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INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/11511

DOI URL: <http://dx.doi.org/10.21474/IJAR01/11511>



RESEARCH ARTICLE

PRODUCTIVE CROP FARMING PATTERNS ON *DUSUNG* LAND IN AMBON ISLAND (CASE STUDY IN ALLANG VILLAGE, WEST LEIHITU DISTRICT AND HUTUMURI VILLAGE, SOUTH LETIMUR DISTRICT)

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Manuscript Info

Manuscript History

Received: 15 June 2020

Final Accepted: 17 July 2020

Published: August 2020

Key words:-

Dusung Productive Crop Farming
Patterns in Ambon Island

Abstract

The *dusung* farming pattern is the use of land by planting productive, economically valuable plants according to custom (culture-culture). *Dusung* farmers usually open land by planting short-term (3-9 months) types of plants in the form of vegetables and tubers, while long-term crops are planted continuously (1-5 years) as intercrops on the same land. Utilization of this land is carried out by always paying attention to the aspects of social sustainability and physical sustainability. Social preservation means that all family relatives depend on the long-term life they manage on the *dusung* land, while physical sustainability means that the long-term existence of plant species formed in the *dusung* land serves as a buffer for the ecosystem as well as the function of soil and water conservation that ensures the maintenance of the ecosystem in the *dusung* land. This encourages the author to conduct research that can provide an overview of the importance of maintaining the function of the *dusung* as an *wanatani* system (traditional agroforestry) which has always been maintained to this day.

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Introduction:-

Background:

The existence of rural communities with farming or farming activities has become a tradition and culture that have supported them throughout history. The type of farming still has an important role in supporting farmers. This is possible because the community's dependence on this sector is quite high, which is the people's agricultural business. In accordance with the geographical conditions of the archipelago and the capacity of the available land, the activities are developed for long-term plantation and forestry plants. Agroforestry in Indonesian is known as *Wanatani* which means planting trees on agricultural land (Luedeling et al., 2016). The pattern of agroforestry systems and forestry plant structures can be said to be a mixture of mixed garden systems and community forests carried out by farming communities by way of land tenure with the contribution of profitable crop products (Malamassam, 2007). Land as a natural resource has a role, among others, as a producer of agricultural commodities. The increase in population and basic needs has led to the need for a wider and more intensive agricultural area (Irmasari et al., 2018).

The potential for agroforestry can be seen from two aspects, namely the potential for vegetation that makes up agroforestry and the economic potential of agroforestry commodities. for the potential of vegetation that makes up

agroforestry by looking at timber forest products and non-timber forest products, while the economic potential is seen from the economic value of agroforestry products produced from existing agroforestry systems (Putra et al., 2020).

Agroforestry is the collective name for land use systems and technologies in which woody perennials (trees, shrubs, palms, bamboo, etc.) are deliberately used in the same land management unit as agricultural crops and / or animals, either in some form of spatial planning or temporal sequence (Newman, 2018). Agroforestry, the practice of integrating trees and other large woody perennials in agriculture and across the landscape, can be recognized as a useful and promising strategy that diversifies production for greater social, economic and environmental benefits (Atangana et al., 2014).

The farming system applied in the sample villages is still classified as subsistence, with the farming system being carried out as a sub system by prioritizing short-term and permanent food crops and shifting cultivation. The permanent farming system applied to local farming communities always uses the *dusung* farming pattern. This farming pattern is a tradition and culture that has been passed down from generation to generation and is still maintained and preserved by the local community. Local commodity crops that are cultivated are predominantly plantation / fruit types (cloves, nutmeg, cocoa, coconut, durian, *langsats*, *duku*, mangosteen) and various types of food and horticultural crops (tubers, vegetables and fruits). This long-term agroforestry practice will also increase biodiversity with the presence of various types of bird species for feed needs (Achmad et al., 2013).

This issue has led to increased interest in the potential of small-scale agroforestry systems to combine sustainable agriculture with biodiversity conservation, especially in rapidly developing tropical regions (Millang, 2015). In addition to providing natural resources (i.e. food, medicine, wood), agroforestry systems have the potential to sustain higher levels of biodiversity and greater biomass than crop systems or grasslands with lower diversity (Sistla et al., 2016). Responding to the importance of maintaining tree species that are identical to agricultural crops, land conservation plants and forests on land, it is necessary to look at the forms of *dusung* land use patterns in two different locations on Ambon Island, namely Allang Village and Hutumuri Village. application of silviculture so as to form a *dusung* ecosystem that has ecological and economic value, so it is necessary to carry out a continuous research study.

Research Problems:

Land use is always based on land characteristics and soil fertility levels that support crop productivity. Diversification mixes different areas to compare agroforestry performance and agricultural mosaic diversification strategies, taking into account the interaction effects of tree crops and economic and climatic uncertainties (Tscharntke et al., 2011). However, land use for farming purposes is carried out always considering the short-term and long-term economic value with traditional farming habits as a hereditary farming tradition (Sahureka&Talaohu, 2018). Observing this, how is the distribution of types of agricultural plants on *dusung* land owned by the community in Allang Village, West Leihitu District and Hutumuri Village, South Leitimur District, Ambon Island. Agroforestry has been suggested as a global solution to improve land use efficiency, while reducing environmental impacts and economic risks for farmers. Previous research has often focused on comparing tree crop combinations with monoculture farming, but agroforestry is rarely systematically compared to other forms of agriculture (Paul et al., 2017). In the context of this study, it is necessary to look at the distribution of plant species on *dusung* land both for plant types. cultivated or types of plants that grow independently during the ecological process and the amount of economic value obtained each time they produce.

Research Methods:-

Place and Location of Research:

The areas selected for the research were *dusung* land owned by farmers in Allang Village, Leihitu Barat District and Hutumuri Village in South Leitimur District. These two villages have advantages and disadvantages based on customary farming patterns.

Research Approach:

Survey quantitative research starts from problems, which consist of background problems, problem identification, and problem formulation. In the vegetation analysis, the problem faced is making squares (sample plots) in the field. Meanwhile, the method without sample plots is based on the sample unit in the form of a point which can be placed

in the field randomly or systematically. The selection of the sampling method used depends on the morphological conditions of the plant species and their distribution, the objectives of the study and the costs and labor available.

Types of Tools and Data Sources:

The qualifications of the tools used in data collection in the field include; Work maps (topography, slopes and land cover maps), rope sheets, and a set of computer software and a set of writing tools. Sources of data taken are species diversity, environmental / habitat conditions, vegetation structure of dusung patterns, dominant species, stratification and aspection (changes in vegetation due to seasons).

Data Collection Techniques:

Data collection was carried out by interview and observation methods and field surveys to determine the types of plants by making sample plots. Sampling plot technique. All plants in the observation transect were identified and classified based on the growth phase, namely seedlings, saplings, poles, and trees. (Paembonan et al., 2020). In-depth interviews (indept interview) using interview guidelines and questionnaires. The indept interview is used to collect data regarding the *dusung* farming pattern and the orientation of the applied management. In addition, a questionnaire based on New Environmental is also used.

Data Analysis:

The method used to analyze the orientation of dusung farming land management, is based on the criteria of individual values, social values, and environmental values. Individual value orientation (egotistical values), focuses on efforts to maximize individual income, by analyzing the type cultivated and the cropping pattern applied. Social (altruistic) values, namely values that reflect attention to the welfare of the group, are analyzed based on the objectives of land exploitation, social values related to the dusung farming pattern developed, and concern for solidarity and the development of groups or members of the community. Ecological (biosphere) values, namely values that emphasize environmental conservation efforts, are analyzed based on their perceptions, attitudes, and assessments regarding what ecological values need to be maintained in relation to *dusung* land use activities.

Results And Discussion:-

Forms of Community Ownership of Dusung Land in Allang and Hutumuri Villages:

In Maluku Province - eastern Indonesia, natural resources are managed under a set of locally established rules and regulations called *sasi*. *Sasi* has been around for over 400 years. It is embedded in local culture and based on customary law (*adat*). (Harkes&Novaczek, 2000).

The form of tenure / ownership of *dusung* or forest land in Allang and Hutumuri Villages is based on the division of tau or clan / fam houses that are in the soa or clan groups. This form of land tenure, according to (Welerubun, 2019), is a form of tenure based on a geonological territory, namely the dominance of land ownership including *dusung* land and forest from each tau / marga / fam house that is incorporated in a particular soa with a territorial division that is has been agreed based on the customs of each soa / clan. The form of control and ownership of the study location is illustrated as follows.

Table 1:- Forms of *Dusung* Land Tenure / Ownership in Allang and Hutumuri Villages.

Location	Ownership Form	Manage area (ha)	Types of Plants	<i>Dusung</i> Status
Allang	One's own	0,5 – 2	Fruits/spices	Dati
	Commons	5 – 25	Fruits/spices	Dati/Pusaka
	Village Owned/ Leased	5 – 10	Fruits/spices	Village
Hutumuri	One's own	0,5 – 1,5	Fruits/spices	Dati
	Commons	5 – 15	Fruits/spices	Dati/Pusaka
	Village Owned/ Leased	3 – 6	Fruits/spices	Village

Research Results (Processed).

Application of Silviculture and Farming Patterns with the Dusun System:

Agroforestry has been suggested as a global solution to improve land use efficiency, while reducing environmental impacts and economic risks for farmers. Much research has focused on comparing tree crop combinations with monoculture agriculture, but agroforestry is rarely compared systematically with other forms of land use diversification, including mosaic agriculture (Paul et al., 2017). The combination of the three components included in agroforestry is agroforestry or a combination of forestry components or activities (trees, shrubs, palms, bamboo, etc.) with agricultural and silvopasture components or a combination of forestry components or activities with livestock and agro-silvopasture or a combination of components or activities. agriculture with forestry and livestock / animals. Based on the results of field observations and interviews with farmers in both Allang and Hutumuri Villages, 3 forms of farming were determined in the *dusun* agroforestry system in both villages, which are presented in Table 2 below.

Table 2:- Dusun pattern farming activities in Allang and Hutumuri Villages.

Location	Farm Forms	Types of Plants	Planting form
Allang	Field Plants	Tubers (cassava, batatas, taro, eggplant, chili, papaya, katuk) banana and others	<i>Tumpangsari</i>
	Mixed Garden Plants	Banana, chocolate, salak, langsa, duku, pulai, rambutan, teak, samama, banana, lenggua, durian and others	<i>Tumpangsari</i> and Agroforest
	Monoculture Plants	Cloves, nutmeg, chocolate	<i>Tumpangsari</i> and Monoculture
Hutumuri	Field Plants	Tubers (cassava, batatas, taro, eggplant, chili, papaya, katuk, banana, corn and others	<i>Tumpangsari</i>
	Mixed Garden Plants	Coconut, banana, chocolate, langsa, duku, rambutan, walnuts, durian, kasawari, salawaku, durian and others	<i>Tumpangsari</i> and Agroforest
	Monoculture Plants	Chocolate, cloves, nutmeg, sago	<i>Tumpangsari</i> and Monoculture

Research Results (Processed)

Types of Local Commodity Plants:

The farming system applied in most of the sample villages is still classified as subsistence. The community's permanent farming system is known as *dusun* as a form of agroforestry in Maluku. Apart from providing natural resources (ie food, medicine, wood). This agroforestry system has stimulated increased interest and small-scale potential as a form of sustainable farming with biodiversity conservation, especially in rapidly developing tropical regions. (Ávalos-Sartorio & Blackman, 2010). In general, the agroforestry system in Allang and Hutumuri Villages has *dusun* land for long-lived (annual) crops, and land for food crops and horticulture. The area of annual crops is around 1-2 ha, while for vegetable and secondary crops it is 0.1-0.4 ha. Types of local commodities cultivated by *dusun* farmers are presented in the table below;

Table 3:- Types of Cultivated Plants and Orientation of Use of Their Production in the Research Area of Allang and Hutumuri Villages.

Location	Types of Plants Cultivated	Production Orientation
Allang	a. Food (peanuts, tubers, corn, bananas)	Selling and Consumption
	b. Fruits (Durian, langsat, duku, mango, mangosteen)	Selling and Consumption
	c. Plantation (cloves, nutmeg, coconut in)	Selling and Consumption

Hutumuri	a. Food (taro tubers, bananas)	Selling and Consumption
	b. Vegetables (mustard greens, spinach, kale, long beans)	Selling and Consumption
	c. Crocodiles (Durian, langsung, duku, mango, mangosteen, papaya, rambutan)	Selling and Consumption
	d. Plantation (deep coconut, cocoa)	Selling and Consumption

Research Results (Processed)

Types of Productive Plants with Dusung Pattern:

here are three components in agroforestry, namely forestry, agriculture and livestock. Agroforestry is known as agroforestry, which is planting tree species on agricultural land. The function of trees with deep roots and spreading intensively in the subsoil will reduce nutrient leaching both vertically and horizontally (Widianto et al., 2003). Multistrata agroforestry systems can prevent landslides by forming soil organic matter, improving soil structure, and making the soil more stable. The use of multistory agroforestry systems with various types of terraced canopy plants is considered as the right step to mitigate landslides due to the presence of dense and terraced tree canopy cover, excellent root systems, and ground cover in the form of grass and shrubs which are very important to avoid landslides (Rendra et al., 2016). The use of agroforestry in the study location has a variety of types of plants and can be found mostly from the coast to hills / mountains. The results of the identification of plant species in the *dusung* pattern in Allang and Hutumuri villages are shown in the following table.

Table 4:- Types of Plants in *Dusung* in Allang and Hutumuri Villages.

Growth Rate	Total Found	Dominant Type	Transect of Allang Village
Tree	20	Cloves, nutmeg, durian, sago, langsung, duku, gayang, walnut, bacang, cempedak, pulaka, titi, teak	
Poles	16	Chocolate, cloves, nutmeg, langsung, kedondong, guava bol, teak, samama, matoa, breadfruit, salawaku	I (Plot: 1-5)
Sapling	9	Chocolate, walnuts, nutmeg, salak, langsung, durian, walnuts, teak, titi, gayang, samama.	
Tree	28	Coconut, nutmeg, mangosteen, spices, durian, guava bol, lenggua, pulaka, siki	
Poles	8	Langsa, mangosteen, chocolate, forest nutmeg, matoa, balsa	II (Plot: 1-5)
Sapling	12	Langsa, chocolate, barking, titi, salawaku, nutmeg	
Tree	23	Coconut, nutmeg, mangosteen, spices, durian, guava bol, lenggua, pulaka, siki	
Poles	5	Langsa, mangosteen, chocolate, forest nutmeg, matoa, balsa	III (Plot: 1-5)
Sapling	12	Langsa, chocolate, barking, titi, salawaku, nutmeg	

Growth Rate	Total Found	Dominant Type	Transect of Hutumuri Village
Tree	27	Cloves, nutmeg, durian, sago, walnuts, salawaku, lenggua, titi, sago	

Seedling	10	Rambutan, cloves, nutmeg, salawaku, samama, pulaka	I (Plote 1-5)
Sapling	12	Chocolate, walnuts, nutmeg, titi, guava bol, lenggua	
Tree	14	Coconut, nutmeg, durian, samama, teak, pule, sago	
Seedling	4	Langsa, pule, salawaku, lenggua, forest guyawas	II (Plote 1-5)
Sapling	8	Langsa, chocolate, mahogany, pule	
Tree	12	Nutmeg, langsa, salawaku, durian, samama, lenggua	
Seedling	8	Nutmeg, langsa, duku, rambutan, cloves, pule	III (Plote 1-5)
Sapling	9	Langsa, chocolate, titi, teak, talk, breadfruit, salawaku	

Research Results (Processed).

The role of plant stratification in *dusung* systems on community owned land through tree cover can be understood as a combination and interaction of the various processes mentioned above. According to (Luedeling et al., 2016), tree-based land use systems are able to maintain flood mitigation capacity close to forest capacity, because different land use systems are able to provide different environmental services depending on the system itself and the way it is managed. The existence of the function and role of *dusung* as a form of agroforestry farming if managed properly and professionally will provide multiple benefits and can be developed for land conservation programs (reforestation and afforestation), ecological conservation (diversity of plant and animal species) and economic improvement of rural communities in Maluku (Mardiatmoko et al., 2014).

Conclusion:-

Utilization of land for *dusung* agroforestry is carried out conventionally by controlling land owned by private, family owned (*marga / soa*) and state / village property with an area varying from 0.5 to 10 ha. There are 3 (three) forms of land use in *dusung* agroforestry, namely field crops, mixed garden plants and monoculture crops. The stratification of the dominant plant species in *dusung* agroforestry varies considerably both for the types of plantation crops (perennial crops / fruits) and forestry plants (woody plants). Orientation of cultivated plants in *dusung* pattern agroforestry both for consumption and for sale to the market.

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