

ROLE OF WOMEN IN SUSTAINABLE AGROFORESTRY

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ABSTRACT

As the third largest forest owner in the world, farm activities in the forest land (known as agroforestry) may found in any forest land in Indonesia. Especially when we look at the history of forest management since the days of pre-colonial, colonial, and independence. The need of agricultural land is also one factor that increasing loss of forest land. At the meanwhile issues on forest and agricultural services for the whole ecosystem are become more important. The dynamic process in forest and agriculture management can also be seen in community involvement in the management, both men and women. Women, "the guard of mother nature", are able to perform forest management with agricultural activities in it. Maintenance ecosystem function and food needs of mankind is resolved. Women of just a middleman or even just the role of 'cheerleaders' in the distribution of timber forest products in Pelluso (1992), become key players in the forest management and other activities (agriculture) in it. Study in Soreang (2008) and Clanjur (2012-2014), present the evidence. How women, after the 'missing' of their male partner, are able to maintain forest. Not just to maintain the ecological functions, but also the social, economic, and cultural function of forest. These are also the picture of sustainable practice of agroforestry conducted by women.

Keywords: Agroforestry, Women, Management, Sustainability, Ecosystem services

INTRODUCTION

Humans have a reciprocal relationship with the environment. Humans are highly dependent to the environment. We can say that environmental management by human is an effort to fulfill their needs. This practice of management raises various forms and levels of environmental damage. At the certain extent, we forgot that the environmental damage that we have caused, will also affect human in returns.

Agricultural activity is basically a human activity in managing the environment to meet human needs, especially for food. Agriculture plays very important role in human life. Agriculture has been known since humans began to recognize the domestication of plants and animals. Farming or land cultivation is one form of human cultural evolution. Based on the evolutionist view, farming and cattle are considered as a higher level of hunting and gathering as a source of human livelihood. Agricultural activities are usually preceded by forest clearing activities. These activities, especially with the increasing demand for agricultural production, damaged and reduced forest land area.

Indonesia is one country in the world that has a fairly extensive forest land. Indonesia is the country's third largest forest owner in the world after Brazil and Cameroon with 120 acres of tropical forest. With a vast forest area, then the damage to forest land makes Indonesia the country with the highest deforestation rates. Based on the data of the Forestry Department, the rate of forest destruction and decline during 1985 to 2005 averaged about 1.9 million hectares per year in Indonesia, as was in other developing countries, often caused by economic factors and unsustainable development practices. In addition, to the need for forest products, especially timber, human population growth leading to an increased demand for settlement and food, causes the conversion of forest land into agricultural and settlements. Forest especially natural forest, has a very important ecosystem services. Those services include water/hydrology regulation, storage of genetic resources, regulating climate and forest soil fertility and sinks of carbon. On the other hand, agricultural activities are also claimed to have a range of services that benefit human and environment. Agriculture has a role in

not only commodities, but also produce non-commodity outputs such as beauty of nature (landscape) and cultural heritage.

One of example of relation between agricultural and forest is agroforestry. Agro-forestry is a practice of agricultural activities on forest or mimicry forest land. This type of relation is a perfect example of human, both men and women, maximize the function of forest for their livelihood. Paying attention to gender perspective in analysis of agroforestry management is very important in term of sustainability.

METHODS

Important question when we will begin a study of women is what differentiates such research with other research. Basically the greatest proportion of research conducted on women is intended to listen to women talk his own voice about her experiences. Based on these considerations, the method will be used in this study is a method of participatory observation techniques. This study will also use data from primary and secondary sources. This method aims to make space for women to be able to express their experiences, views, and ideas. The result of this study is expected to be very different compared to when using a patriarchal viewpoint that considers the value of women is lower than men.

RESULTS AND DISCUSSIONS

Women In Agro-Forestry

Indonesia, specifically Java, has a long story on women's activities related to agricultural and forest management. In colonial era, in Daendels teak forest management, women were only a 'cheerleader' in teak production and distribution (Pelluso, 1992). Agricultural activities on forest land were pioneered in reforestation program in 1873 with taungya or tumpangsari method. Pelluso (1992) described this method was worked as follows: after a forest area was clear-cut, local cultivators were sought to clean the rest of the land and plant teak seeds in certain measurement row. Between the rows, the planters could grow agricultural crops such as rice, corn, or tobacco for one and two years. The agricultural crops belong to the planters; they also receive a nominal

cash fee. They were allowed to collect fallen or dead wood. By 1912, 61% of reforestation in Java was done by tumpangsari; by 1928 the system share accounted for more than 94%.

By time, the tumpangsari or farming on forest land was changing. The dynamic practices affected by the dynamic social economy and culture process surrounding the forest community. Overall, there are several stages of cultivation of agricultural activities involving women workers. According to Dove (1988), in outside Java, stages of farming activities in the community Kantu in West Kalimantan consist of: (1) choosing field location, (2) cutting, (3) hewing, (4) burning, (5) planting, (6) weed, (7) maintaining, (8) harvesting, and (9) Transporting. While stages on farming or *ngahuma* Baduy (Iskandar, 1992), consist of: (1) land setting, (2) land preparation, (3) planting, (4) maintaining the plant, (5) harvesting, and (6) saving the crop.

Stages of farming activities are generally, though not a binding rule, distinguished by gender. For example, slashing and cutting down on Kantu tribe or setting up of the land is the work of men. While the work of planting and weeding or maintaining are the work of women. Although it is not impossible for women are also doing work that is considered men's work or vice versa. Dove (1988) also describes that the divisions of labor by sex in the fields, among them, based on the practice carried out by the community Kantu. This is evident in the statement: "...Even though both men and women carry out the weeding, the contribution given by the women obviously greater".

The quite critical review about gender in the management of dry land agriculture with agroforestry systems was undertaken by Christanty, et al in 1989. One of the outcomes of the study is about the distribution of labor between men and women based on the difficulty level type of work. The study implies that all types of very heavy work (*very demanding*) done by male, mild or moderate (*light/intermediate*) entirely and/or most by women.

Table 1. Gender Based Labour Division in Agroforestry

Type of Work	Labor			
	Christanty's		Wiyanti's	
	Male	Female	Male	Female
Opening Phase of Land				
Clean grass and dry leaves	√	√	√	√
Collect grass and leaves	√	√	√	√
Burning of grass and dead leaves (<i>ash</i> residue collected)	√	X	√	√
Taking and collecting small twigs and leaves of bamboo	√	X	√	√
Cutting down bamboo	√	X	√	√
Reversing the ground with a hoe	√	X	√	√
Collecting bamboo leaves in bamboo <i>stumps</i> , twigs used for firewood)	√	√	√	√
Burning of leaves and twigs of bamboo (<i>ash</i> residue collected with ash residue before)	√	X	√	√

Collecting and sorting bamboo	√	X	√	√
Transporting bamboo to house / market	√	X	√	√
Gardening Preparation Phase				
Hoeing	√	X	√	√
Sow the seeds of vegetables: cengek / leunca / tomato	X	√	√	√
Make holes for tuturus roay plantation	√	X	√	√

Type of Work	Labor			
	Christanty's		Wiyanti's	
	Male	Female	Male	Female
Plugging <i>tuturus</i> roay	√	X	√	√
Phase Gardening				
Plant	X	√	√	√
Hoeing	√	X	√	√
Make holes to plant roay seeds	√	X	√	X
Making sewerage	√	X	√	√
Giving manure	√	√	√	√
Fertilize	√	√	√	√
Weeding		√	√	√
Harvest Stage				
Harvest cucumbers	√	√	√	√
Harvest cengek / leunca / tomato	√	√	√	√
Harvest roay	√	√	√	√
Post-Harvest Stage				
Transporting the crop	√	X	√	√
Pod roay	√	√	X	√
Sell the harvest	√	√	√	√
Cooking	X	√	X	√

Source: Christanty (1989) and Wiyanti (2008)

Women have an important role in agro-ecosystem. They maintain the food production by managing forest land for sustainable food supply for household. In this case, women establish a sustainable practice of agro-ecosystem. Almost 20 years after Christanty's study in Soreang, labor division in agriculture was encountered an enormous change in my study (Table 1). Very demanding and demanding type of works were not only occupied by male farmers. The gender value that women were not able doing 'muscular' works broken down. Same thing occur in Clanjur (Table 2). Both men and women do every type of work in agroforestry.

Table 2. Gender Based Labor Division in Agroforestry (Cianjur)

Type of Work	Men	Women
Seeding Preparation	√	√
Clearing land and hoeing	√	√
Cultivating	√	√
Fertilizing	√	√
Weeding	√	√
watering (if needed)	√	√
Harvesting	√	√
harvest transport	√	√

Sumber: Survey, 2012

**Figure 1.** Post-harvesting activity**Figure 2.** Women doing "Men's" work

Another important role of women in agro-ecosystem is show in food production. They maintain the food production by managing forest land for sustainable food supply for household. In this case, women establish a sustainable practice of agro-ecosystem. Based on Christanty's (1989) and Wiyanti's (2008) study, both at the different era of study, women are the main stakeholder that preserve food for the family. The same case is also occurs in Cianjur, women are also the main subject in preserving food for the family.

Women Supporting Sustainable Agroforestry And Their Effect To The Climate Change

As one type of agricultural activities, agroforestry concerned as a type of sustainable agriculture. The FAO working definition of sustainable agriculture is a "Sustainable development is the management and conservation of the natural resources base and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development (in agriculture, forestry and fishery sectors) are conserves land, preserve water, plant and animal genetic resources, are environmentally non-degrading, technically appropriate, economically viable and socially acceptable" (FAO 1994). Sustainability in agriculture has to be defined with respect to systems (in our case agrarian systems) rather than doing singular analyses of input and output, because crop varieties and inputs produce nothing in isolation (Lynam and Herdt, 1989 in Herdt and Steiner 1995). Only when combined as components of a system do they produce output as they understand sustainability as a result of the relationship between technologies, inputs and management used on a particular resource base within a given socio-economic context, three aspects of systems spatial level, time, and the different dimensions have to be taken into account.

In spatial level, systems exist within a large range of space: global, regional, farm, field, individual plants and microscopic. Herdt and Steiner (1995) argue that this shows one of the major difficulties of the concept of sustainability and reinforces the need to define carefully the spatial dimension. The number of levels and their interconnections are part of the problem of determining when sustainability is an inherent property of a given system and when sustainability is so dependent on external forces that it can be most usefully examined at a higher-level system. In time, the idea of sustainability can only be seen in relation to a certain time period. Taking into account the time dimension is getting difficult considering that, the real world agricultural production systems are constantly changing. And in dimensions, usually three dimensions are mentioned, the biological/physical, the economic and the social dimensions. But actually, there are even more of them. The following points are of major importance for specifying the concept, for example Ethic dimension inter-generation fairness as an ethical concept for the future.

As seen at the site studied, the three dimension of sustainability in agroforestry practices are interrelated. The biological/physical dimensions were shown in the diversity of management of land that also supports the diversity of tree/crops type. The economic dimension pictured in the use of harvest that not only for subsistence purposes but also for commercial purpose. The social dimension, specific in this study, gender relation role of women is captured that the missing men partner increases the role of women in agroforestry practice.

On the socioeconomic side, it has been found that forest communities' vulnerability is based mainly on the lack of access to markets and the existence of migratory outflows resulting in a shortage of agricultural labor. Although villagers can obtain exploitation rights on the forest area the technical requirements for exploitation of national forests might become a barrier for local communities, therefore reducing their access to forests. In addition, only exploitation for subsistence is allowed in community forests. Nevertheless, the rural exodus reduces

pressure on natural resources, leaving a margin of resilience. The communities' weak social capital increases vulnerability. Customary institutions are not well developed and have few unknown management rights over forest. External institutions are not well established either. This results in a lack of community-level decision making being integrated into higher level decision-making processes. Political macro-decisions such as bans on kerosene as source of energy for household have direct and indirect negative impacts on rural livelihoods.

On the ecological side, vulnerability is framed by the status of natural resources and the impact of climate stimuli. Forest degradation limits community adaptive capacity in difficult periods. The most important climate change impacts are increased temperatures, torrential rains, and erratic/hanging rainfall patterns, and, to a lesser extent, strong winds. Farmers indicate that droughts are the major climatic threat, while torrential rains and a shift in the seasons are secondary. Drought can refer to different climatic conditions based on villagers' perceptions: late arrival of the rainy season, decrease of rainfall during the dry months, longer dry spells during the dry season; perception of drought can be also influenced by higher temperatures or decreased water flow in rivers.

Sustainable forest and agroforestry management within REDD+ which is setting simple management plans (SMPs) for community forests, should go through a legal procedure to ensure land performance for the community. The SMO will integrate REDD+ and adaptation, including the development of a management manual, and will be based on analyses of community vulnerability. The sustainable forest management within REDD+ improve of carbon stocks through selection of best practice and species for adaptation within stronger financial capital. The best practice of forest and agroforestry will also protect of water sources, emphasis on local species, improve of green corridors for fauna, establishing new income sources, food and health security, and secured forest tenure rights.

The agroforestry and tree domestication are establishing a tree nursery and distributing saplings among farmer, with the main species being those of edible and medicinal value. These practice increased carbon stocks due to tree domestication; protection against floods, strong wind and soil erosion; stronger financial capital emphasis on local

species; new income source, more secure crops; livelihood diversification, food and health security, diversification of forage sources for livestock.

CONCLUSION

Time after time, the role of women in food production in the household are sustain. Women still play important roles in this aspect. The same thing happens when they act as a key person in agroforestry. Maintain food supply for the family is the first target to achieve when women manage the agroforestry system.

The changing of agroforestry practices both in Soreang and Cianjur also provide examples of flexibility of women and gender roles to adjust environmental change, particularly in the agro-forestry system. Through their actions on agro-forest practices, new identities are emerging in the division of labor. In other words, gender based labor division in agroforestry are negotiable and can be change.

In ecological aspect, the increasing role of women in agroforestry management can be also a hope for the future of forest in Indonesia. As we noticed that people participation in forest management in Indonesia is one thing that we cannot avoid. As women became the important players, their participation and effort to sustain the forest under agroforestry practice, are also become very important.

Table 3. Disturbance-impact matrix (realized by a mixed group of men and women) 0=no impact; 5=very high impact; +=positive; -=negative

Exposure Unit	Impacts			
	Wind Storms	Torrential Rains	Changes in Rain Season	Rising Temperature
Agriculture	-2	-3	-1	-5
Hunting	-1	-4	-1	*2
Fishing	-1	-4	0	0
Population	-2	-3	0	-5
Trees	-2	-1	-1	*1
Livestock Farming	-2	-1	-3	0

Source: Obiang-Mbomio and Perez-Teran (2014)

Table 4. People Knowledge about Type of Services from Ecology in Cianjur (N=110)

Type of Services from Ecology	Kebun Talun		(Mixed) Talun		Talun Bamboo		Needle Leaf		Wide Leaf Forest		Forest	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
maintain food production	21.8	78.2	7.3	92.7	3.6	96.4	2.7	97.3	3.6	96.4	6.4	93.6
maintain water quality	30	70	27.5	72.5	38.2	61.8	49.1	50.9	48.2	51.8	59.1	40.9
maintain water quantity	29.1	70.9	27.5	72.5	37.3	62.7	46.4	53.6	48.2	51.8	59.1	40.9
maintain biodiversity	9.1	90.9	9.2	90.8	17.3	82.7	43.6	56.4	51.8	48.2	56.4	43.6
maintain the capacity of carbon storage	9.1	90.9	7.3	92.7	20.9	79.1	41.8	58.2	49.1	50.9	54.5	45.5
maintain soil erosion	25.5	74.5	22.9	77.1	48.2	51.8	45.5	54.5	47.3	52.7	52.7	47.3
maintain wild life habitat	10	90	15.6	84.4	21.8	78.2	40	60	41.8	58.2	55.5	44.5
maintain climate	25.5	74.5	25.7	74.3	35.5	64.5	44.5	55.5	48.2	51.8	50.9	49.1
maintain fiber production	10.9	89.1	21.8	78.2	32.7	67.3	33.6	66.4	30.9	69.1	40.9	59.1
maintain firewood production	37.3	62.7	33.6	66.4	56.4	43.6	32.7	67.3	36.4	63.6	30.9	69.1
maintain fodder production	23.6	76.4	23.6	76.4	30.9	69.1	22.7	77.3	20.9	79.1	22.7	77.3
maintain (family) heritage	27.3	72.7	26.4	73.6	37.3	62.7	2.7	97.3	1.8	98.2	0.9	99.1

Source: Survey, 2013

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