locations. The study was conducted in three districts: Gunungkidul District, Daerah Istimewa Yogyakarta; Sumbawa District, West Nusa Tenggara; and Timor Tengah Selatan District, East Nusa Tenggara. These three locations were considered to represent the three models of timber and non-timber forest product management in Indonesia. Gunungkidul represents the domesticated (planted) timber and NTFP management model. Sumbawa represents the forest-extracted timber and domesticated NTFP management model, and Timor Tengah Selatan represents the domesticated (planted) timber and forest-extracted NTFP management model.

2.2 Data collection

2.2.1 Household interview

The interview was conducted with 500 farmers in a household survey. Information collected in the interview includes (i) the extension services received by the community in the past five years; (ii) the process of information dissemination in addition to the formal extension activities; and (iii) farmers' expectations from forestry and agroforestry extension. Smallholder interviews were conducted in two villages in all districts: Bejiharjo and Karangduwet villages in Gunungkidul District; Pelat and Batudulang village in Sumbawa District; and Bosen and Fatumnasi village in Timor Tengah Selatan District. The respondents were randomly selected, with the following number of respondents: Gunungkidul: 102 farmers (36% female, 64% male); Sumbawa: 167 farmers (20% female, 80% male); and Timor Tengah Selatan: 129 farmers (11% female, 89% male).

2.2.2 Focus Group Discussion (FGD)

In this study, 11 FGDs were conducted with five groups of extension agents and six groups of farmers. The FGDs with extension agents were conducted to collect data on extension institutions, extension programs, the quantity and quality of extension agents, extension materials, extension methods, and budget for extension in each study location. The FGDs with extension agents were conducted at:

- The Agriculture, Fisheries and Forestry Extension Agency (BP3K) of Paliyan Subdistrict, Gunungkidul District;
- BP3K of Karangmojo Subdistrict, Gunungkidul District;
- BP3K of Mollo Utara Subdistrict, Timor Tengah Selatan District;
- District Agricultural (BP4K) of Timor Tengah Selatan District; and
- BP4K of Sumbawa District.

The FGDs with farmers were conducted in every village of the study locations, with the objective to confirm the information obtained from the household interview. The FGDs involved in-depth interviews with the farmers. Each FGD was attended by 5–10 participants, with 18% of the participants are female.

2.2.3 In-depth interview

In-depth interviews were conducted with key respondents, which included: the head of the district extension agency; the extension coordinator of the extension agency at subdistrict level (BP3K); private extension agents; voluntary extension agents; and research institutions/universities. In-depth interviews were aimed to collect more detailed data on extension institutions, extension programs, the quantity and quality of extension agents, extension material, extension method and the budget for extension in each study location.

2.2.4 Observations and literature review

Observations were conducted to ensure and reduce the bias between the data collected from the interviews and FGDs and the reality on the field. Observation was aimed at completing the data in quality and in quantity. Observed components were:

- The typology of agroforestry gardens and its management systems applied in the study locations;
- Extension media produced and used by extension agents; and
- Extension media received by farmers.

The literature review involved studying documents related to extension systems and techniques, such as policies related to extension, extension program documents in each study location, and research papers and articles on extension.

3. Study sites

3.1 Gunungkidul District, Daerah Istimewa Yogyakarta Province

Gunungkidul is one of the five districts in the Daerah Istimewa Yogyakarta ('Special Region of Yogyakarta'). Gunungkidul District is located on the east side of Yogyakarta, with Wonosari as its capital city. The district has a total area of 148 536 ha and is divided into 18 subdistricts and 144 villages ('kelurahan'). Based on the 2010 national population census, it was estimated that Gunungkidul was home to 683 735 people in 2013 with a ratio of 330 461 to 353 274 women (District Statistical Bureau/BPS Gunungkidul, 2014).

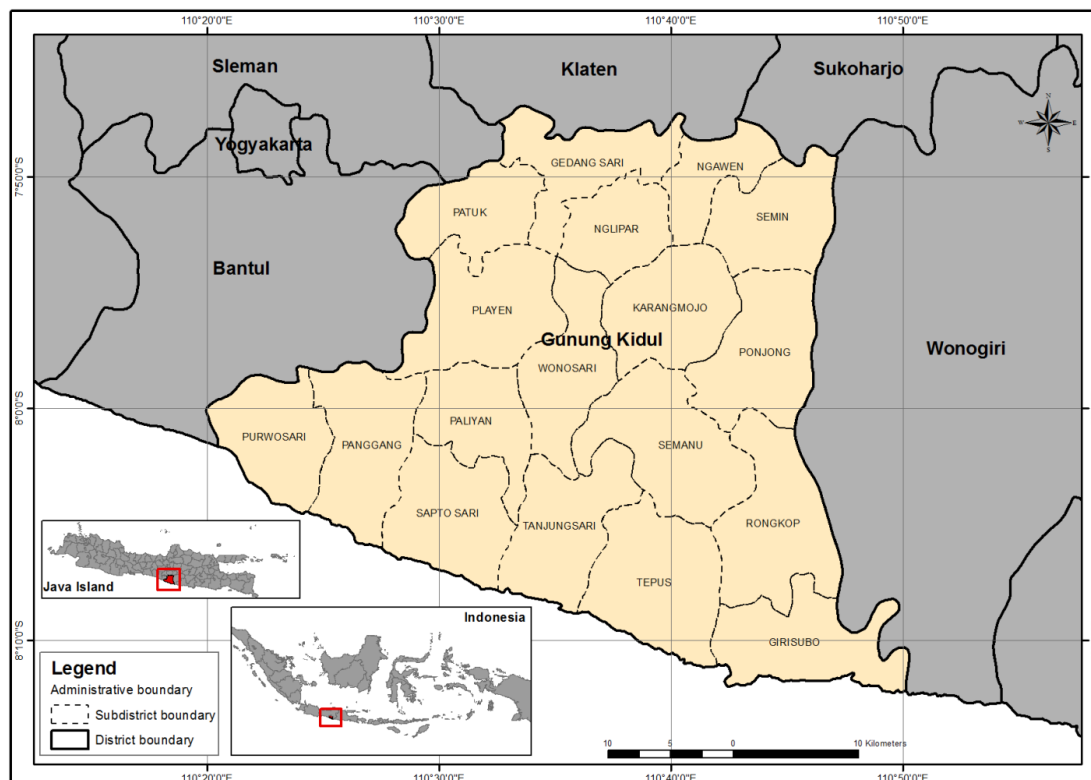


Figure 1. Map of Gunungkidul District, Daerah Istimewa Yogyakarta, Indonesia.

Gunungkidul is located on 0–700 masl (metres above sea level). Most of the area is located on limestone hills, especially the centre and northern parts. The district's southern part is lowland, adjacent to the Indian Ocean. In the span of 2010–2013, the highest level of rainfall in Gunungkidul was in January (on average 433.21 mm per month) and the lowest was in August (on average 0.4 mm per month) (BPS Gunungkidul 2014).

Agricultural and forested land in Gunungkidul cover an area of approximately 7 865 ha of irrigated agriculture, 36 065 ha of non-irrigated agriculture, 5 500 ha of sustainable farming, 12 810 ha of

permanent production forest, and 38 444 ha of people's forest ¹(Gunungkidul District government, 2011). Produce included, among others, rice, maize, groundnut, soybeans, and cotton. Meanwhile, in 2012–2013, the people's forest produced timber and non-timber forest products, as described in Table 1.

Table 1. Production of people's forest in Gunungkidul District in 2012–2013

No	Product	Unit	2012	2013
Timber				
1	Teak	m ³	55 958.5	2 434.7
2	Mahogany	m ³	4 505.3	285.2
3	Rosewood	m ³	4 338.2	274.0
4	Acacia	m ³	1 262.1	73.8
Non-Timber Forest Products				
5	Honey	Litre	241.0	92.5
6	Bamboo	Pieces	541.9	541.9
7	Charcoals	Tonnes	73.9	7.8

Sumber: BPS Kabupaten Gunungkidul, 2014

The study in Gunungkidul was conducted in two villages of two subdistricts: Bejiharjo Village, Karangmojo Subdistrict, and Karangduwet Village, Paliyan Subdistrict. Bejiharjo is one of the nine villages located in Karangmojo Subdistrict. The village is 6 km from the district government in Wonosari (BPS Gunungkidul 2014). Bejiharjo has total area of 2 201 ha with 14 ,558 inhabitants, spread over 20 hamlets. Like most villagers in Karangmojo Subdistrict, most villagers in Bejiharjo work in the agriculture and forestry sectors. In the 2010–2030 Gunungkidul Spatial Plan, it was stated that the land managed as people' forest ('Hutan Rakyat') in Karangmojo Subdistrict covered an area of 1 869 ha, while the production forest ('Hutan Produksi Tetap') covered 946.7 ha (Gunungkidul District Government 2011).

Karangduwet Village is located in the administrative region of Paliyan Subdistrict, southwest of Wonosari. The village is 17.2 km removed from the district government in Wonosari (BPS Gunungkidul 2014). The land assigned as people's forest in Paliyan Subdistrict covered 1 140 ha; 2 224 ha were assigned as production forest (Gunungkidul District Government 2011).

¹ People's forest is a land-use designation. Defined in Ministerial Decree No. 49/Kpts.II/1997., people's forest is private land owned and governed by private entities or a community with a minimum area of 0.25 ha and timber and other tree species covering at least 50%, or with a tree density of 500 trees per ha in its initial stage.

3.2 Sumbawa District, West Nusa Tenggara Province

Sumbawa is one of the five districts located on Sumbawa Island, in the Province of Nusa Tenggara Barat. The other four districts are: Sumbawa Barat District, Dompu District, Bima District and the City of Bima. Sumbawa covers an area of 664 398 ha, which includes 24 subdistricts, 158 villages and eight ‘kelurahan’ (administrative villages). The population in 2012 was 419 989 people, of which 214 387 men and 205 602 women. The topography tends to be hilly, with altitude ranging from 0–1 730 masl, 41% of which is between 100–500 masl. In terms of land use, 41.9% of the total area is state forest, and 23.9% is used for paddy fields (51 588 ha), tree gardens (60 611 ha), rain-fed farms (17 178 ha), plantations (26 496 ha), fishponds and other uses. Most rainfall in Sumbawa occurs in March, with up to 465.5 mm of rainfall per month (BPS Sumbawa 2013).

Batulan teh Subdistrict covers an area of 39 140 ha and is home to a population of 10 333, of which 5 399 men and 4 934 women. Its topography is hilly, at 250–900 masl. Batulante is 17 km from the district government in Sumbawa. Administratively, Batulante covers six villages: Batu Rotok, Tangkal Pulit, Boa Desa, Tepal, Batudulang, and Klungkung. Batudulang is one of the villages chosen for this study, located in the upstream of the watershed. The village is relatively close to the protected forest zone which functions as a water catchment for Sumbawa district (BPS Sumbawa 2013). A household survey conducted by the Kanoppi ICRAF-CIFOR team (2014) stated that as much as 48.6% of villagers in Batudulang work on their own agricultural land which was managed as a rain-fed farm/‘angkum’ garden/mixed garden. The garden is usually planted with timber, coffee, candlenut and fruit trees (jackfruit, mango, avocado, etc.). Other than managing their tree gardens, villagers also collect honey from the forest.

Unter Iwes Subdistrict is only two kilometres from the government in Sumbawa District. The subdistrict covers 4 483 ha and in 2012 had a total population of 18 493 (9 530 men and 8 693 women). The subdistrict is located at 21–113 masl. Administratively, the subdistrict is divided into eight villages: Pelat, Kerekeh, Boak, Jorok, Kerato, Uma Beringin, Pungka and Nijang (BPS Sumbawa 2013). The village chosen as one of the study locations is Pelat, fifteen minutes drive from Sumbawa Besar. The Kanoppi team’s household survey in 2014 showed that most Pelat villagers (57.4%) worked in their own agricultural land. They managed their land in rain-fed farms/mixed garden systems (37.5%); tree gardens/‘gepang’ systems (30.9%); and paddy ricefield (27.2%). The types of plants commonly found here are timber trees (21.7%) and short-term crops (28.3%).

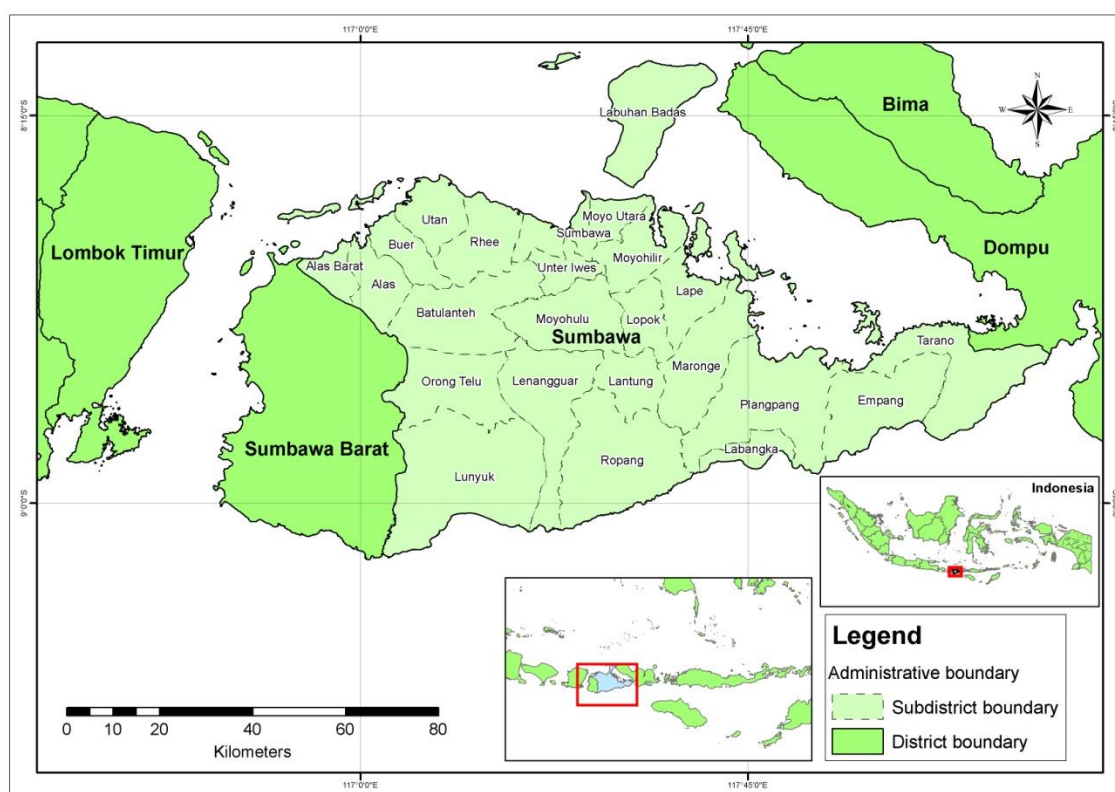


Figure 2. Map of Sumbawa District, West Nusa Tenggara, Indonesia.

3.3. Timor Tengah Selatan District, East Nusa Tenggara Province

Timor Tengah Selatan district is located on Timor Island with Soe as the capital city, a three-hour drive from Kupang. Timor Tengah Selatan District covers 395 536 ha, with a total population of 451 922 (222 490 men and 229 432 women) in 112 446 households. Administratively, the district is divided into 32 subdistricts, 266 villages and 12 administrative villages. The topography is varied, ranging from 44 masl to 1 600 masl. The timber production, according to BPS in Timor Tengah Selatan district (2014), was still dominated by mixed timber and teak (Table 2). Non-timber forest products in the district included tamarind, candlenut and honey.

Table 2. Timber and non-timber forest products in Timor Tengah Selatan district in 2011–2013

No	Product	Unit	2011	2012	2013
Timber					
1	Processed Mixed Timber	m ³	1,042.8	822.8	1,547.5
2	Processed Teak	m ³	346.1	116.4	486.6
3	Mahogany	m ³	107.2	177.9	113.1
4	Red Wood	m ²	25.2	7.2	30.9
Non-timber forest products					
1	Tamarind	ton	1,693.7	3,810.0	39,000.0
2	Candlenut	ton	537.0	3,014.0	15,500.0

Source: BPS Timor Tengah Selatan, 2014

Fatumnasi is one out of the 32 subdistricts in Timor Tengah Selatan District. The subdistrict is 37 km from the district's capital. Fatumnasi covers an area of 19 865 ha with a total population of 6 784 (3 346 men and 3 438 women). Fatumnasi Subdistrict is located on the Mutis Mountains, with the average land height of 1 480 masl. Fatumnasi Subdistrict is administratively divided into five villages: Fatumnasi, Nenas, Naupin, Kuannoel and Mutis. Fatumnasi Subdistrict is one of the vegetable-producing areas in Timor Tengah Selatan with carrot, cabbage, onion springs, potatoes, shallot and garlic among the main products cultivated in the area. These vegetables are usually sent to markets around Fatumnasi, such as Naupin, Kuannuel and Kapan market.

Mollo Utara Subdistrict is 20.6 km from the district capital. Mollo Utara covers 20 822 ha with a total population of 23 971 (11 814 men and 12 103 women). Mollo Utara is located on a hilly area with an average altitude of 1 007 masl. The subdistrict is administratively divided into 18 villages, one of which is Bosen Village which was selected as the study location.

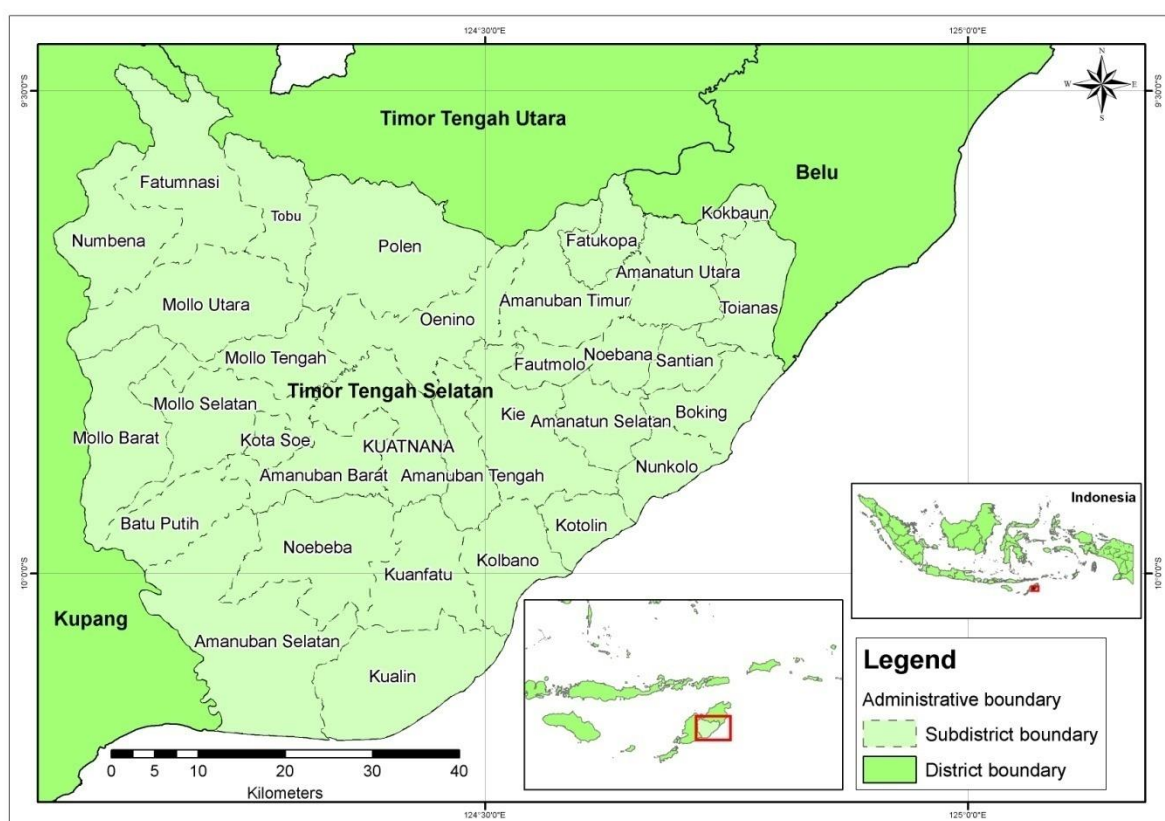


Figure 3. Map of Timor Tengah Selatan District, East Nusa Tenggara, Indonesia.

4. Results and discussion

4.1 The history of agricultural extension in Indonesia

Agricultural extension in Indonesia was started in 1817, when Dr CGL Reinwardt established the Bogor Botanical Garden and introduced 50 new types of plants (Syufri, 2011). Since then, the extension system in Indonesia developed rapidly. The development history of extension work in Indonesia cannot be separated from the political situation and government in each period (Table 3.). Over time, extension work underwent a dynamic change, with the methods used including individual, mass, group, intergroup, and participative approaches. A unified agriculture, fisheries and forestry extension system is stipulated for Indonesia in Law No. 16/2006. Before the law was enacted, extension was conducted in each sector which involved different agencies, in which the Agriculture Agency dealt with the agricultural extension, the Fisheries Agency dealt with fishery extension and Forestry Agency dealt with forestry extension services.

Table 3. The history of agricultural extension in Indonesia since 1900 to now.

No	Time period	Overview of Extension Work	Approach strategy used
1	Dutch colonial period (1905–1942)	<ul style="list-style-type: none"> The Agriculture Department ('Landbouw Nijverheid en Handel') and the Agriculture Extension Agency ('Landbouw Voorlichtings Dienst-LDV') were established. Extension was conducted in order to modernize farming based on research results that covered: land processing, irrigation, fertilization (green, compost and inorganic), the use of high-quality seeds and controlling pest and disease. 	<ul style="list-style-type: none"> In 1905, extension was based on command to the farmers. In 1908, an extension approach that was based on education and voluntarism was started. Formal and non-formal agriculture education. Formal education was done by opening schools of agriculture and non-formal education was done through courses on agriculture. Extension strategy with an individual approach that was often called the oil leak system ('olielek-systeem'), referring to the automatic spread.
2	Japanese occupation (1942–1945)	<ul style="list-style-type: none"> Extensions in this period were not properly run because farmers were forced to produce food and other strategic materials. 	<ul style="list-style-type: none"> Forced compliance.
3	1945–1950	<ul style="list-style-type: none"> The three-year agricultural production in the Kasimo Plan² didn't run well due to the physical revolution (post-independence war) 	

² This was a three-year agricultural production plan (1948–1950) that was pioneered by the then minister of people's food supply, I. J Kasimo. Kasimo's plan focused on: (i) planting unused land in East Sumatra; (ii) intensification on Java by increasing the number of high-quality seedling planting; (iii) avoided the slaughter of any productive cattle; (iv) seedling nursery establishment in every village; and (v) transmigration of the 20 million inhabitants of Java to Sumatra in the span of 10–20 years.

No	Time period	Overview of Extension Work	Approach strategy used
4	1950–1959	<ul style="list-style-type: none"> The unexecuted items in the Kasimo plan were included in the Wisaksono Plan³ which then was called the Special Welfare Plan (RKI). During this period, a Village Community Education Hall was established in every subdistrict to support the implementation of the RKI. 	<ul style="list-style-type: none"> Individual approach or oil leak approach
5	1960–1963	<ul style="list-style-type: none"> Political changes affected the agricultural target in this period. During the guided democracy time, RKI was replaced with Planned Overall National Development (PNSB) of which one of the programs was rice self-sufficiency from a national to village level in the Welfare Movement Operational Commando. 	<ul style="list-style-type: none"> Mass approach, large campaign in a commando system.
6	1963–1974	<ul style="list-style-type: none"> By the end of the guided democracy period and the failure of rice self-sufficiency, a plan was made to restore extension service to its original principles: voluntarism, education and democracy. The political and societal change towards development targeted rice self-sufficiency by employing special rice intensification ('insus' in Indonesian). Based on the insus pattern, the government targeted 2–3 harvests per year from irrigated fields. 	<ul style="list-style-type: none"> Mass demonstration, mass facilitation and mass intensification. The approach was conducted through farmer groups. This approach introduced farm contact; successful farmers volunteered to give extension. Mass methods such as radio broadcast, performance, exhibition, traditional art were used in this period.
7	1974–1983	<p>The education, training and extension agency was in charge of regulating the education, training and extension on national level. In 1976, a training and visit method (LAKU) was established. The working system of extension agents was regulated in the Field Agricultural Extension (PPL) in the village working unit.</p>	<ul style="list-style-type: none"> Extensions using training and visit method were conducted by approaching farmer groups in the village unit.
8	1983–1993	<p>The Special Supra Intensification pattern was applied, which was known as the Supra Insus. Supra Insus required farmers to use growth hormones to accelerate production.</p>	<ul style="list-style-type: none"> Supra Insus pattern was applied using the farmer group approach and inter-farmer group approach in one extension work area. In this period, Leading Fishermen Farm Contact was initiated. The methods that were used in the inter-farmer group approach included: public

³Wiksaksono Wirodhiharjo (the mayor of Bogor) was appointed as the head of Indonesian High Education Office in 1951 by the then Indonesian vice-president Moh. Hatta and was assigned to run the agriculture and fisheries department for the federal states that were managed by the Dutch. In conducting his tasks, he drafted a work plan known as the Wiksaksono plan.

No	Time period	Overview of Extension Work	Approach strategy used
			forum, technology forum, discussion forum, working forum. <ul style="list-style-type: none"> • At the national level, a National Extension Week was held. • Training and visit system was evaluated and modified with a more holistic approach, which included: agriculture, small industry, health, education, co-ops, etc.
9	1993–1997	The orientation of agricultural development in Indonesia was starting to lean on the agribusiness approach, which meant that extension activities were also changing. Participation and independence of farmers and groups became the target of the extension program.	<ul style="list-style-type: none"> • A participative and cost-sharing approach was applied. • Farmer training started to apply the andragogic method (education for adults), such as: agribusiness field school, integrated pest control field school, etc.
9	1998–2006	Extension activity was handed over to the district/municipal government as a form of regional autonomy. Under regional autonomy, the extension and its institutions were the responsibilities of the regional leader.	The approach in this period still mirrored the approaches in previous periods or was adapted to regional needs.
10	2006–present	Law No. 16 Year 2006 on Extension System for Agriculture, Fisheries and Forestry in Indonesia was enacted.	Approach of one extension agent per village.

Source: Ahmad, 2011.

Extension work in Indonesia before the enactment of Law No. 16/2006 focused more on the production of food crops, mainly rice, than on forestry cultivation or fisheries. This was influenced by the priority of self-sufficient rice production in Indonesia. The approaches and methods used in food crop extension show different characteristics compared to forestry and agroforestry extensions, influenced by different types and diversity of the plants. In the past, agriculture extension promoted monoculture food crops with short cultivation times. Timber requires more time and effort due to the need for tree pruning or thinning in order to achieve better timber's quantity and quality. Agroforestry management tends to have more than one type of commodity, intercropped with either timber species, estate crops or food crops.

Insufficient practice of forestry and agroforestry extension compared to agricultural extension is a challenge in developing the production and marketing of forest and agroforestry products. The approaches and methods that have been used in agricultural extension in Indonesia can be used as a reference in the effort of developing the forestry and agroforestry extension in Indonesia.

4.2 Extension Institutional Issues

Since Law No. 16/2006 was enacted, agricultural, fishery and forestry extension in Indonesia has been conducted by extension organizations from the national level down to the subdistrict level. Extension activities that were once managed separately by each ministry and department are now coordinated and conducted under one extension organization, the Extension Agency ('Badan Penyuluhan'). Cross-sectoral coordination and polyvalent extension agents have become an issue and challenge in providing extension services since Law No. 16/2006 was enacted.

It will take time to fully transform extension organizations on the regional level. Many districts/cities established their District Extension Agency in the fifth year after the law was ratified. The names and focus of this agency at the district level are not uniformed. In our study area, the names are District Extension and Food Security Agency (BP2KP), Food Security and Extension Agency (BKP2), and District Agriculture, Fisheries and Forestry Extension Agency (BP4K). These name variations represent the different needs and priorities of each district. In 2014, Presidential Regulation (Perpres) No. 154 on extension organizations which regulates extension organizations at the national level down to the subdistrict level was issued. The regulation explains and regulates the functions and duties of each extension organization and their working procedures.

According to Perpres No. 154/2014, government extension organizations are:

- Extension organization at national level: Extension and Human Resources Development Agency (BP2SDM) at the Ministry of Agriculture; Human Resources Development Agency (BPSDM) at the Ministry of Maritime Affairs and Fisheries; and Extension and Human Resources Development Agency (BP2SDM) at the Ministry of Environment and Forestry. They report to the ministers and are led by the head of the agency.
- Extension organization at provincial level: Extension Coordinating Agency (Bakorluh) reports to the president through a minister. Bakorluh is chaired by the governor.
- Extension organization at district/municipal level: District Agriculture, Fisheries and Forestry Extension Agency (BP4K) reports to head of district or mayor, and led by an echelon-level-IIb officer.
- Extension organization at subdistrict level: Agriculture, Fisheries and Forestry Extension Agency (BP3K) reports to head of BP4K.

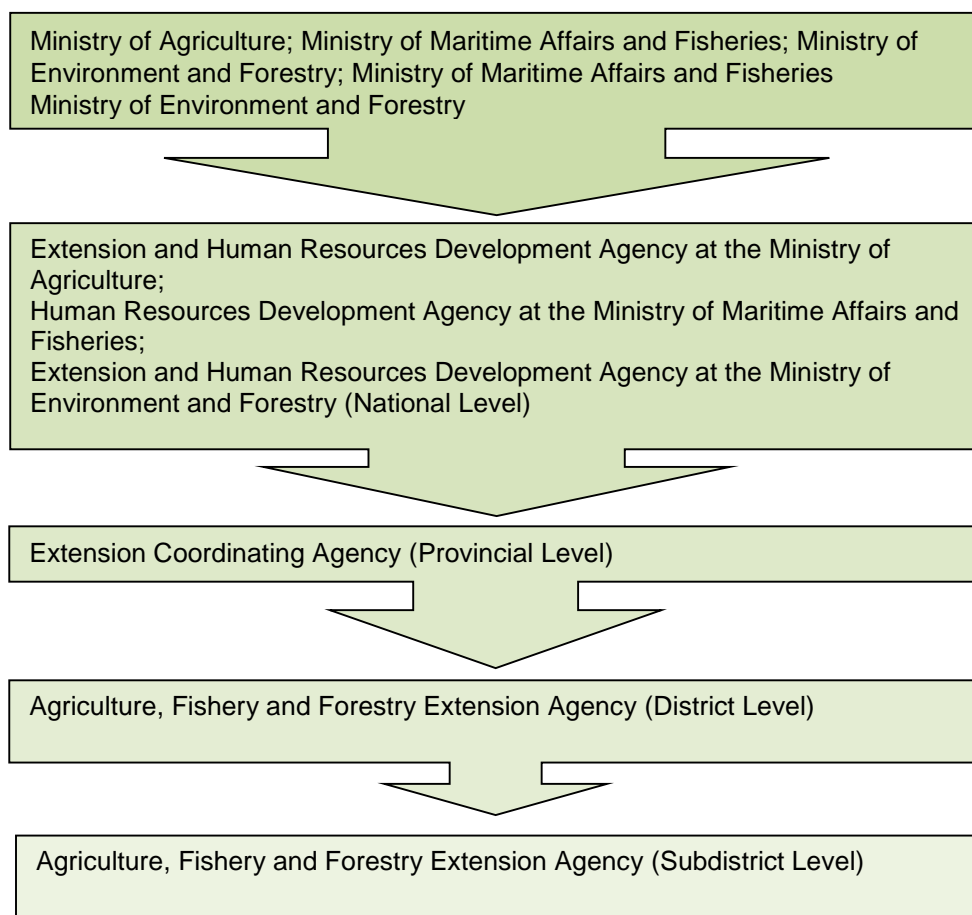


Figure 4. Diagram of the organization of government extension in Indonesia based on the Presidential Regulation No. 154/2014

4.2.1 Government Extension Agency at district level

As stated above, the extension agencies at district level in our study area have different names, organizational structures and extension programs (Table 4).

Table 4. Extension Organizations in Gunungkidul, Sumbawa and Timor Tengah Selatan districts.

Item	Gunungkidul	Sumbawa	Timor Tengah Selatan
Name of the district extension organization	District Extension and Food Security Agency (BP2KP)	District Agriculture, Fisheries and Forestry Extension Agency (BP4K)	Food Security and Extension Agency (BKP2)
Year of establishment	2008 (Regional Regulation No 12 Year 2008)	2010 (Regional Regulation No 3 Year 2010)	2012
Tasks	Conduct regional government's affairs and supporting tasks in agricultural, fishery and forestry extension and food security.	Draft and execute regional policies on agricultural, fishery and forestry extension.	Conduct regional government's affairs in food security and agricultural, fishery and forestry extension.

Current sectors	– Institutional and Workforce;	– Institutional Development;	– Agricultural, Fishery and Plantation Extension;
	– Facility and Infrastructure;	– Human Resources and Extension Implementation;	– Fishery and Forestry Extension;
	– Food Security.	– Extension Facility, Infrastructure and Cooperation.	– Food Availability, Security, Insecurity and Consumption.

Source: Study result based on FGDs with extension agents and farmers, 2015

In Gunungkidul and Timor Tengah Selatan district, the District Extension Agency manages the food security issue, while also being responsible for the implementation of agricultural, fishery and forestry extension programs. In Sumbawa District, the agency has specific tasks in agricultural, fishery and forestry extension. The agency establishment is regulated by the district regulation in each region. The legal basis for the district-level extension agency is Law No. 16/2006. Meanwhile, the Presidential Regulation on Agricultural, Fishery and Forestry Extension Organizations was issued only in 2014 (Perpres No. 154/2014). The Perpres does not mention specifically the names of the district extension agency. Article 12 of Perpres No. 154/2014 stated that “The extension institution at the district/municipality level comes in the form of the extensions implementation agency”. In article 15, it is also explained that the establishment of the district extension agency is regulated by the district regulation. Agency establishment is also conducted based on the criteria of potentials in the agriculture, fishery or forestry development.

Based on the year of agency establishment in each district, the implementation of Law No. 16/2006 was initiated earlier in Java than in Nusa Tenggara. In Timor Tengah Selatan, the establishment of the Food Security and Extension Agency in 2012 shows that it took six years before the Law was implemented. Access to information, the socialisation of Law No. 16/2006 and the readiness of regional facility and infrastructure had affected the implementation of the Law.

4.2.2 Government Extension Agencies at subdistrict level

The extension organization on subdistrict level in Gunungkidul district is the Agriculture, Fishery and Forestry Extension Agency (BP3K). BP3K is coordinated by an extension coordinator who is supported by an extension supervisor. Besides extension agents, BP3K employs one farm technician (‘mantri tani’) and one observer for pest control. Gunungkidul district has 18 extension agency offices located in 18 subdistricts. BP3K in Paliyan and Karangmojo subdistricts, chosen as the study samples, have the same organizational structure. According to Wagimin, S. ST (male, 58 years), the extension coordinator at BP3K Karangmojo, the duties and functions of BP3K are: 1) providing extension service on food crops, estate crops and livestock management to farmers; 2) providing extension service on fisheries to farmers; 3) providing extension service on forestry to farmers; 4) facilitating farmer groups; and 5) performing the role of the coordination centre of extension agents in the

subdistrict. In fulfilling its tasks, the BP3K reports to the head of the District Extension and Food Security Agency (BP2KP) in Gunungkidul district.

In fulfilling its tasks on subdistrict level, Sumbawa BP4K has a Technical Implementer Unit that is the Agriculture, Fishery and Forestry Extension Agency (BP3K). BP3K is led by an agency coordinator who structurally reports to the head of BP4K in Sumbawa District. In Sumbawa District there are 18 extension agency offices providing services in 24 subdistricts, which means that some BP3Ks cover two subdistricts. Unter Iwes BP3K is one of the BP3Ks that cover two subdistricts: Unter Iwes and Batulante subdistrict in Sumbawa District. Pelat and Batudulang village, which were chosen as study locations, are under Unter Iwes BP3K's administrative area.

Extension agency on subdistrict level in Timor Tengah Selatan district is called Subdistrict Extension Agency (BPK). BPK is led by the head of the agency whose task is to coordinate extension agents in the subdistrict. Timor Tengah Selatan district has 32 BPKs in 32 subdistricts. According to Baltasar Dara, S. ST (male, 53 years), head of Mollo Utara BPK, the BPK's main duties and functions are: 1) conducting agriculture, livestock management, fishery and forestry extension; 2) drafting the subdistrict's extension program; and 3) identifying potentials in the region. The Decision Letter (SK) of Head of Timor Tengah Selatan District No. BKD. 820/107/3/2012 on the Placement of Extension agents in the Work Areas of Timor Tengah Selatan District stated that extension agents, besides providing extension services, they also perform structural duties in each BPK.

Subdistrict extension organizations in Gunungkidul and Sumbawa Districts are called the Agriculture, Fishery and Forestry Extension Agency (BP3K), while in Timor Tengah Selatan District it is called the Subdistrict Extension Agency (BPK). Based on Perpres No. 154 Year 2014 Article 17, the extension organization at the subdistrict level is established in the form of the Agriculture, Fishery and Forestry Extension Agency which reports to the head of the district extension agency at the district/municipal level.

Study results showed that only Sumbawa district had not established BP3K in each subdistrict. Sumbawa district has six BP3K and each covers two subdistricts. In Gunungkidul and Timor Tengah Selatan district, a BP3K/BPK is established in every subdistrict. In terms of work coverage, farmers can access the service at BP3K that is available in every subdistrict except for the office that covers two subdistricts. BP3K in Unter Iwes also covers two subdistricts: Unter Iwes and Batulante. The Unter Iwes office is far from Batudulang village (in Batulante Subdistrict), which prevented extension agents to visit the village and farmers to visit the extension office. According to Perpres No. 154 Year 2014, BP3K is a meeting place for extension agents, farmers and business players. This function can be affected by distance, means of transportation (road and vehicles) and the BP3K's facility and infrastructure. The conditions of the office building in Timor Tengah Selatan District are not adequate compared to office buildings in Sumbawa and Gunungkidul district.

4.2.3. Private Extension Agents

Besides government extension agents, private extension institutions are available in all study sites as alternatives to the government extension organizations. Identified private extension institutions are companies and/or establishments that provide extension and counselling service to farmers. Private extension institutions identified in the three study locations are explained in Table 5.

Private extension institutions can reach more remote areas. Their extension and mentoring program is more in-depth and the frequency of the extension is higher than government extension organizations. Unfortunately, coordination between private and government extension institutions is not effective. The coordination and cooperation between organizations, if conducted well, can improve extension activities.

Table 5. Private Extension Organizations in Gunungkidul, Sumbawa and Timor Tengah Selatan Districts.

Extension Organizations	Gunungkidul District	Sumbawa District	Timor Tengah Selatan District
Private Extension Organizations	PT Rimba Partikel Indonesia PT Dipantara Yogyakarta Perkumpulan ARuPA Perhimpunan Shorea Lembaga Javlec	UD Makassar Utama WWF - Indonesia Jaringan Madu Hutan Sumbawa (JMHS)	Yayasan Mitra Tani Helen Keller International-Indonesia Sanggar Suara Perempuan Soe Threads of Life WWF - Indonesia

Source: Study result based on FGDs with farmers and in-depth interviews with private/independent extension institutions.

4.3. Extension agents

An extension agent is someone who provides an extension service. Based on Law No. 16/2006, extension agents include government, voluntary and private extension agents. Government extension agents are categorised by their employment status: civil servants (PNS) and daily freelance extension agents (THL). PNSs receive a permanent monthly salary, while THLs receive monthly payment if they are contracted to one of the government extension projects or programs.

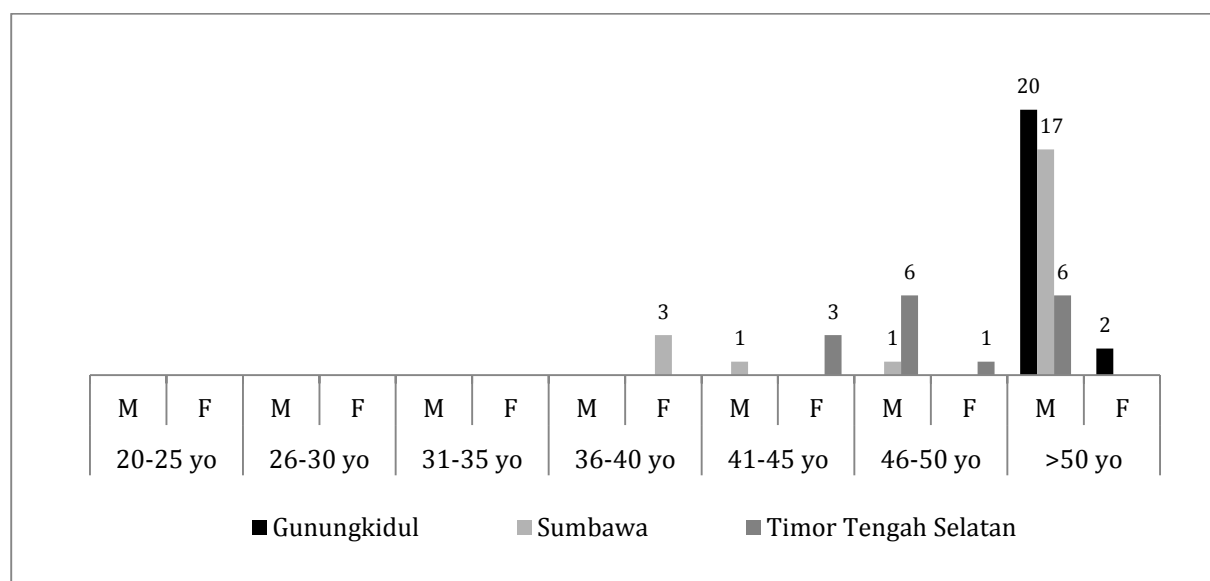
4.3.1. Civil servant extension agents

Government extension agents are civil servants. Their work placement in the district is determined by the Decision Letter of the Head of District. It was discussed once that extension agents should be able to work polyvalently, which meant extension agents would provide extension on agriculture, fishery and forestry issues. In Sumbawa District, polyvalent extension agents proved not to be effective due to the limited knowledge of the extension agents, proficient only in their own specialized field. Eventually, extension agents reverted to providing extension services according to their respective background.

In general, the number of extension agents is still relatively low compared to the number of villages they need to assist. Especially for forestry extension agents, in all three study locations, there are a limited number of workers: 22 people (all male) in Sumbawa District, 22 people (20 male and 2 female) in Gunungkidul District and 16 people (12 male and 2 female) in Timor Tengah Selatan (Figure 5). An interesting factor is that the average age of these extension agents was above 45. The age imbalance may hinder the regeneration process of extension agents which then would hamper the continuity of available extension agents.

During the group discussion in Sumbawa District, an extension worker who was older than 50 said that their motivation in providing extension had decreased due to their physical condition, which prevented them from travelling far. The scope of their working area in Sumbawa and Timor Tengah Selatan district is relatively wide, and both districts have damaged and hilly roads.

The retirement period is also a problem when hiring, and the regeneration process virtually does not exist. In the next five years, the number of extension agents will decrease significantly if the office does not start hiring new people. Making extension agents work longer would be equally ineffective since extension work, especially in remote areas, requires dynamic and highly-motivated extension agents.

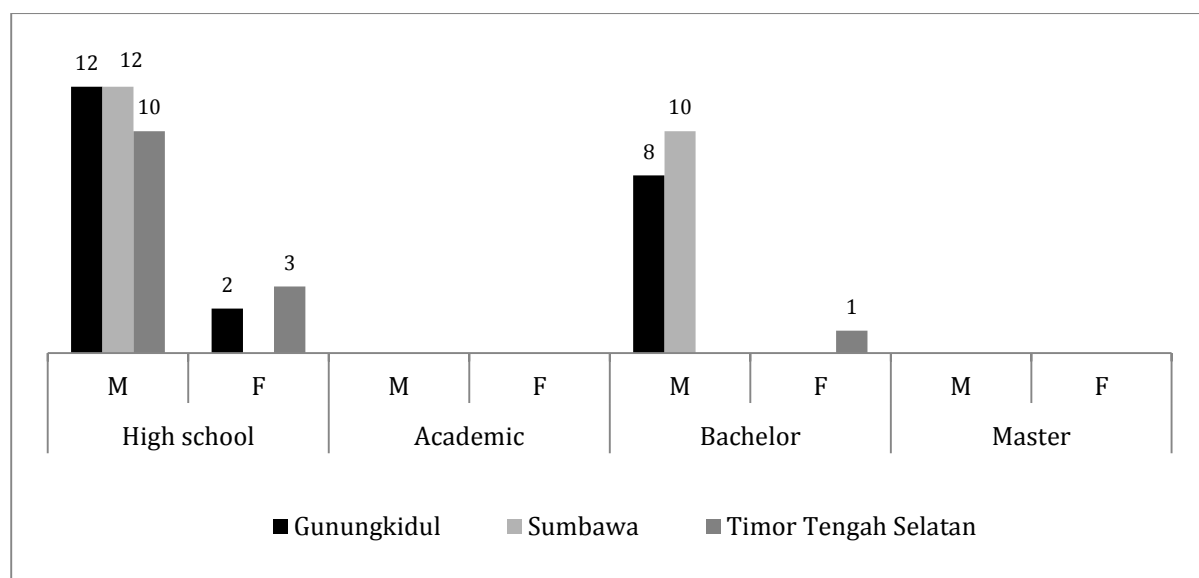


Sources: SK BP2KP Gunungkidul No 36/KTPTS/2014, SK Bupati Sumbawa No 401/2015, SK Bupati Timor Tengah Selatan No BKD.820/107/3/2012.

Figure 5. The number of civil servant extension agents in Sumbawa, Gunungkidul and Timor Tengah Selatan Districts based on age and gender.

In terms of education level, forestry extension agents in the three study locations are mostly graduates from the School of Forestry Extension (SPK), commensurate with high school (SMA) (Figure 6). In Gunungkidul District, there are 14 workers (63.6%) with an SPK/SMA level of education; in Sumbawa District that figure is 12 (54.5%); and Timor Tengah Selatan District 13 (81.2%). The

highest number of extension agents with a bachelor degree is in Sumbawa District with 10 workers (45.4%), followed by Gunungkidul District with 8 workers (36.4%). Timor Tengah Selatan ends last with only 3 workers with a bachelor degree (18.7%).



Note: F = female; M=Female

Sources: SK BP2KP Gunungkidul No 36/KTPTS/2014, SK Bupati Sumbawa No 401/2015, SK Bupati Timor Tengah Selatan No BKD.820/107/3/2012.

Figure 6. Forestry extension agents in Sumbawa, Gunungkidul and Timor Tengah Selatan district based on education level and gender.

The level of education is often used as an indicator of human-resource quality, despite of their working experience and other non-formal education forms. In order to improve the quality of human resources (extension agents) in the district, Timor Tengah Selatan District sent three forestry extension agents to obtain a bachelor degree. Capacity-building activities that were often conducted in the three districts were technical mentoring and training, carried out by training agencies or provincial government.

4.3.2 Daily freelance extension agents ('Penyuluh Tenaga Harian Lepas', THL)

Daily freelance extension agents (THL) in the three selected districts were only available for the agricultural sector. They are the daily freelance support agricultural extension agents (THL-TBPP), recruited by the Ministry of Agriculture and funded by the national budget allocation (APBN). THL-TBPP is tasked to assist extension at BP4K, and their work area is established by the Decision Letter of the Head of District or the Decision Letter of the District Extension Agency. Daily freelance extension worker for forestry issues is not listed in the three districts.

4.3.3 Voluntary extension agents

Different from government extension agents, voluntary extension agents are farmers who have succeeded and other members of the community who are willing and capable to work as extension agents. Voluntary extension agents do not receive a monthly salary from the government for the services they extend to other farmers.

Voluntary extension agents in the forestry sector are known as the community voluntary forestry extension agents (PKSM). According to Riyadi (42 years, male), he was put forward by the Gunungkidul Forestry and Plantation Agency as an extension worker and appointed officially with the issuance of the Decision Letter of Head of Gunungkidul BP2KP. There were 33 PKSMs in 18 subdistricts in Gunungkidul. Riyadi has been doing forestry extension work along Kukup Beach, Tanjungsari Subdistrict, Gunungkidul District. He invited other farmers to participate in coastal reforestation and cultivation. Extension work carried out by Riyadi includes teaching planting techniques of 'sengon laut' (*Paraserianthes falcata*); teaching planting techniques of 'nyamplung/bintangur' (*Calophyllum inophyllum*); to plant 'empurit' ginger (*Zingiber officinale* var. *amarum*) under sengon laut stands; and to mentor the community seedling nurseries (KBR).

The 22 civil servant forestry extension agents in Sumbawa District were considered incapable of covering all farmers in every subdistrict. In 2013, the Sumbawa government, through the Decision Letter of Head of BP4K, has appointed and assigned community voluntary forestry extension agents. These voluntary extension agents were tasked to assist extension activities in their home subdistrict. There were 35, all male, independent forestry extension agents who were assigned by the head of BP4K. In both Unter Iwes and Batulanteh subdistrict, three independent forestry extension agents were appointed. The main activities of independent forestry extension agents are conducting and mentoring the establishment of community seedling nurseries and the planting of people's forest. Both are included in the BP4K program and Sumbawa Forestry and Plantation Agency.

According to Mariah Elisabeth Magang (female, 43 years), the coordinator of forestry extension agents of Timor Tengah Selatan District, there was one voluntary forestry extension worker in each administrative village. These agents had not been assigned under a Decision Letter of Head of District or Decision Letter of Head of District Extension Agency. Voluntary forestry extension agents are tasked to support forestry extension activities in each village, such as people's forest facilitation, reforestation, rehabilitation and conservation monitoring, conducted by the Forestry Agency and the Food Security and Extension Agency in Timor Tengah Selatan.

The insufficient number of forestry extension agents should have been supported by the presence of voluntary extension agents; however, the management of voluntary extension agents in the district still requires a lot of improvement. Capacity building for voluntary extension agents is still inadequate

or non-existent. Voluntary extension agents were under the coordination of the forestry extension agents at each BP3K.

4.4 Extension programs

An extension program is a systematically-drafted written plan which serves as a direction and guidance in controlling efforts in achieving the objectives of extension services (Law No. 16/2006). Drafting extension programs is one function of an extension organization on national, provincial, district and subdistrict level. This working paper presents and discusses forestry extension programs. As per the Ministry of Forestry Regulation (Permenhut) No. 78/2014, a forestry extension program consists of a matrix and a narrative. The matrix of an extension program is similar to a general activity program matrix, which includes: conditions of the area, objectives of extension, issues, target of extension and means of achieving the objectives. As a means of achieving the extension's objectives, it will be broken down into a guideline for extension material, method, location, time, funding plan, funding source and people in charge.

4.4.1 Mechanism of extension program drafting

The drafting of an extension program on the subdistrict level is facilitated by the head of BP3K, and carried out by extension agents and representatives of the main actor (farmers) and business players. The drafting starts with identifying potentials of the region by applying various methods and tools, such as Participatory Rural Appraisal (PRA), Impact Point, Focus Group Discussion (FGD) or other identification techniques for regional conditions.

The drafting of an extension program on the district/municipal level is facilitated by the head of BP4K, and followed by extension agents and representatives of the main actor and business players. The drafting starts with recapitulating the subdistrict extension program (Permenhut No. 78/2014 on Guideline for Forestry Extension Program Planning).

The drafting mechanism of an extension program in Gunungkidul District starts with the identification of village potential. Main actors, represented by farmer groups and a farmer group alliance, are involved to identify the potential and to draft an extension plan at village level. There has not been any involvement of business players, private extension agents and voluntary extension agents in Gunungkidul District. The drafting process of an extension program would be conducted for around three months, starting in February until April annually.

In Sumbawa District, the extension program is drafted for a one-year period. Based on the extension program, extension agents will draft their annual work plan which will then be used as a basis for conducting extension activity in each work area.

In Timor Tengah Selatan District, there are two ways to draft an extension program: internally through BKP2 and through a regional development planning forum ('Musrenbang'). An extension program drafted internally at the Food Security and Extension Agency (BKP2) starts with the design of the extension plan for each sector. The plan for each sector will be discussed in a BKP2 meeting. The meeting results will be re-discussed with the head of BKP2 and the program team. After the results have been approved by the head of BKP2, the extension program will be submitted to the Regional Planning Agency to then be submitted to the Regional Legislative (DPRD) budget meeting. The musrenbang is conducted in phases, starting with the village musrenbang and ending with a district musrenbang. The musrenbang ensures the participation of multiple parties on every level of administration.

4.4.2 Gunungkidul forestry extension program

According to Sugeng Raharjo (male, 53 years), secretary of Gunungkidul BP2KP, BP2KP drafted their extension program annually and it covered the agricultural, fishery and forestry extension program. This working paper provides a sample of forestry extension program matrix from Gunungkidul BP2KP. This is taken from the 2014 extension program of Gunungkidul district as an illustration of an implemented extension program.

The forestry extension program in Gunungkidul covered five aspects: cultivation techniques for forestry crops, surface runoff control, organization of forestry farmer groups, forestry economy and farmer welfare (Annex 1).

The objective of forestry extension at Gunungkidul BP2KP focused more on giving additional knowledge to farmers, mainly in cultivation techniques for forestry crops and surface runoff control aspects. Changes in attitudes and improved skills have not yet appeared in either aspect. Achievable extension objectives include changes in knowledge (cognition), skills (psychomotor) and attitudes (affection). To achieve these objectives, the right materials and methods must be applied. The extension materials in Annex 1 show that half of them were directed to increase knowledge and techniques (skills). Methods used in extension programs mostly consisted of lectures, discussions and demonstration plots (Annex 1). Trainings and business meeting can be used to disseminate technology (skills) and increase motivation that can influence a change in attitudes of farmers. The important changes in attitudes of farmers could not be separated from a consistent and continuous mentoring process.

The Gunungkidul BP2KP forestry extension program was funded by the Gunungkidul District budget allocation (APBD), the Yogyakarta provincial budget, the Special Fund, national budget allocation, a specially-allocated fund and an independent fund. The budget was allocated and managed by several institutions that also functioned as executors of extension activities under the supervision and

coordination of Gunungkidul BP2KP. The executors of the extension program in Gunungkidul were the Gunungkidul BP2KP, the Gunungkidul Forestry and Plantation Agency, the Watershed Management Office, the Forestry Farmer group and the Reforestation Farmer group.

4.4.3 Sumbawa district forestry extension program

In the focus group discussion (FGD) with forestry extension agents in Sumbawa district, it was gathered that the extension program was drafted for one year. The Sumbawa forestry extension program was drafted by every forestry extension agent in BP3K. The documentation of the extension program of the past five years could not be obtained by the authors. During the FGD, the only information obtained was about the 2016 Sumbawa forestry extension program that had just been drafted and submitted to BP4K by the Sumbawa forestry extension coordinator. The 2016 forestry extension program is not too relevant as a reference of past forestry extension activities conducted by BP4K in Sumbawa District. However, it can be used to observe the needs and challenges of forestry extension in Sumbawa. The outline of the forestry extension program in Sumbawa is presented in Annex 2.

The objectives of forestry extension in Sumbawa are divided into several aspects: forest and water spring conservation, farmer group organization and administrative regulations of rights forest. The goals of the extension program in Sumbawa District were to increase awareness and to improve the abilities, behaviours and attitudes of farmers. The methods used in the program were lecture, discussion and demonstration. All methods were designed to increase knowledge and motivation in order to initiate changes in awareness. In order to improve skills, technical guidance and training were used. Initiating changes in attitudes takes more time and must be supported by a consistent and continuous facilitation process.

The Sumbawa forestry extension program was funded by the Sumbawa District budget, the Nusa Tenggara Barat provincial budget and the national budget. According to the conditions set by the funding sources, the implementation of the Sumbawa forestry extension program must be carried out by Sumbawa BP3K/BP4K, Sumbawa Forestry and Plantation Agency and Forest Management Unit (FMU) under the Ministry of Environment and Forestry.

4.4.4 Timor Tengah Selatan forestry extension program

The Timor Tengah Selatan forestry extension program documents could not be obtained. The information about forestry extension activities in the past five years in the district was obtained from an interview with Mariah Elisabeth Magang (female, 43 years), coordinator of Timor Tengah Selatan forestry extension agents. Based on the interview, the extension activities in Timor Tengah Selatan district were:

- Beekeeping, conducted in Nae Bebu Subdistrict. Extension methods included visit, lecture and discussion with the honeybee farmers.
- Honeybee development, in Amanuban Tengah Subdistrict. Extension was conducted by giving facilitation to honeybee farmer groups.
- Silkworm cultivation development, in 2010–2011 in Soe Subdistrict. This activity was conducted by the Forestry Agency by donating silkworm eggs and facilitating silkworm farmer groups.
- Forestry crop development, which was seasonal. During the dry season, the extension activity focuses on crop cultivation for conservation, and during the rainy season, working together with food crop extension agents, the extension activity focuses on intercrops.
- Demonstration plot activity in the people's forest, conducted annually in one subdistrict.

Timor Tengah Selatan forestry extension program was funded by the Timor Tengah Selatan district budget, the provincial budget and the national budget. In 2010–2011, before the Timor Tengah Selatan BKP2 was established, the implementation of forestry extension activity was under the coordination of the Forestry and Plantation Agency. From 2012 to 2015, extension activities were carried out by BKP2, coordinating with the Timor Tengah Selatan Forestry and Plantation Agency.

4.4.5 Extension programs from other institutions

Extension work in the three study locations is conducted not only by government extension institutions but also by private extension institutions and other government institutions. The work conducted by these institutions has had a quite significant role in increasing the knowledge, skills and attitudes of farmers in the study locations. The overview of these institutions and their programs are:

1 Private extension institutions in Gunungkidul District

a. PT Rimba Partikel Indonesia

PT Rimba Partikel Indonesia is one of the subsidiaries of Sumitomo Group. Their extension program focuses on the conservation of the Paliyan Wildlife Reserve and the timber plantation outside the area of the Paliyan Wildlife Reserve. The type of extension provided by PT Rimba Partikel Indonesia, according to Gunawan Setiaji (male, 40 years), project manager at PT Rimba Partikel Indonesia, was a conservation campaign of the Paliyan Wildlife Reserve and facilitation on seedling production of timber crops for partner farmers. The facilitation covered seedling preparation, field processing and fertilization. The conservation campaign of the Paliyan Wildlife Reserve was carried out together with Yogyakarta Natural Resources Conservation Agency (BKSDA) by holding a community meeting and giving a presentation at the village hall of the wildlife reserve's buffer village once every month. The campaign used film, presentation slides and brochures. The extension work area of PT Rimba Partikel Indonesia covered four villages: Karangduwet and Karangasem village in Paliyan subdistrict; Jetis

and Nglipar village in Saptosari subdistrict. Karangduwet village is one of the locations of this study. PT Rimba Partikel Indonesia is supported by seven extension agents, all male. The extension agents were recruited from around the villages in the Paliyan Wildlife Reserve buffer zone.

b. ARUPA Group (Volunteers Alliance for Saving the Nature)

ARUPA group is an institution that carries out forestry extension activity in Gunungkidul district. The group's extension program covers natural resources conservation, microfinance, a timber legality verification system and facilitation for timber production. The focus of the counselling is the farmers of the people's forest in Nglipar, Dengok and Panggang Subdistricts. ARUPA has six extension agents/facilitators; four men and two women. Applied methods include: (i) community meeting to map their need and to compile an activity plan; (ii) training of trainers; (iii) technical mentoring; (iv) comparative study. In order to gain more understanding of the characteristics of farmers and their areas, ARUPA's extension agents/facilitators live in the assisted areas. The extension media, produced and used by ARUPA, include presentation slides, tutorial films, books and brochures.

c. Shorea Association

Shorea Association's extension service is giving facilitation in issues such as people's forest, community forest and village forest. Extension materials given to farmers were among others: sustainable management of the community forest, organizational strengthening of forestry farmers, business management and area management. Shorea Association has three extension agents/facilitators who live in the work area as a way to approach the farmers. The extension agents/facilitators schedule regular meetings and special meetings with the farmer alliance. Other than these regular meetings, extension activities include training, business meetings and study visits. Their work area in Gunungkidul district covers Dengok, Wonosari, Semanu, Tepus, Giriselo and Saptosari Subdistricts.

d. The World Agroforestry Centre (ICRAF) and the Center of International Forestry Research (CIFOR)

ICRAF, in a partnership with CIFOR that is funded by the Australian Centre for International Agriculture Research (ACIAR) conducted a research project on teak in 2007–2011. The objectives of the project were: to introduce silviculture technology and its adaptation to increase teak production of farmers; to identify and design intensive financial schemes for farmers for a profitable teak production; and to increase market access for smallholder teak production. The project was conducted in eight villages in Gunungkidul District. Some capacity-building activities during this project involved, among others, field visit training and facilitating smallholder financial organizations. The training carried out in this project focused on the production aspect that involved cultivation techniques of teak during the Farmer Field Day event. During FGD in Bejiharjo and Karangduwet

village, farmers stated that they acquired the knowledge on pruning and thinning techniques from the training sessions and study visits facilitated by ICRAF.

2 Private extension institutions in Sumbawa District

a. WWF Indonesia

WWF Indonesia, Nusa Tenggara program in 2010–2015, was the implementing partner in the two ACIAR-funded projects in Sumbawa: Community Base Commercial Forestry (CBCF) (2011–2015) and Development of timber and non-timber forest product' production and marketing strategies for improvement of farmers' livelihoods in Indonesia, or Kanoppi (2013–2016). In CBCF in Sumbawa, WWF cooperated with the Sumbawa District government on 28 April–2 May 2014, to conduct a training program for Master Tree Growers (MTG) in Semamung village, Moyo Hulu Subdistrict, Sumbawa. MTG was training farmers to optimize the growth of timber crops to produce high quantities of high-quality timber. Besides acquiring the ability to cultivate good timber crops for themselves, participants were also prepared to tutor and counsel other farmers who didn't participate in the training.

In the Development of timber and non-timber forest product' production and marketing strategies for improvement of farmers' livelihoods in Indonesia Project (Kanoppi), WWF Indonesia initiated the establishment of a working group for policies on timber and non-timber forest products in Sumbawa. WWF Indonesia also provides facilitation to increase the capacity of the working group and to strengthen the organization of the working group.

b. Sumbawa Forest Management Units (FMUs)

Sumbawa FMUs are divided into two work areas, i.e. Batulante FMU and Puncak Ngengas FMU. The work area of Batulante FMU covers eight subdistricts, and two of them are the study locations: Batulante and Unter Iwes subdistrict.

The plan and activities that have been executed and will be conducted by Batu Lante FMU focus on production-forest and protected-forest management plans. The production-forest management plan involves making an inventory of the production forest, maintaining stands in production forest, rehabilitating production forests that were illegally logged, developing eucalyptus as a way to optimize critical land, and optimizing land usage under the tree stands. The protected-forest management plan includes: identifying changes, supervising and evaluating the development of protected forest periodically, minimum once every year; drafting a reforestation plan for the protected forest area; involving village communities in the management of the protected forest area; and allocating community forest to the village community (KPH 2012).

c. Sumbawa Forest Honey Network

The Sumbawa Forest Honey Network (JMHS) is part of the Indonesia Forest Honey Network (JMHI). JMHS was initiated by several forest honey collectors in Sumbawa and facilitated by Sumbawa FMU in cooperation with the JMHI. JMHI provided facilitation and capacity building to members of JMHS, covering honey processing techniques, and organizational and marketing issues. JMHS is currently doing some extension activities for honey collectors/farmers in Sumbawa. Extension activities conducted by the JMHS in Batudulang village, according to the information acquired during the FGDs with farmers, included: training in honey-based wax production, honey-based soap production, draining and packaging; and facilitation in forest honey marketing through co-ops in Sumbawa and Jakarta. One of the locations of JMHS' extension activity and also the study location was Batudulang village, Batulante, Sumbawa.

d. Makassar Utama Trading Company

Makassar Utama Trading Company is the only primary industry in Sumbawa District. Makassar Utama Trading Company has the need to obtain good and legal timber, both in quality and quantity, from farmers. In order to achieve that, the Makassar Utama Trading Company provides facilitation to affiliate farmers to process documents to certify the timber's legal status (Timber Utilisation Permit from Private Land/IPKTM or Timber Origin Certificate/SKAUK). Makassar Utama Trading Company also gives facilitation to youth organizations in Semamung village, Moyo Hulu subdistrict to process waste timber into furniture or household equipment. Makassar Utama Trading Company is also open to work with other villages.

3 Private extension institutions in Timor Tengah Selatan District

a. Yayasan Mitra Tani Mandiri (YMTM)

During an FGD in Fatumnasi village, it was informed that YMTM was routinely facilitated farmers in Fatumnasi village in integrated agricultural development issues (agriculture, husbandry and forestry). This institution is located at Jalan Basuki Rahmat, Kefamenanu, Timor Timur Utara district. One of the farmer respondents said that in Fatumnasi village, YMTM: (i) facilitated farmers in creating a plan for group work; (ii) facilitated in a regular meeting that also functioned as an agricultural class study; (iii) provided technical facilitation in agricultural cultivation and cattle management; and (iv) provided facilitation in fair marketing of agricultural and livestock production. In implementing their program, YMTM assigns one facilitator to live in Fatumnasi village.

b. Sanggar Suara Perempuan (SSP) Soe

SSP is an information and communication centre for gender issues which is located on Jalan Beringin No. 1 Kesetnana, Soe, Timor Tengah Selatan district. This institution provides facilitation to women in Bosen village, Mollo Utara, using a household-scale agricultural facilitation approach for female

inhabitants. In the FGD in Bosen village, it was gathered that the SSP's activities were, among others, providing fertilizer, water pumps and technical facilitation for food crop cultivation. SSP Soe has a regular activity in Bosen village, conducted once to three times in a month.

c. WWF Indonesia

WWF Indonesia Nusa Tenggara program runs a program of non-timber forest products in Gunung Mutis area, Timor Tengah Selatan. WWF Indonesia initiated the establishment of natural-honey collector groups in the villages of Gunung Mutis Natural Reserve buffer zone. WWF Indonesia also provided technical facilitation for natural-honey processing and marketing. One of the continued programs is the Mutis Community Group Network. The network markets their natural honey as one of their activities. WWF Indonesia in Nusa Tenggara Timur province is located at Jalan Srikandi No. 6, Kupang.

d. Helen Keller International-Indonesia (HKI-Indonesia)

HKI-Indonesia is one of the non-government institutions that work in health, nutrition and education issues. In Timor Tengah Selatan, HKI-Indonesia has been running household-scale programs in food production and education in nutrition since 2012. From the interview with the program coordinator for HKI-Indonesia in Soe, Ibu Dian, it was gathered that HKI-Indonesia's program was focusing on education in nutrition, technical facilitation for agriculture and household-scale livestock production in 18 subdistricts and 66 villages in Timor Tengah Selatan. The subdistrict participating in the HKI-Indonesia program, which was also the work area of the Kanoppi project, is Fatumnasi Subdistrict (Nuapin, Mutis, Koanoel village). In Timor Tengah Selatan, HKI-Indonesia is located at Jalan Bougenvile RT 003 RW 02, Kelurahan Soe, Soe Subdistrict.

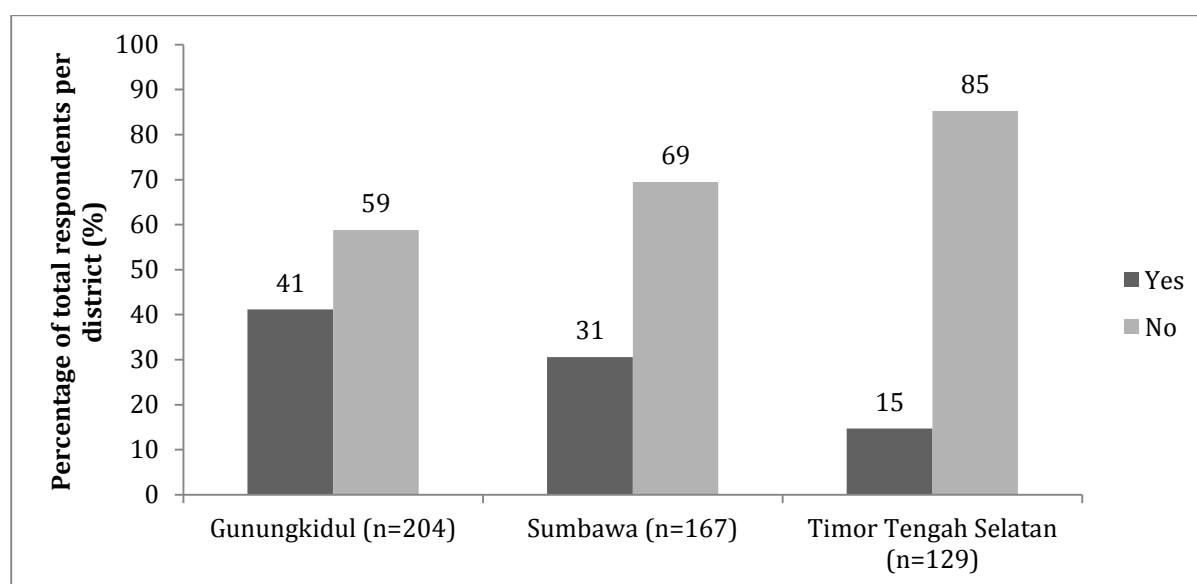
4.5 Extension services received by farmers

4.5.1 Farmers who received extension

The beneficiaries of an extension service are the farmers. To evaluate the extension received by farmers in the past five years, interviews were conducted with 500 smallholder households in the three districts selected for the study locations. From the interviews, it was gathered that on average only 28% of the total interviewed farmers received extension. The highest percentage of farmers who received extension occurred in Gunungkidul (41.2%); the lowest in Timor Tengah Selatan (14.7%) (Figure 7).

The low percentage of farmers who have received extension in Timor Tengah Selatan was due to the limited number of extension agents, especially to reach remote villages such as the two villages chosen as the study locations in Timor Tengah Selatan (Fatumnasi and Bosen). During the FGD it

transpired that farmers in Bosen village, Mollo Utara, had not received any extension from government extension agents since 2012. Similarly, in Fatumnasi village, government extension activity was last conducted in 2013, during the distribution of sandalwood (*Santalum album*) and white teak seedlings (*Gmelina arborea*) from the Timor Tengah Selatan Forestry Agency. The insufficient number of extension agents is a challenge which resulted in a high number (>50%) of farmers who have not received extension services in three locations. The insufficient number of government extension agents limits the work coverage in all districts, especially in relatively far and remote areas. The role of other extension institutions (private and voluntary) is seen as supporting extension services in three locations, which eventually will change the number of farmers receiving extension service.



Source: Household survey result based on interviews with farmers

Figure 7. Farmers who participated in extension service in the past five years in Gunungkidul, Sumbawa, Timor Tengah Selatan District.

4.5.2 Extension topics

Based on the discussion with farmers, in Timor Tengah Selatan, the most often received extension topic is generally related to agricultural extension. Forestry extension is given most often to farmers in Gunungkidul, covering such topics as timber and management of timber crops. NTFP extension material is most often received by farmers in Sumbawa. Different topics in different districts reflect the different needs and characteristics of forestry agricultural pattern in the study locations (Table 6).

Gunungkidul is a teak-producing district (2 434.7 m³ in 2013), more so than the other two districts, which means Gunungkidul has a greater need for information about forestry. It is also supported by the fact that most of the community manages the people's forest by intercropping teak with food

crops. The support from BP2KP, the Forestry Agency and private extension institutions who provide extension services and conduct research on people's forest and teak cultivation influences the contents of the forestry extension material received by farmers.

Table 6. Extension topics received by farmers in Gunungkidul, Sumbawa and Timor Tengah Selatan District

Extension topics received by farmers	District		
	Gunungkidul (n=84)	Sumbawa (n=51)	Timor Tengah Selatan (n=19)
Non-Timber Forest Product	Nothing specific	15.7% (Honey production)	10.5% (Production and harvesting of forest honey)
Forestry	34.5% (Silviculture, Timber harvesting, People's forest, Community Forest)	9.8% (Silviculture and Timber harvesting)	Nothing specific
Agricultural	61.9%	66.7% (Dominated by coffee cultivation)	73.7%

Source: Household survey result based on interviews with farmers.

Sumbawa District is an area which is developing as a non-timber forest product production center, forest honey and *trigona* (stingless) bees are two priorities. Therefore, NTFP extension topics are more needed compared in this district than in the other two. The Sumbawa Forest Honey Network (JHMS) and Batulanteh FMU often conduct extension programs on honey, especially in Pelat and Batudulang villages.

Timor Tengah Selatan is one of the districts whose community is relying on the agricultural sector for their livelihood, which means that farmers here receive agricultural extension more often than others. Other than government extension programs, private extension programs (from YMTM, SSP Soe and HKI-Indonesia) play a role in providing extension services in agricultural issues, mainly in remote areas, such as Mollo Utara and Fatumnasi.

FGDs and in-depth interviews with extension agents and farmers identified extension topics that farmers have received in three districts (Table 7), including: forestry/agroforestry cultivation techniques, timber and non-timber forest products (NTFPs), timber and NTFP processing technology, timber and NTFP marketing and policies related to timber and NTFPs.

Table 7. Identification result on extension topics in Gunungkidul, Sumbawa and Timor Tengah Selatan district.

Extension Topics	District		
	Gunungkidul	Sumbawa	TTS
Forestry/agroforestry cultivation techniques	<ul style="list-style-type: none"> • Enrichment of people's forest with teak; • Silviculture in the People's Forest; • Cultivation of tubers/root plants under teak stands; • Seedling production of mahogany, sengon, acacia. 	<ul style="list-style-type: none"> • Seedling techniques of local plants (Community Seedling Nurseries); • Silviculture and teak plantation management 	<ul style="list-style-type: none"> • Pine cultivation, white teak cultivation (<i>Gmelina arborea</i>), mandarin orange cultivation and catch crop cultivation (ginger, turmeric) under timber stands (Mollo Utara). • Sandalwood and white teak cultivation (Fatumnasi).
Timber and non-timber forest products (NTFPs),	<ul style="list-style-type: none"> • Development of NTFPs, i.e., bamboo and honey (Paliyan and Karangmojo subdistrict); • Honeybee husbandry. 	<ul style="list-style-type: none"> • Gaharu cultivation and honeybee husbandry; • Extension on honeybee <i>Trigona sp.</i> and <i>Apis cerana</i> development; • Sustainable harvesting procedures of forest honey. 	<ul style="list-style-type: none"> • Forest honey management in Fatumnasi; • Bamboo cultivation; • Sandalwood cultivation training.
Timber and NTFP processing technology	<ul style="list-style-type: none"> • Instant ginger and turmeric processing (Paliyan subdistrict). • Nothing yet in Karangmojo subdistrict. 	<ul style="list-style-type: none"> • Honey-based wax and soap production as secondary products from honey production (Batudulang); • Honey processing with draining and the packaging (Batudulang); • Training in ketak grass weaving (Batudulang). 	<ul style="list-style-type: none"> • Forest honey processing with draining (Fatumnasi). • Instant ginger and turmeric processing.
Timber and NTFP marketing	PT Dipantara Yogyakarta once provided timber volume and timber price calculation	Honey marketing (by Sumbawa Forest Honey Network)	Honey marketing (by WWF in Fatumnasi)
Policies related to timber and NTFPs	Timber Origin Certificate (SKAU) Verification system of timber legality	None	Timber Origin Certificate (SKAU) Prohibition on logging in the protected forest area.

Source: Study results based on interviews and FGDs with farmers.

Based on the information obtained from farmers, government extension agents rarely visited extension topics related to the marketing and policies of timber or non-timber forest products. According to BP3K extension coordinator in Karangmojo subdistrict, Gunungkidul district, the topic on timber and NTFP marketing was usually given by the Industry and Trade Agency. Gunungkidul Industry and Trade Agency and the Gunungkidul Extension and Food Security Agency have not

established cooperation. During the FGD with farmers in Bejiharjo village, Gunungkidul, it was gathered that the farmers once received information about timber marketing from private institutions, such as PT Dipantara Yogyakarta and ARUPA Group who provided facilitation to farmers of the people's forest and presented information about timber volume and price calculation.

Extension topics on timber and NTFP policies have not been provided by extension agents from Karangmojo and Paliyan BP3K. According to farmers in Karangasem village, Paliyan subdistrict, in the past two years, they had received information about forestry policy on felling permits, timber origin certificate (SKAU) and a verification system of timber legality (SVLK). The materials were obtained by farmers from the Gunungkidul Forestry and Plantation Agency, the ARUPA Group and the Shorea Association.

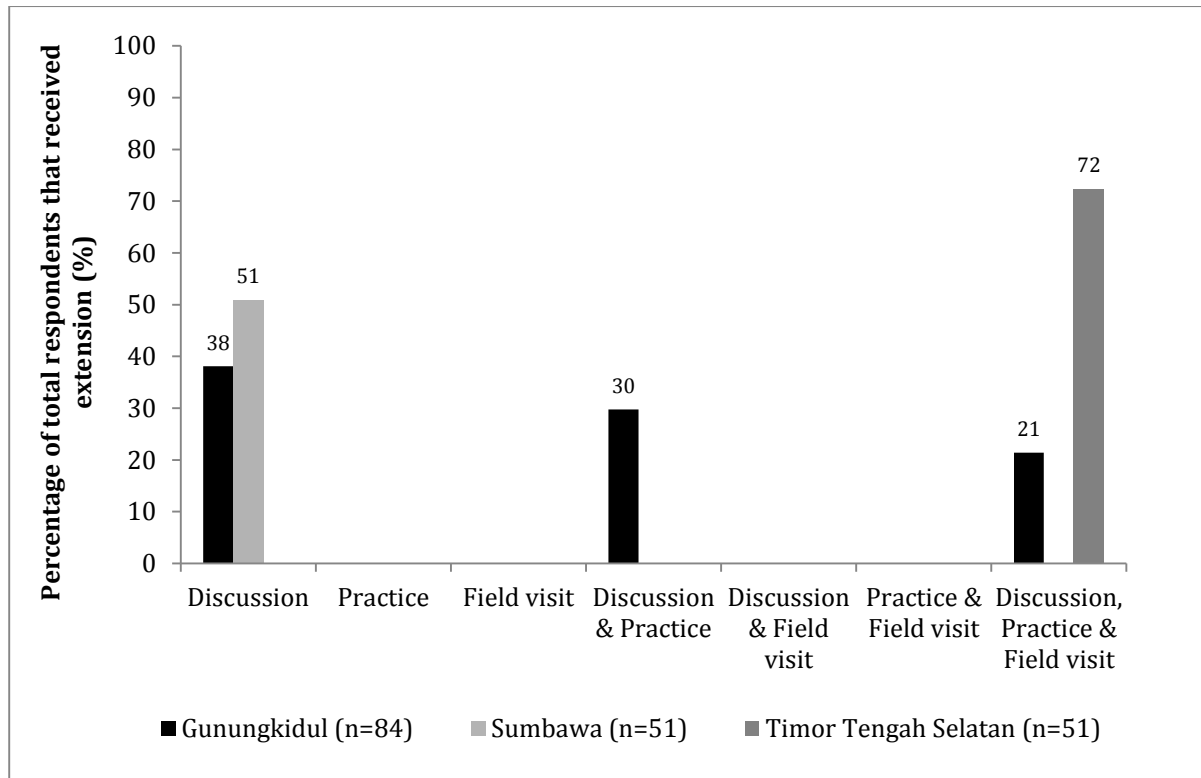
In Sumbawa District, government extension agents have not touched on marketing topics. According to farmers, timber and NTFP marketing is an important thing. The information and knowledge surrounding this issue are currently limited compared to the knowledge of production and cultivation techniques. Timber and NTFP policy topics has not been discussed by Sumbawa BP4K extension agents. Most participants who joined the group discussion in Batudulang have not been informed about policies that are related to timber and NTFPs.

In Sumbawa, there are two legal bases for policies on timber: Perda No. 26/2006 on Timber Utilisation Permit from Private Land (IPKTM) and the Ministry of Forestry Regulation (Permenhut) No. 30/2012 on the Administration of Forest Products from Rights Forest (Hutan Hak, privately-owned and customary forest). According to Nurdin Hamid (male), who was informed about these policies at seminars and workshops held by WWF Indonesia and CIFOR, stated that Perda No. 26/2006 on IPKTM benefitted entrepreneurs more than farmers. The Permenhut, according to Hamid, did not apply to villages in Sumbawa District considering most farmers didn't own a land certificate, which is one of the requirements in processing the Timber Origin Certificate (SKAU). Government officials who issue the SKAU have not been placed in every village, and this situation has caused some manipulation and illegal usage of SKAU, which is now referred as 'SKAU terbang' (fake SKAU).

In Timor Tengah Selatan District, government extension agents have not provided extension topics on timber and NTFP marketing. Extension topics on honey marketing were provided once by WWF Indonesia in Fatumnasi village. The presentation of the honey marketing material was conducted along with providing facilitation to the community who collected natural honey in Gunung Mutis. Topics on timber and NTFP policy that were provided by Timor Tengah Selatan Forestry Agency's forestry extension agents covered SKAU. Extension on the use of NTFPs in the protected-forest area of Gunung Mutis was provided by the local Natural Resource Conservation Agency (BKSDA).

4.5.3 Extension methods

An extension activity requires proper methods or presentations, enabling farmers or other main actors to be able to comprehend the material well. Most commonly-used methods in an extension activity in three districts are discussion and practice, while field visits are rarely used (Figure 8).



Sumber: Household interview with farmers in the study locations

Figure 8. Extension methods used in Gunungkidul, Sumbawa and Timor Tengah Selatan

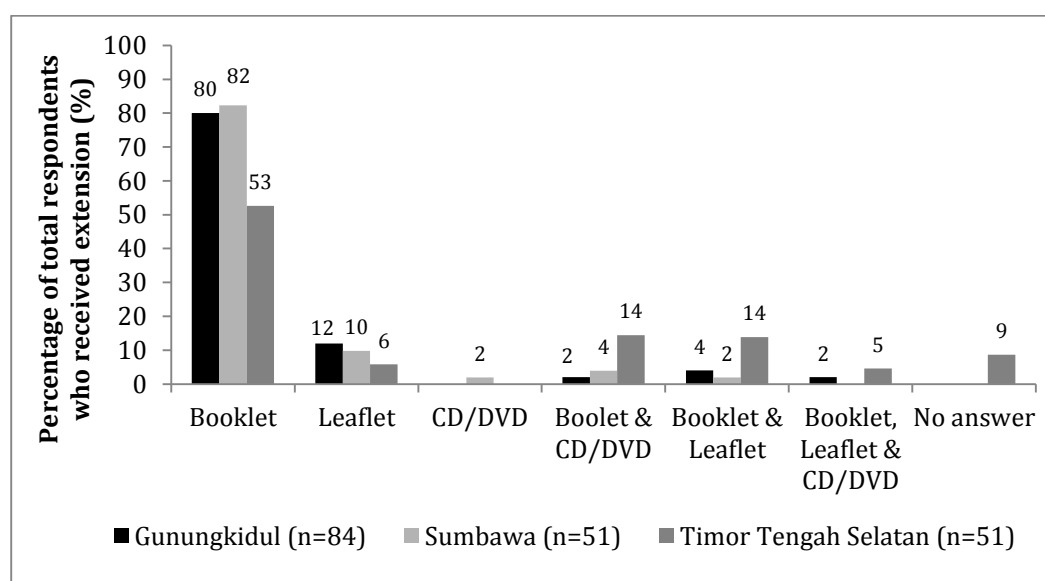
Extension methods that are often used by extension agents in presenting their material varied in Gunungkidul District. The FGD and in-depth interview with extension agents identified the applied methods, which included: lecture, discussion, simulation, demonstration plot, field school, field practice and comparative study. The most often used methods in the forestry extension program in Gunungkidul were lecture and discussion. These are usually applied to present information to increase farmers' knowledge. Meanwhile, the practice method is used to gain deeper knowledge and increase the farmers' abilities.

Community seedling group facilitation is an extension method often used by forestry extension agents in Sumbawa. Extension agents would usually give a lecture followed by practice. According to participants in Batudulang village group discussion, extension agents often presented theories in their lecture. Sometimes they would also provide practice sessions. Farmers prefer the extension agents to provide both theory and practice. According to Nurdin Hamid, theory and practice should be balanced.

Extension methods applied by extension agents in Timor Tengah Selatan included: discussion, talks, field schools, and demonstration plots. Government extension agents often used discussion, teaching, field schools, and demonstration plots as their methods. Extension agent-facilitator from private extension institutions more often used methods that involved the farmers, such as games and demonstration plots, demonstrations of methods and group discussions.

4.5.4 Extension media

The most frequently used extension medium during an extension activity in Gunungkidul, Sumbawa and Timor Tengah Selatan is booklets (Figure 9).



Source: Household survey result based on interviews with farmers.

Figure 9. Extension media used in extension activity in Gunungkidul, Sumbawa and Timor Tengah Selatan Districts.

Based on group discussions and interviews with extension agents at BP3K in Karangmojo and Paliyan Subdistrict, Gunungkidul District, it was gathered that frequently-used extension media were guide books and leaflets. Gunungkidul BP2KP has produced extension leaflets in the past five years. The produced leaflets mostly covered food security issues, such as local food and alternative food sources. An agricultural extension medium produced by BP2KP was a leaflet on soy bean cultivation. Gunungkidul BP2KP, Karangmojo BP3K and Paliyan BP3K have not produced any extension material on forestry.

Extension agents in Karangmojo and Paliyan have been using extension media produced by Gunungkidul BP2KP and other institutions, such as the Yogyakarta Office of Food Security and Extension, Yogyakarta Assessment Institute for Agricultural Technology. In 2014, Karangmojo BP3K printed a leaflet on a spaced-row rice planting system ('jajar legowo') in rice fields. The material was drafted by the agricultural extension agents at Karangmojo BP3K which was then edited by the

extension worker coordinator before it went to print. The leaflet was distributed to assisted farmer groups in Karangmojo subdistrict. The distribution would be done as fast as possible and completed maximum one year after printing.

During the FGD in Karangduwet and Bejiharjo village, farmers stated that the leaflet made and used by the extension agents had been less effective. The lack of images and the use of small print increased farmers' reluctance to read. According to farmers, interesting extension media is with many images and fewer texts.

Other than print media, the Gunungkidul BP2KP also uses audio in a feature broadcast and radio talk show. However, during the FGD, most farmers stated that they did not listen to the radio frequently anymore. Only one farmer in Bejiharjo said they would still listen to the radio for agricultural information. Farmers prefer to get information from television rather than the radio. ARUPA group produced a tutorial film "Calculating the Carbon Level of People's Forest" and PT Rimba Partikel Indonesia also used slideshows and film to present information on the Paliyan Wildlife Reserve and their company profile.

The Sumbawa BP4K forestry extension agents still have not produced any extension media. They use brochures from the Nusa Tenggara Barat Extension Coordinating Agency. Extension agents use the material and information provided in a forestry bulletin, magazine and pocket books. Most Sumbawa extension agents still don't have the ability to use internet and computers.

The Timor Tengah Selatan Food Security and Extension Agency has not produced extension media since 2012. Extension agents have been using media that was printed before 2012. Some leaflets that were used by Mollo Utara extension agents were leaflets produced by the Agricultural Extension Secretariat of Timor Tengah Selatan Agricultural and Food Security Agency in 2011. Mollo Utara BPK had printed a leaflet on carrot and potato cultivation guidelines in 2006, and they still use this leaflet today.

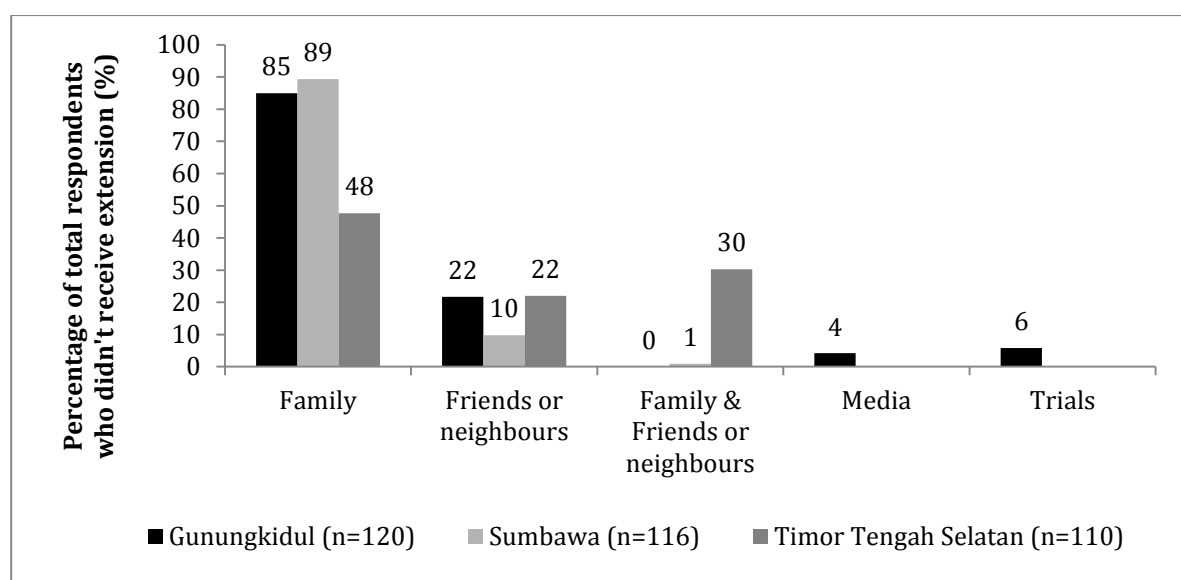
Timor Tengah Selatan BKP2 has not produced any forestry extension media. The forestry extension agents have been using material from other institutions, such as the leaflet from Timor Tengah Selatan Forestry and Plantation Agency and Ministry of Forestry. According to Mariah Elisabeth Magang, they have the material for extension but no funds to print the media. This problem could be solved by copying the extension material on coloured paper and distributing the leaflet to farmers. In one year, extension agents will draft 2–3 different materials for extension.

Hellen Keller International-Indonesia (HKI-Indonesia) uses various media for their education activity on health and nutrition. The printed media included food cards, snake-and-ladder games, posters, healthy food cookbooks, fact sheets and vegetable calendars for a demonstration garden. Printed media from HKI-Indonesia is in full colour, easy to read with more images than text. According to

HKI-Indonesia's project coordinator, they surveyed the community that would benefit from these media before producing. Colour preference, traditional symbols and information in the vegetable calendar were discussed with the community.

According to the farmers, they could easily understand audio and visual media, such as images and films. Most farmers who participated in the FGD in Bosen and Fatumnasi village rarely used a radio and they watched television more often. There is one radio station in Soe that broadcasts an agricultural program: the Timor Tengah Selatan government radio. However, it doesn't attract a lot of listeners. Farmers in both villages would hang posters or illustrated information in their house when they received them.

4.5.5 Sources of information for farmers who do not receive extension service



Source: Household survey result based on interviews with farmers

Figure 10. Sources of information on agriculture and forestry for farmers who do not receive extension.

Farmers who do not receive an extension service will access agricultural and forestry information that is passed down or on from their elders and friends/neighbours (Figure 10). People tend to receive information for the first time from the closest people around them. Families or relatives would be the first source of information before people try to obtain information externally. In districts outside Java, such as Sumbawa and Timor Tengah Selatan, farmers receive information both from their elders/families and friends/neighbours. Meanwhile, in Gunungkidul, which is located on Java, farmers also obtain their information from the media. It is clear that the development of facilities and infrastructure also influences how farmers can access the information.

4.6 Agricultural extension budgetary policy

4.6.1 Agricultural extension budget of Gunungkidul District, Yogyakarta

The extension budget of Gunungkidul BP2KP is funded by the Gunungkidul budget (APBD), the special budget (DAK) and the national budget (APBN). Gunungkidul APBD is annually allocated for demonstration plot programs. APBN is a fixed budget allocated for extension operations such as regular meetings of farmer groups, transportation for extension activities, etc. DAK is allocated for facilitating extension agents, such as building/renovating the office of BP3K, procuring motor vehicles, procuring working equipment (laptop/computer) etc.

The District APBD is submitted annually through a district-level development planning forum (Musrenbang), while APBN is submitted annually in a fixed form. The DAK will be submitted after the publication of technical guidelines for fund utilization. The DAK is submitted to the central government through the provincial extension-coordinating agency.

BP3K's extension budget is funded by Gunungkidul BP2KP and used for the operational costs of extension activities. According to Wagimin, the operational budget is IDR 112 000 per extension worker per month. This figure is insufficient to fund every program listed in the annual extension program. It is merely enough for complimentary food and beverages during regular group meetings. In order to run the extension program, extension agents would have to approach farmer groups and participate in farmers' activities.

4.6.2 Agricultural extension budgetary of Sumbawa District, Nusa Tenggara Barat

The current extension budget in Sumbawa is funded by the district budget allocation, regional budget allocation (APBD) and national budget allocation (APBN). According to the sub-division head of programs at BP4K, Iwan Setiawan, the regional budget that was allocated for forestry extension was not high. Meanwhile, APBN was distributed in a form of deconcentration budget, disbursed by the regional extension coordinating agency directly to extension agents. This fund is used to finance operational costs, and the value is IDR 400 000 per month per extension agent.

The regional APBD is allocated for field activities, such as demonstration plots, community seedling nurseries (KBRs) and field schools. The budget tends to decrease annually. For example, in 2013, the APBD was planned to fund 70 KBRs, while in 2014, they only planned to fund 30 KBRs. The decreasing fund had also influenced field extension activities directly and cancelled the execution of a number of planned extension programs.

In order to continue extension activities according to the plan, some extension agents made some strategic changes, such as:

- Changing the group approach to an individual approach.
- Integrating extension programs with other related programs.
- Providing extension at schools by working together with the government education agency.

Another budget issue that was highlighted by extension agents was the lack of fund for capacity building of the extension agents. They expected to be able to have a budget increase for capacity-building activities, such as training, seminars and other activities.

4.6.3 Agricultural extension budget of Timor Tengah Selatan, Nusa Tenggara Timur

The extension budget of Timor Tengah Selatan BKP2 is funded by APBN in the form of Extension Operational Costs (BOP), provincial APBD and the special allocation fund (DAK). BOP is allocated for production facilities (seedlings, fertilizer), transport for extension agents and extension materials. BOP is paid every three months to Timor Tengah Selatan BKP2. BOP will be paid to the BPK, valuing IDR 500 000 per month per extension worker. Other than BOP, there is also a budget for a field school that is paid from the APBD and APBN. According to forestry extension coordinator Mariah Elisabeth Magang (female, 43 years), the forestry sub-sector extension budget that should be submitted for funding by the regional APBD was hardly ever approved, and sometimes it didn't get approved at all. This is due to the proposed program often not being a development priority. DAK is allocated for facilitating extension agents, such as building/renovating BPK offices, procuring motor vehicles, procuring working equipment (laptop/computer), etc.

The regional APBD is submitted every year through a district-level development planning forum (Musrenbang) and internally at BKP2. Every division at BKP2 would propose a financial budget plan (RAK) to the program division. BKP2 then would submit RAK and present it during the budget meeting at the regional planning agency and the budget would then be proposed to the provincial legislative council (DPRD). The BOP of the APBN is submitted annually with a fixed form. DAK will be submitted after the publication of technical guidelines for fund utilization. DAK is submitted to the central government through the provincial extension coordinating agency.

The existing budget cannot fund all planned extension activities in the program. Therefore, in order to carry out the planned activities, extension agents would rearrange their working areas, use independent funding and create condensed activities to save time.

4.7 Needs and challenges of forestry and agroforestry extension agents

Extension is one of the education processes for farmers. Considering that most Indonesians rely on agriculture, fisheries and forestry for their livelihoods, extension, especially in the forestry and

agroforestry sector, will be much needed in the future. Based on the findings in the three studied districts, there are several things that must be considered in conducting forestry extension:

- The number and quality of government forestry extension agents that provide extension service. Currently, the average number of extension worker in a subdistrict is one person. Most of these workers are over 50 years old (Gunungkidul 100%; Sumbawa 77.2%); Timor Tengah Selatan 37.5%), and in the next five years, they will reach their retirement age. In 2014, 5 056 forestry extension agents were working in 5 340 subdistricts of Indonesia. The assumption is that, in order to provide an extension service in Indonesia, there need to be 20 241 forestry extension agents.
- Insufficient forestry extension material is given to farmers. The current material is limited on cultivation techniques, nurseries (community seedling nursery) and conservation. Material about potential plantation and forest products is still very limited. Material about forestry product marketing (timber and non-timber forest products) and supporting policies is still insufficient or doesn't even exist in the three districts.
- Limited budget for forestry extension might affect the quality of the activities. This can also affect the implementation of planned extension programs, such as the intensity, media procurement, method establishment, facility and infrastructure and the continuity of the extension.

There is some potential that can be developed in order to improve the extension work, such as:

- Private and voluntary extension institutions (companies and NGOs) that have provided extension and facilitation to farmers. Cooperation with private and voluntary institutions will increase the quantity and quality of forestry extension so that it will be able to reach remote areas.
- Increasing collaboration between forestry, agricultural and fishery extension agents in the context of agroforestry extension.
- Increasing the number and role of community voluntary forestry extension agents (PKSM) to cover more ground.
- Using research results made available by the Forestry Research and Development Office of the Ministry of Environment and Forestry and other research institutions as extension material for farmers. Research results have not been optimally submitted to the district extension agency and tend to be submitted to the district/municipal forestry and plantation agency.

5. Conclusions and recommendations

The implementation of agricultural extension in Indonesia, from its beginnings in 1905, has experienced continuous change and development, largely in keeping with changes in government systems and related political issues. The newest extension system in Indonesia was marked by the issuance of Law No. 16/2006 on Extension System for Agriculture, Fisheries and Forestry in Indonesia. Under the Law, a united agricultural, fishery and forestry extension service is conducted by the district extension agency.

The analysis in this study shows that there are still many farmers in the study locations that do not receive sufficient extension service on forestry and agroforestry, showing that the extension system is not optimum. Challenges that prevent better forestry and agroforestry extension service include the number and quality of government forestry extension agents in providing extension service, the lack of forestry extension material for farmers and the limited budget for forestry extension which can determine the type of methods, media, and topics that can be delivered through extension program.

However, there is potential for the service and performance of a forestry and agroforestry extension program to improve, namely: (a) cooperation between government extension agents with private and voluntary extension agents to increase the quantity and quality of forestry extension programs; (b) collaboration between agricultural, fishery and forestry extension agents in the context of agroforestry extension services; (c) community voluntary forestry extension agents (PKSM) supporting the provision of a wider forestry extension service; and (d) using research results made available by the forestry research and development office of the Ministry of Environment and Forestry and other research institutions as materials for extension.

There should be collaboration between district extension agencies and private and voluntary extension agents to increase the effectiveness of extension implementation at the district level so that the coverage of the extension service will be broader. Cooperation with research institutions must also be strengthened in order to enrich and update forestry extension material which later can be delivered to farmers.

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Annex 1. Conditions of region, objectives of extension, materials and methods in extension program in Gunungkidul district in 2014.

No	Conditions of Region	Objectives of Extension	Materials	Methods
Technical aspect of forestry crop cultivation				
1	The quality of timber from the people's forest (Hutan Rakyat/HR) is not yet optimum.	52% of HR farmers will be able to fertilize their own garden according to the Standard Operational Procedures (SOP) of good HR cultivation	Individual fertilization for the crops in the people's forest	Lecture, discussion, demonstration
		50% of HR farmers knows how to prune teak according to the SOP of good HR cultivation	Pruning technique of teak crop in the people's forest	Lecture, discussion, action research.
		48% of HR farmers knows how to harvest mature timber according to the SOP of good HR cultivation	Tree-harvesting technique and economic analysis	Lecture, discussion, practice
		55% of HR farmers knows how to use land under the stands for productive cropping according to the SOP of good HR cultivation	1. Garut (arrowroot) and ganyong (<i>Canna edulis</i>) cultivation. 2. Tubers/root plants cultivation (ginger, turmeric, galanga, etc.). 3. Porang cultivation.	Lecture, discussion, demonstration, training
2	The quality of the reforestation along the coast is not yet optimum.	50% of farmers managing costal reforestation know how to determine and choose the type of forest vegetation according to the SOP of good costal reforestation	1. Choosing techniques of plants species for coastal reforestation 2. Recognising the right types of forestry plants for coastal reforestation	Lecture, discussion, demonstration, demonstration plot.
		55% of farmers managing coastal reforestation know how to conduct coastal reforestation according to the SOP	1. Techniques of coastal reforestation 2. The planting distance of coastal reforestation 3. The direction of the planting rows	Lecture, discussion, demonstration plot, training

No	Conditions of Region	Objectives of Extension	Materials	Methods
3	The quality of reforestation of water spring/lake is not yet optimum	50% of farmers know how to do reforestation of water spring/pond according to the SOP.	1. Area for conserving spring water. 2. Suggested planting distance 3. Row planting system.	Lecture, discussion, demonstration plot, training
		55% of farmers know how to determine which types of plants that is appropriate and good for water spring/pond reforestation.	1. Introduction technique of appropriate types of trees 2. Selection of types of trees that can be used in conserving water spring.	Lecture, discussion, demonstration
4	The quality of Community Forest (HKm) is not yet optimum	45% of HKm farmers know how to maintain HKm according to the SOP of HKm cultivation.	1. HKm crop thinning 2. Pruning technique	Lecture, discussion
		50% of HKm farmers know how to optimise land usage in HKm according to the HKm SOP.	1. Catch crop cultivation 2. Pharmaceutical forest	Lecture, discussion, demonstration plot, training
5	Community Seedling Nursery (KBR) The quality of the seedlings of forestry crops is not yet optimum	55.3% of KBR farmers know how to choose high-quality teak/sengon laut seedling according to the SOP in KBR establishment	1. Selection techniques of mother trees 2. Collecting techniques of forestry seedlings. 3. Seedling certification	Lecture, discussion, training
		55.5% of KBR farmers know how to produce seedlings from forestry crops according to good KBR establishment procedures.	1. Teak seeding techniques 2. Seeding techniques of sea sengon 3. Seedling weaning techniques	Lecture, discussion, farmer training.
		55.8% of KBR farmers know how to organize forestry crop seedlings according to the SOP of KBR establishment	1. The direction arrangement of the beds 2. Seedling-moving techniques	Lecture, discussion, training

No	Conditions of Region	Objectives of Extension	Materials	Methods
Controlling aspect of surface runoff				
1	The terracing structure is not yet optimum	1. 50% of farmers know how to plant good plants to strengthen the terrace's structure 2. 55% of farmers know how to maintain terraces according to the SOP.	1. Getting to know plants that can strengthen the terrace's structure 2. Spacing arrangement of terrace-strengthening plants 3. Maintenance techniques of terrace channels.	Lecture, discussion, demonstration
2	Drainage (SPA) The quality and quantity of the water drains is still very poor	1. 55% of farmers know how to build water drains according to the SOP 2. 55% of farmers know how to maintain SPA according to the SOP	1. How to build SPA 2. Functions and uses of SPA for soil conservation 3. SPA maintenance techniques 4. Functions and benefits of SPA maintenance	Lecture, discussion, demonstration
3	Drop Structures The quality and quantity of drop structures is still very poor	1. 50% of farmers know how to build good and proper drop structures 2. 55% of farmers knows how to maintain drop structures properly	1. Building techniques of drop structures 2. Functions and usages of drop structures 3. Maintenance techniques of drop structures	Lecture, discussion, demonstration
4	Supporting Dam/Embung/Gully Plug Gully plug structure is not yet optimum	1. 40% of farmers know how to build the right and proper supporting dam/embung/gully plug 2. 45% of farmers know how to properly maintain supporting dam/embung/gully plug	1. Building techniques of gully plug, embung, supporting dam 2. Maintenance techniques of gully plug, embung, supporting dam	Lecture, discussion, demonstration, training

No	Conditions of Region	Objectives of Extension	Materials	Methods
Organizational aspect of forestry farmer groups				
1.	The level of abilities and independence of members of farmer groups is still low	Improving smallholder's behaviour-context-attitude in the role and function of a series of activities	1. Farmer groups function as a communal study mean 2. Farmer groups as a business unit	Lecture, facilitation
2.	The level of abilities and independence of farmer groups in drafting the participatory rural appraisal (PRA) is low.	Improving farmer groups' behaviour-context-attitude in PRA drafting techniques	1. Identification of the area's potential 2. Village program drafting	Group facilitation
3.	Group management	Improving behaviour-context-attitude of farmer groups' managers in the management and organization of farmer groups.	1. Management of forestry/ reforestation plants 2. Task division in the groups	Meeting
4	Farmer groups have not established their organizational statute and rules of procedures (AD/ART), regulations and sanctions	Improving behaviour-context-attitude of farmer groups' managers in drafting techniques of their AD/ART, regulations and sanctions	1. Drafting AD/ART 2. Getting to know the local culture	Meeting, facilitation, discussion
5	The legality of forestry farmer groups is still weak.	Improving behaviour-context-attitude of farmer groups' managers and members in order to gain legality	1. Forestry farmer groups are considered as legal farmer groups 2. Proposal on legality	Meeting, facilitation
6	The unity of forestry farmer groups and their members is not optimal	Improving behaviour-context-attitude of farmer groups' managers in establishing a group alliance	1. Data collection of forestry farmer groups 2. United farmer groups	Discussion
7	No task division of managers of forestry farmer groups	Improving behaviour-context-attitude of farmer groups' managers in dividing tasks within their groups.	1. Task division technique in a group	Meeting, discussion

No	Conditions of Region	Objectives of Extension	Materials	Methods
Economic aspect of forestry				
1	Marketing system of forestry products is still not yet optimum	Improving behaviour-context-attitude of farmers in product marketing system	Techniques of product marketing system	Lecture, discussion
2	The level of development of productive business is still low	Improving behaviour-context-attitude of farmers in establishing productive business groups	Establishment techniques of productive business group	Meeting Demonstration of productive business groups Facilitation
3	Development level of forestry business capital is low	Improving behaviour-context-attitude of farmers in capitalisation by establishing co-ops for people's forest groups	1. Strengthening group capital 2. Building a 3 rd -party partnership	Meeting Enforcement
4	Timber and non-timber forest product processing is still low and limited	Improving behaviour-context-attitude of farmers in forest product processing	Processing techniques to make half-ready products or ready products	Meeting Business meetings
V Farmers' welfare aspect				
1	There are still people who are prone to insecure food, clothing and housing	Improving behaviour-context-attitude of village community in providing enough and decent food, clothing and housing	1. Building techniques of village forestry extension centre 2. Empowerment of village communities	Training Facilitation

Source: Extension Program of Gunungkidul BP2KP, 2012

Annex 2. Conditions of region, objectives of extension, materials and methods in forestry extension program in Sumbawa

No	Conditions of region	Objectives of extension	Materials	Methods
1	Forest stands in the region are decreasing annually due to illegal logging.	Increasing the awareness of main actors and business players in protecting and preserving the forest area.	Law No. 18/2013 on prevention and eradication of forest destruction	Lecture, discussion
2	The planting and maintaining of land-rehabilitation plants outside and inside the forest area is not optimal.	Main actors are willing and capable of applying the planting and maintenance pattern of timber trees and multi-purpose tree species (MPTs) according to the right techniques	Planting and maintenance techniques of timber trees and MPTs	Lecture, discussion, demonstration
3	The potential of non-timber forest products is not explored optimally	Improving behaviour-context-attitude of main actors in taking advantage and managing NTFPs	Types of NTFPs, development and processing of NTFPs	Lecture, discussion, training and field practice
4	Water spring capacity is decreasing even more	Protecting and preserving water springs	Maintaining and protecting water springs	Lecture, discussion, demonstration and campaign
5	Land processing does not consider soil and water conservation principles	Improving behaviour-context-attitude of main actors in land processing according to soil and water conservation principles	Soil and water conservation techniques	Lecture, discussion, demonstration
6	Farmer group organizations are still dominated by beginners	Class improvement of forestry farmer groups	Organizational and management strengthening of forestry farmer groups	Visit and comparative study
7	Main actors have not understood the administrative procedure of forest products	Main actors understand the administrative procedures of forest products	Minister of Forestry Regulation (Permenhut) 30/2012, 41/2014, 42/2014, 35/2012	Lecture, discussion

Source: Sumbawa forestry extension program, 2016

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