

People and Agroforestry (The Use of Non-Commercial Products from Agroforestry)

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Abstract— Agroforestry is a practice of agriculture on forest land. This can be mix among trees, plant, fishery (ponds), and animal husbandry. Agroforestry is usually practice by the people live surrounding forest. These people usually have specific relationship with the forest. Forest is a rich resource that can support their life. Before they practicing agriculture, people live surround forest collecting timber, fodder, fruits, leaves, for many purposes. Most of them are for daily use, and some for sale. This paper will discuss about the use of non-commercial agroforestry product. People in Cianjur, West Java, Indonesia, are use the agroforestry product for non-commercial purpose.

Keywords — agroforestry, non-commercial product, West Java.

I. INTRODUCTION

Agroforestry is defined as a system of land use in accordance with cultural practices and local environmental conditions (Whitten, et al. (1999) in Iskandar, 2001). In agroforestry systems, annual cultivated crops or jointly or by rotation, and even sometimes in multiple layers, allowing production conducted continuously. *Agroforestry* usually have a very dense structures such as natural forests that have ecological functions such as forests (Soemarwoto, 1984). In addition, *agroforestry* provides social benefits, economic, and cultural rights for rural communities. In other words, land use has a variety of functions which is the integration between the natural functions of forests and functionality to meet the social, economic, cultural community (who live around the forest). These functions, among others, is a function of soil to resist erosion, regulate hydrological systems, germplasm conservation, and provide a positive effect on microclimate. Another function that is not less important is to provide socio-economic functions that are very important to the rural people, for example, produces food production to sustain the daily needs of the population (*subsistence*), or in commercial production. *Agroforestry* has long been widely practiced in Indonesia. In fact, regarded as the embodiment of authentic Indonesian culture that has been modified and able to adapt to changing biophysical and socio-economic communities. On the island of Java, known for various forms of *agroforestry*, among others: (1) fruit trees-growing in dry fields; in West Java known as Huma, (2) mix garden system or Talun called *Krakal* in Purworejo,

Central Java, and *gardens* in Malang, East Java, and (3) Kebun Talun system in West Java (Soemarwoto, 1984).

In general, *agroforestry* land planted by diverse types of crops (*annual*) and perennials or annual (*perennial*). The species that make up the very bottom is the type of vines at ground level, such as sweet potato (*Ipomoea batatas*), while at the top there is a bush plant that has a height less than 1 m, at the top is filled by other types of plants that 1-2 m tall, then other types of plants that has a height of 2-5 m, in the deeper layers of structured types of fruit trees, firewood, and building materials, and the top layer is filled by the type of plant that has a height of more than 8 m. One factor that can distinguish systems of agricultural production in *agroforestry systems* is a state and type of plants. Like the garden, generally dominated by annual crops and intensive treatment (Iskandar, 2001).

Base on the description above, agro-forestry is the concept of integrated land management based on the forestry sector, combined with agriculture, livestock, or fisheries. Agro-forestry is to cultivate the land by multi-strata plant. Not only with plants but can also combined with animal husbandry and fisheries. The selection of plants and planting layout is a key success of this concept. Multi-strata is the use of land with different crops to plant such as lower-strata vegetation (empon-empon, tubers, grass for animal feed), saplings or seasonal vegetation (bananas, papaya, mango, rambutan, durian), and tree vegetation that need decades to grow.

Application of the concept of agro-forestry in land management can provide benefits economically, ecologically, socially, and culturally. With a variety of cultivated plants can provide good income for the community on a daily, monthly, annual, seasonal, and decades. It depends on the pattern adopted agro-forestry. Agrisilvikultur (forestry-agriculture), silvopastura (forestry, animal husbandry), agrisilvopastura (forestry-agricultural-livestock), silvofishery (forestry, fisheries), apiculture (bee-forestry), Sericulture (silkworm-forestry), or multipurpose forest tree production system (fusion complex). Ecologically, agroforestry support soil and water conservation. With multi-strata plants will certainly minimize the occurrence of erosion, reduce run off and increase the effectiveness of water infiltration. Spatial patterns of agro-forestry can also allow its function as a wind-breaker.

Socially, agro-forestry can provide good jobs in land management and processing of crop products. Variations of agricultural strengthen local community food security system. So people do not have to worry about price increases or

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shortages of certain basic commodities. The agro-forestry products provide supply of wood building materials. Agroforestry is how we put the right types of plants, in appropriate locations, and with good reason. Agro-forestry is increasingly recognized as a pattern approach to natural resource management in a sustainable manner, incorporating the purpose of protection, agriculture, and development. Among these benefits is the contribution to the conservation of native biodiversity. Although the protection of natural habitat remain the backbone of biodiversity conservation strategies, at least agro-forestry also support the role.

Multi-strata planting allows the selection of rare species of plant or endemic plants to cultivated again. This is useful as a germplasm protection of biodiversity. Types of crops and cropping patterns provide living space for micro-habitat for many wildlife species. Butterflies need specific plants as hosts. Several species of flowering plants are able to invite the presence of various types of insects and birds. Types of fruit trees provide food reserves for birds and herbivorous mammals. Increased production of litter can improve soil fertility and enhance soil insects. Agro-forestry maintain the stability of the material production of the type of producer to support the food chain in the balance of ecological systems. Good food chain supporting the recycling of energy and material are important. That would keep the balance of the ecosystem. With a variety of benefits to be derived from the application of agro-forestry, putting this concept to be worth a try as an alternative concept of watershed management, especially the upper with an integrated management system and involves multi-stakeholder.

Practice of agroforestry are continuously conducted in many places in Indonesia, especially where there are (forest) land to cultivate. In Cianjur, West Java where the location is surrounding by (state) forest land, people are also practicing agroforestry.

II. NON-COMMERCIAL GOODS FROM AGROFORESTRY

A. Timber



Figure 1 Pines Tree

People use various products derived from agroforestry to meet their daily needs in the household or for sale to the market. The utilization are for timber/fuelwood, medicines, fruits, food, vegetables and seasonings. For timber, there are various types of trees planted and utilized both as a timber for building houses or furniture, and as energy source (fuelwood). Various types of wood that are puspa (*Schima wallichii*), Rasamala (*Altingia*

excelsa Noronha), pine (*Pinus pinaster*), mahogany, Weru or kihang (*Albizia procera*), caliandra, and bamboo.

B. Medicine

Medicinal function from agroforestry products can be found in *Pulus* plants (*Laportea stimulant*, syn. *Dendrocnide stimulant* syn. *Urtica stimulant*), *sambung nyawa* (*Gynura procumbens*), and *kumis kucing* (*Orthosiphon aristatus*). The *Pulus* leave has properties as a cough medicine and shampoo. The leaves, young shoots and roots of *pulus* are also edible. Young shoots which consists of two leaves can also be used as a substitute for spinach recipe. The roots and leaves are boiled for soup is also a good source of nutrition.

Sambung nyawa has a cool and natural characteristic. Its benefits, among others, lower the heat of the body, spleen, kidney pain, sore skin, lowering blood sugar, antimicrobial, heart disease, high cholesterol, diabetes, stomach disorders, cough and sinusitis. *Sambung nyawa* leaves usually consumed only as vegetables complements. But now it can be consumed in capsule form. Rods of plants are often used to lower fevers. This plant is also used in an attempt to cure kidney disease, dysentery, an infection of the esophagus, in addition to use in efforts to stop the bleeding, and bites of venomous animals.

Wet and dry *kumis kucing* leaves use as tackling a wide range of diseases. Dried leaves are used as drugs that induce urinary drain (diuretic) and to treat rheumatism. The community uses the *kumis kucing* as a traditional medicine in an effort to cure cough cold and constipated. In addition, the leaves of this plant are also useful for treatment of kidney inflammation, kidney stones, diabetes, albuminuria, and disease syphilis, rheumatism and lowers blood glucose levels. In addition to being a diuretic, cat's whiskers are also used as an antibacterial.

C. Ornamental Plant

Sinyo nakal (*Duranta erecta* L.) is a kind of ornamental shrubs commonly planted as living fences or garden components. There are a number of cultivars of plants fence or border plant. Cultivars that have bright leaf color known as *tea-tehan* for being such a trim plant in the tea plantations.



Figure 2 Hanjuang

Hanjuang (*Cordyline*) plant is often used as a protective barrier and blocks in the rice paddies, fields, as well as tea plantation or quinine in Indonesia. *Cordyline fruticosa*, especially c., popular as an ornamental plant. *Cordyline* leaf is used as a food wrapping. The results showed, *cordyline* leaf wrappers have the ability antibakterial. In Sundanese, Javanese, Balinese, and the *cordyline* have meaning as "border spaces", both literally and philosophically.

Sansevieria or *lidah mertua* is the clan's ornamental plants which are quite popular as ornaments to the inside of the House because the plant can grow in a little water and sunlight. *Sansevieria* has hard leaves, succulent, upright, with the tapered end.

Sansevieria known as mother-in-law tongue plant because of its sharp. *Sansevieria* not only as ornamental plants, but also has benefits to nourish hair, treat diabetes, cancer, and malignant hemorrhoid. While the seratnya used as a clothing material. In Japan, the *Sansevieria* is used to eliminate the smell of home furnishings in the room. Compared to other plants, the *Sansevieria* have privilege to absorb toxic materials, such as carbon dioxide, benzene, formaldehyde and trichloroethylene.

Euphorbia milii is also used as ornamental plants, as well as nutritious as a healer. Drugs made from *e. milii* are namely: bleeding, hepatitis, and burns.

D. Fruits



Figure 3 Jengkol (*A.jiringa*)

Various types of fruit trees can be found in agroforestry. People use those for their own needs and also for commercial purpose. Jengkol (*Archidendron pauciflorum*, synonyms: *A. jiringa*, *Pithecellobium jiringa*, and *P. lobatum*), petai (*Parkia speciosa*), durian (*Durio zibethinus*), Coconut (*Cocos nucifera*), banana (*Musa acuminata*, m. and m. *balbisiana paradisiaca*) are fruits products from agroforestry.

E. Food/Vegetables/Spices

There are very various type of edible plant from agroforestry. Padi huma or upland paddy rice (*Oryza sativa*) is the most popular crops people cultivated in agroforestry land. This because rice from paddy huma is also the source of staple food. Kecombrang, kantan, or honje (*Etlingera elatior*) is one of them. This plant is a kind of spices and herbs.



Figure 4 leunca

A perennial plant which ternate-shaped flower, fruit, and seeds used as vegetables. In West Java, the flower bud is often used as *lalab* (raw dish) or boiled then eaten with sambal. Another plant is *Kecipir* or winged bean, or pea (*Psophocarpus tetragonolobus* (L.) D.C.). His young shoots and pods used as vegetables.

Edible plant from agroforestry and often use as staple food beside paddy rice is Singkong or Ketela Pohon or Ubi Kayu or Cassava (*Manihot utilissima*). Cassava widely known as the staple food-producing carbohydrates and leaves as vegetables. Cassava cooked in various ways, cassava is widely used in a variety of cuisines. Boiled potato, to replace and complement the cuisine. Cassava flour can be used to replace wheat flour. The most popular vegetables use by people of Cianjur from agroforestry land is leunca (*Solanum nigrum* L.). Leunca is edible which derived from cultivars that only contain low levels of toxins.

F. Fodder

Fodder collection can be collected together or separately from fuelwood collection. Agroforestry practice that also combines agriculture with the animal husbandry has triggered people to collect the grass and leaves from the agroforestry land and also from the forest near their farm land to feed their animal. Besides collecting fuelwood, people of Cianjur also collect fodder almost every day.

III. CONCLUSION

Agroforestry system are practice by the peasant in in Cianjur, West Java. The Cijedil village is 'the ideal agricultural landscape' with low to moderate human disturbance and agricultural intensities. Existing production forest areas are under authority of State Forest Company (Perhutani). In the mountainous area, there are human-modified landscape and also natural and semi-natural forests. There are secondary and fragmented production forests that are usually connected or mixed with traditional agroforestry systems. such as tree garden or *kebon tatangkalan*, bamboo tree garden or *kebon awi* (bamboo), upland rice fields (*huma*), crop fields, rice fields, fish ponds, and residential area.

Agroforestry provides timber, food, fuelwood, fodder, and other commodities like medicinal herbs and ornamental plants. People in the study site commonly use some parts of trees or crops for emergency things or for healing diseases. For example, if someone's hand is injured, they will shed squeezed sirih leaves extract to the injured hand. The leave is also used to help recovery after a mother deliver her baby.

Agroforestry systems support peasant household security. The reliance of people on trees and forests is limitless. Women in Cianjur understand the long term benefits of agroforestry, so they sustain agroforestry to meet their basic needs.

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APPENDIX

TABLE TYPE OF CROPS IN AGROFORESTRY SYSTEM

| Name of Crops | | | |
|---------------|----------------------------------|---|---|
| Sundanese | Indonesia | English | Latin |
| Awi | Bamboo | Bamboo | bambusa Spinoza |
| Puspa | Puspa, seru, medang gatal | | Schima wallichii |
| Pinus | pinus, tusam, dammar | pine | <i>pinus merkusii</i> |
| Afrika | kayu afrika | Umbrella tree | Maesopsis eminii |
| Jeunjing | Albasia | albizia | Albizia falcataria |
| Rasamala | Rasamala | | Altingia excelsa Noronha |
| Mahoni | Mahoni | mahogany | Swietenia macrophylla |
| Kaliandra | Kaliandra | calliandra | Calliandra calothyrsus |
| Pulus | Pulus | wood nettle, stinging nettle | Laportea stimulans, syn. Dendrocnide stimulans syn. Urtica stimulans |
| Jengkol | Jengkol | dog fruit | Archidendron pauciflorum, sinonim: A. jiringa, Pithecellobium jiringa, dan P. lobatum |
| Kadu | Durian | stinky fruit | Durio zibethinus |
| Nangka | Nangka | jackfruit | Artocarpus heterophyllus |
| Rambutan | Rambutan | rambutan | |
| Peuteuy | Petai | | parkia speciose |
| Jambu | jambu air | bell fruit | Syzygium aqueum |
| Alpuket | Alpukat | Avocado | |
| Kalapa | Kelapa | coconut | Cocos nucifera |
| Limus | Bacang | horse mango | Mangifera foetida Lour |
| Suren | Surian | | <i>Toona ciliate</i> |
| Cau | Pisang | banana | Musa paradisiaca |
| Jahe | Jahe | ginger | Zingiber officinale |
| Koneng | Kunyit | turmeric, curcuma | Curcuma longa |
| Honje | kecombrang | | <i>Etilingera elatior</i> |
| Bayem | Bayam | spinach | Spinacia oleracea |
| Cengek | cabe rawit | chilli | Capsicum annum |
| Jagong | Jagung | corn | Zea mays subsp. Mays |
| kacang suuk | kacang tanah | peanut, groundnut | Arachis hypogaea |
| Bonteng | Ketimun | cucumber | Cucumis sativus |
| Kuca | Kuca | garlic chives, Chinese chives, Oriental garlic | Allium tuberosum |
| Leunca | | duscle, garden nightshade, hound's berry, petty morel, wonder berry, small-fruited black nightshade | Solanum nigrum |
| Cengek | cabe rawit | chilli | Capsicum annum |
| Sampeu | singkong, ketela pohon, ubi kayu | cassava | Manihot utilissima |
| Sosin | sawi hijau | caisim | <i>Brassica rapa convar</i> |
| Kapol | Kapulaga | true cardamom | Amomum compactum |
| hui | ubi jalar | sweet potato | Ipomoea batatas |
| Laja | Lengkuas | laos | Alpinia galanga |
| Jaat | Kecipir | Winged bean, Winged pea, Four-angled bean | Psophocarpus tetragonolobus |