

The System of Shifting Cultivation Management of Dayak Ngaju Local Community in Central Kalimantan

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Abstract

The aim of this study is to identify the factors causing local communities to actively manage the system of shifting cultivation in Central Kalimantan. The research took place in Mantangai Tengah Village and Mantangai Hilir Village of Mantangai Sub-District, Kapuas Regency, Central Kalimantan Province. The location and sample of the research are determined by using the "purposive sampling" method. The total of respondents is 70 people consisting of 60 farmers and 10 key informants. There are primary and secondary data in this research. The descriptive qualitative method is used for the data analysis. The results showed that the management of shifting cultivation done by the local people has changed that in the early 2000 era, a settled cultivation management was applied. It can be concluded that the factors causing the change are population pressure, village development, and oil palm plantation development. These are the factors which narrow the space of the farming community to do shifting cultivation business. The rotation and fallow systems are no longer done because the fields have been managed throughout the year. However, it is known that the technology is still simple including the system of land preparation and processing using the burn method. Without any fertilization and intensive care, the burn method is considered effective and efficient in land preparation. This is also considered suitable for hetero-culture planting system. To have a settled cultivation system, such suitable technology for managing a dry land is required since the land is generally marginal and have a peat structure. This will possibly decrease the yield if it is practiced continuously.

Keywords: Shifting cultivation, Subsistence, Planting System, and Dayak Ngaju

I. INTRODUCTION

The shifting cultivation system is still a potential source of subsistence food source in Indonesia especially for the people of local dry land and hills including those in Central Kalimantan. Shifting cultivation is the tradition of local communities (indigenous peoples) to get food especially rice in a dry land. It is a form of land use managed by local communities with the system of rotation and fallow (temporary resting of land) which most of them aim to have a subsistence living. This research is based on Scott's subsistence theory (1989) that the management of shifting cultivation system of Dayak Ngaju local communities, particularly farmers, is an attempt to meet the main food needs on a basis for non-profit living and managed throughout the year.

The general concept of shifting cultivation as defined by some experts is a form of land use between the resources of poor people conducted with rotation and fallow system in the same unit of land. This is generally done in dryland zones seasonally. Shifting cultivation is also an agricultural activity in many parts of the tropical agricultural border which is practiced as a subsistence farming way. This practice consists of cutting and burning (Slash and Burn) the natural vegetation at the end of the dry season in which the cultivation begins on the rainy season and the harvest will complete at the end of the rainy season (Hossain 2011; Grogan *et al.*, 2012; Culas 2013; Pestorini *et.al* 2013).

Some studies illustrate the management of shifting cultivation system as a form of traditional activity done by tribal people around the world. It is the most ancient farming system as a survival scenario of past societies. Shifting cultivation has various terms in the world, among others; *Hoe and Burn*, *Slash and Burn*, and *Jhum* cultivation. This cultivation system is a common practice in agriculture and intrigue related to social or humanities institutions. It is a traditional farming practice in most tropical regions of the world and has the potential to provide food for people in tropical regions. In general, shifting cultivation is

accounted for almost 86% of the total cultivation area in Asia making it more suitable to represent the traditional agriculture system in Southeast Asia. (Mero *et. al* 2012; Saha *et. al* 2013; Patel *et. al* 2013; Li *et. al* 2014; Magnuszewski *et. al* 2015).

Although technically and economically the shifting cultivation business is inefficient because it is not productive for financial gain, this is in line with the results of a study showing that shifting cultivation is still a patchwork knowledge related to important elements such as areas and the people involved that have not been well documented. Unsustainable farming systems are associated with social, economic, political and cultural changes that affect the communities. This is also related to the negative impacts on the environment that the socio-cultural factors of the actors need to be taken into consideration, the conversion of forests into grasslands as a result of an increasing process of burning in the last 10 years, as well as a short fallow time which caused the decline of biodiversity conservation (Mertz *et. al* 2009; Robiglio *et. al* 2011; Filho *et. al* 2013; Talaohu, 2013; Vliet *et. al* 2013).

Based on the data from the Central Bureau of Statistics of Central Kalimantan in 2017, the potential area of dry land in Central Kalimantan reaches more than 2 million hectares. The land area that is used as paddy fields by the people in Central Kalimantan is 85,654 hectares in a total production of 177,732 tons with the productivity per hectare of 2 tons. As for an example, Kapuas Regency has 10,494 hectares area of dry land with 3,884 hectares of paddy fields. The total production rate in Kapuas is 10,262 tons with a productivity that reaches 26.42 tons per hectare. By that, the cultivation management is still potential to be the main food source for the local people in Central Kalimantan.

The problem of shifting cultivation has always been linked to global, national, and local issues as the cause of forest and land fires in which the increasingly complex problem is in relation to government policies on banning forest and land fires. This shifting cultivation system is a potential agricultural business as a source of food producers which needs the right solution in the management so that the potential and actual gap can be overcome for local people, especially in Central Kalimantan. This is in line with Carmenta *et al.* (2013) that the problems in slash and burn activity in the shifting cultivation system is the land and forest fire in concern with the involvement of local communities with small-scale enterprises which use fire in the business. Therefore, the government's policy needs to be evaluated to develop a better alignment between the fire policies with small agricultural practices. The objective of this study is to identify the management of shifting cultivation done by the local people in Central Kalimantan.

II. RESEARCH METHODS

2.1. Research Sites

The research was conducted in the area of Mantangai Tengah Village and Mantangai Hilir Village, Mantangai District, Kapuas Regency, Central Kalimantan Province. There is still a lot of active local farmers in this area. The level of community education is still low which about 52% of them only graduated from elementary school. They also have an average low income which is IDR 25,000-27,000 per day. This area is tropical and humid in between 60%-90% with a temperature of 21°-23°C. It has a moderate sunlight intensity with a rainfall in between 1000-2600 mm/year. The highest rainfall occurs in October-March while the lowest rainfall happens in June-August.

The topography is relatively flat with an altitude between 0-28m above sea level with the slope of the land ranging from 0-18%. The managed soil and farmland conditions are fine-to-medium-textured alluvial soils in general. It has a peat typology and acid-sulfate soils. The peat thickness of the soil ranges from 0-50 cm in type B to C and D consisting of deep peat and shallow peat. The degree of acidity (*pH*) of the soil ranges from 3.5 to 5.5 so that the tillage needs to be done carefully. In order to reduce the level of soil acidity, it is necessary to calcify the land so that it can be processed by farmers. The study was conducted for 12 months from May 2017 to May 2018.

2.2. Data Collection

The sample was determined by taking 70 people with purposive sampling method (Rianti, 2014) consisting of 60 farmers and 10 key informants. The criteria of the population is a native and a farmer in Dayak Ngaju so that the data about the condition of shifting cultivation in the area can be well received. The primary data comes from farmers while the secondary data comes from The Department of Agriculture, The Department of Food Crop, and The Central Bureau of Statistics as well as related institutions in Regency and Province of Central Kalimantan. The method of data collection was performed by using surveys, observations, and interviews with questionnaires based on the time, activities, patterns of crops, and types of commodities. The data collection was done with the survey, observation, and interview which was also used in several studies (Matinahoru 2013; Sairdekut *et.al* 2013).

2.3. Data Analysis

The method of data analysis was carried out by tabulating the data in which the results will be described with qualitative descriptive technique (Adijaya 2012; Jupir 2013). The data emphasized the socio-economic condition of the farming communities associated with: the identification of factors causing local communities to conduct shifting cultivation system, the way to perform shifting cultivation system, and the current condition of shifting cultivation system management in Central Kalimantan.

III. RESULTS AND DISCUSSION

3.1. Identification Based On Activity and Time

The results of the identification in this study indicate that the shifting cultivation system in Dayak Ngaju community, Central Kalimantan is still done by local communities with a total active population of 1,097 households in a total area of 3,556 hectares and an average production of 2 tons per hectare. With rice crops as the main commodity, this cultivation system is intended to fulfill the needs of food or subsistence of life. From the planting process until the harvest, the management system takes place only once a year. Kafle (2011) said that shifting cultivation is a traditional form of land use that the majority of its use is for households subsistence living. Today, it is known that this practice is in transition along with the increasing population of farmers and with the shifting demand. It is widely used to produce food for the family.

The production process of paddy fields begins in April and ends in the next April which is also known as *Asep* (April-September). This technique is particularly done for rice crops. As for the other crops which grow in the field, the crops will grow and develop in accordance with the natural conditions. This process is shown in Table I as follows:

Table I. The Identification of Shifting Cultivation Management Process Based on the Activity and Time of Implementation within One Year of Paddy Field Production.

Time	Activity and Process in Activity
April	Land Search *) . The cultivators go into the forest looking for suitable land for farming
April-May	Land Clearing **) . Cultivators cleared the forests on a limited basis, only 1-2 hectares by cutting trees and shrubs to clear the land.
June-July	Land Cleaning and Processing ***) . The cultivators clear the land by burning twigs and collect the big chunks to be used as materials for the lodge. Before burning, the cultivators will create firebreaks by digging the land around 1 to 2 meters width so that the fire does not burn other people's land.
August	Hut Making (temporary storage house****) . The hut or cottage is made from big wooden chunks from the logging. The hut has used a shelter and a place to temporarily collect and store the harvest.
September	Planting (<i>menugal</i>) . Rice cultivation is done communally in a cultivation community within a village with a simple technology such as wooden slats to make planting holes.
October-March	Maintenance . Technically, there is no intensive maintenance process as it is generally allowed to grow by itself. It grows without fertilization and without watering, only by virtue of nature.
March-April	Harvest. Harvesting is done communally because the harvest is generally identical to the party ceremony. The party is generally opened with a prayer and followed with eating together as a gratitude for God Almighty.

April	In the harvest management, there is only drying and storage for the needs of family food.
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Source: Primary Data of 2017-2018

Description: *) until *****) this process is only done once during the first opening of a field or the first year of opening.

The field is a dry land managed for one year of production to produce foods especially rice. The activity of shifting cultivation in the first year of land clearing begins with the clearing of shrubs and then the land is allowed to dry to be followed with the burning process. Subsequently, the land will be planted with the *tugal* system. The preparation activity starts from April to July and then the process of hut making and planting (*menugal*) begins in August and September. The process of waiting for harvest is generally carried out from March to April depending on the type of rice seeds. The activity of land clearing up to the making of the hut is only done in the first year of management. The subsequent management will only need the process of land clearing, land burning, and harvest until the third year. Furthermore, the land will be left behind and the cultivators will look for new land. The land will be left alone until rubber and other crops will grow on its own by the virtue of nature.

The previous studies conducted by Karthik *et.al* (2009) and Wangpakapattanawong *et.al* (2010) proved that shifting cultivation is a forest agrarian system which has been widely practiced by the hill community in Asia, Africa, and Latin America since the Neolithic period (13,000 to 3,000 BC). This is characterized by a cultivation phase through primary or secondary forest clearing for one to three years followed by a fallow phase to enable the restoration of soil fertility. In the land use system, forests will be felled (February) and burned (March) and planted with *gogo* rice or mixed crops (May-October/November). This will be cultivated for a year or more and then will leave a fallow for secondary forest regeneration and restoration of soil fertility as well as succession through several stages.

3.2. Identification Based on Planting Pattern

The farming activities for local communities are not just merely managing a land but as an effort of food security by diversifying the crops on the land. This has been done from generation to generation from their predecessors. This is reflected in the pattern of planting and business commodities as illustrated in this following Table II:

Table II. The Identification of Shifting Cultivation Management Based on Planting Patterns and Commodities Cultivated Annually for 4 Years Until the Next Period of Rotation and Fallow.

Time	Planting Pattern
Year -1	Food Crops-Vegetables- Horticulture- Fruit-Rubber
Year-2	Food Crops-Vegetables- Horticulture- Fruit-Rubber
Year-3	Food Crops-Vegetables- Horticulture- Fruit-Rubber
Year-4	Vegetables- Horticulture-Fruit-Rubber
Subsequent year Entering the rotation and fallow period (Minimum of 5 to 10 Years)- Period of tree enlargement	1. Fruits-rubber-other hardwood plants (<i>Galam, mahang, karamunting, fern type (kalakai, paku), pawah (teki), Tingen (alang-alang)</i>) 2. Rubber and <i>sengon</i> have started to enter the period of tapping (rubber plants can be tapped)
Subsequent year (> 10 Years)- rubber production period*)	Rubber, <i>Sengon</i> , and some fruit trees are allowed to grow and rubber plants have become an effort to make money

Source: Primary Data of 2017-2018

Description: *) after > 10 years, farmers only cultivate rubber (as an income) and several types of fruit (only a few).

The characteristic of the plants in the first year to the third year is still varied, but the number and variety will be decreased after entering the fourth year and continues until the next fallow and rotation. This is caused by the rubber plants which have begun to grow big and cover the sunlight which means the land is no longer productive to be used in paddy fields. This condition will decrease the commodity in the fifth year and so on because the rubber plants will enter the phase of enlargement and tapping period. The fallow and rotation period had been done at the beginning of the fifth year meaning that the cultivators had already cleared new land in which, generally, the location will not be far from the previous field. Grogan *et. al* (2013) told that the traditional shifting cultivation system remains an essential component of livelihood strategies throughout the region even

in households engaged in commercial practices where the traditional system continues to provide a form of food security and increases the income of farmers.

3.3. Identification Based On Variety of Business Commodity

The variety of crops managed in the fields depends on the habits and desires of the cultivators. Generally, it is in the form of crops, vegetables, and horticulture managed together in one area. This can be seen in the Table III below:

Table III. The Identification of Shifting Management Process Based on the Variety of Cultivated Commodities in a 4 Years Period Until the Next Rotation and Fallow Period.

Variety of Cultivated	Commodities
Main Food Crops	Local rice type: <i>Nampui, Sintang, Garagai, Manyahi</i>
Other Food Crops	Corn, Taro, Cassava, Sweet Putato
Vegetables/Horticulture	Eggplant, Cucumber, Summer Squash, Bird's eye chili, <i>Katuk</i>
Spices/Rhizomes	Ginger, Turmeric, Lemon Grass, Galangal, <i>Kaempferia galanga</i>
Fruits	Coconut, Palm, Jackfruit, <i>Cempedak, Rambutan, Pineapple, Banana</i>
Woods	<i>Galam, Mahang, Karamunting, Fern (kalakai, paku), Alang-alang (Tingen), Rumpu Teki (Pawah), sengan</i>
Woods and Latex	Rubber ^{*)}

Source: Primary Data of 2017-2018

Description: ^{*)} After 10 Years, all types of food crops and wood trees will naturally die from not being able to compete with the rubber plants.

The types of commodity cultivated include short-term crops such as food crops, vegetables, and horticulture crops (corn, tubers, several types of eggplants, and spices) as well as long-term crops that become the characteristic of crops cultivation for food availability and family food security for an active production period of 1-4 years. This also indicates that the management of the shifting cultivation system is an effort of adaptation and food security for one year. It is reflected by the variety of crops that are planted, developed, and cultivated by the cultivators to meet the needs of the family. On the other hand, rubber plants and woods generally serve merely as an income of money for the family. Rubber plants are considered as family assets as well as a marker of legal ownership rights because the one entitled to tap the rubber plants and land with all its contents is the owner. Having an old period of harvest does not mean that the land is not cultivated but the productive crops planted this time are rubber plants, hard trees, and fruits. Those crops are functioned as a source of money.

In line with Takeuchi (2010) that shifting cultivation is a traditional agricultural practice often performed in tropical forests by integrating short planting phases (fallow) and long rotation phases. In the short planting phase, farmers grow rice and vegetables to sustain the balance of shifting cultivators' needs while in the long rotation phase, farmers would plant hard trees and fruits.

CONCLUSION

The management of shifting cultivation is the traditional farming pattern of the Dayak Ngaju community in particular and the Dayak community of Central Kalimantan in general. Traditionally, it is done only to produce food for the family. In contrast, rubbers and other plants serve as a proof of ownership and a source of money to buy goods that farmers cannot produce by themselves. The results show that shifting cultivation activity with the slash-and-burn system is not the cause of forest and land fires because of the burned land only 1 to 2 hectares. There are firebreaks and the burning time is approximately 3 hours. The burning process is carried out communally and together. Traditionally, the extensive way of management is intended to fulfill the needs of foods for the family.

The results of this study provide an illustration that the location of the research is a relatively flat topography, has peat structure and contains poor nutrients. However, the area already has a canal on the sides of the land so that it changes the land use. The local communities manage the land throughout the year with the settled system without fallow and rotation. This has caused

an intensification of land to produce foods for the family. Although it is used intensively, its management still based on subsistence with a variety of plants that are potentially developed economically. However, it is known that rice is the most dominating food crops to be produced by the settled cultivators. There are other crops such as corns, beans, eggplants, peppers, cucumbers, squash, and tomatoes. Those are also intensively managed by farmers with the hetero-cultural system. Some of them also plant *sengon* trees along the sides of the land as a source of money.

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ABBREVIATION

Dayak Ngaju : Dayak sub-ethnic in Central Kalimantan Indonesia

Subsistence: Land management that is limited only to the needs of farmers' family

Extensive: Limited land to a maximum of 2 Ha per family

Hetero-culture : Varied managed crops (more than two types of commodities in one growing field)

Agroforestry : A mixed land management system between seasonal crops (short term) and annual crops (long term)

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