Transformation of the Palm Oil System in the Conservation Village in Riau, Indonesia

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Abstract: Sultan Syarif Hasyim Forest Park is one of the protected areas in Riau Province - Indonesia, which is currently in critical condition due to illegal conversion, particularly into monoculture palm oil plantations. In order to recover the forest, a necessary approach that combines conservation and community empowerment is needed. One of it is through the concept application of village-based conservation that based on planting agro forestry patterns. The purpose of this study was to determine the farmers strategy in adopt agro forestry systems that developed to replace palm oil monoculture. The data collection included the distribution of questionnaires, observation, and direct involvement of researchers in the processes of rural development of conservation. The research conducted in Minas Jaya village, Riau Province, on February - July 2017. The strategy implemented by farmers to adopt agro forestry system is set the result of pattern harvest plan by selecting a combination of the commodities types in accordance with the purpose.

Keywords: Village conservation, agroforestry, Tahura SSH, palm oil monocultures

1. Introduction

Sultan Syarif Hasyim Forest Park (a.k.a. Tahura SSH) is one of the protected areas in Riau Province - Indonesia, which is currently in critical condition due to encroachment, illegal logging and other issues. Of the total area of 6,172 ha, two-thirds has been turned into palm oil plantation and small portion became degraded land. Some reason why the people encroach the state forest area easily because the lack of effective organization management at site level and the establishment of state forest status in the region has not been completed until now. Besides that people living near protected areas will access illegally to the forest because of the lack of economic opportunities. In developing countries such as Indonesia, deforestation is often caused by social factors, economic, and cultural. Such conditions above requires well-planned and comprehensive treatment, also the cooperation of various parties, such as local government, security forces, the private sector, universities and communities around the villages in the area. One of the nearer villages to the Tahura SSH is Minas Jaya Village Siak. The result from Lancang Kuning University community service interview with a number of community members, they showed positive response to develop a conservation village program. So does the government that represented by Minas Jaya head chief village and manager of Forest Management Unit of Minas Tahura.

Conservation Villages concept is stated in Minister of Forestry Number: P8/Menhut-II/2013 on General Guidelines for Forestry Development of Rural Community-Based Conservation. The purpose of the rural development of conservation is to (1) encourage the society in Minas Jaya village, especially Kampung Meranti awareness, insights, and psychomotor aspects of environmental conservation. One of the targets is to transform monoculture palm oil plantations into agro forestry land. Agro forestry type ranging from simple agro forestry to the complex agro forestry that combines the management of many species of trees with various types of crops, and even with livestock or fisheries, and the development of non-timber forest products featured include honey, bamboo, rattan and agar wood [9, 10]; (2) facilitating the right of public access to forests state to other land uses and non-timber forest products; and (3) mediate the relations of collaborative multi-stakeholders.
Based on the experience of the implementation of conservation programs in rural villages around Bukit Barisan Selatan National Park, the community empowerment through conservation village models tend to reduce the activity of the people to destroy the forest. Same as the result of the research at the National Park Mountain Trench, West Kalimantan. In other words the society will prefer conservative opportunities if provided alternative livelihood. Even through the China State PES incentive policy since 1999 has been able to convert cropland into forestland of 28 million hectares. Along with the efforts to protect the implementation of rural development programs of conservation through community empowerment agroforestry that conducted by three groups of farmers in the village of Minas Jaya, the research was also conducted. The purpose of this study was to determine the strategy of farmers to adopt agro forestry systems developed in palm oil plantations that planted as a monoculture, in order to achieve the common goal of conservation rural development.

2. Method

The research team conducted the research while directly involved in the processes of mentoring farmer group in community development programs of rural development conservation scheme in Kampung Meranti, Village Minas Jaya, Minas, Siak , Riau Province - Indonesia. Thus, this research belongs to action research. The study was conducted in February - July 2017.

In order to plan community development interventions, at an early stage researchers performed basic identification character of farmer group partners, social capital, the types of plants that grow well in the study site, the types of farm animals can be developed, the types of training and support tools needed. The data were collected by distributing questionnaires. The respondents were drawn semi-purposive of 3 farmer groups namely Siak Smart Farmers Group, Farmers Group Tunas Maju and Meranti Prosperous Farmers Group, 14 people are members of the 36 people overall. The collecting data about how farmer groups propose alternative options, make decisions, manage the implementation of the work and carry out the work were done by direct observation during research team in processes. Furthermore, the data were analyzed descriptively by using theoretical analysis framework of the adoption of farming systems.

The adoption in the process of community empowerment is defined as the process of behavior change either in the form of knowledge, attitudes and skills in a person having received the innovation delivered by the instructor. In the adoption process, there are stages before the public will accept or reject the innovation. The stages of adoption that is (1) awareness, the object became aware of the innovations offered by the instructor; (2) interest, namely the growth of interest are often characterized by the desire to ask questions or to learn more about everything related to the innovations offered by the instructor; (3) evaluation, the assessment of the good / bad or innovations that the benefits already known in more complete information. In this assessment, the target communities not only to evaluate the technical aspects, but also economic, social and cultural aspects; (4) the trial or small scale try-out for a more convincing judgment, before applying for a wider scale; and (5) adoption or implementation with confidence based on the assessment and trials that have been done alone.

The pace of adoption was influenced by several factors, including (1) the nature of innovation itself. At least five characteristics that affect the rate of innovation adoption rate by farmers objectives, which is (a) the relative advantage means an innovation will be ready to accept by the targeted farmers if these innovations are economically profitable; (b) compatibility means that an innovation will be more readily accepted by farmers if in suitable with social norms, experience of previous farmer and farmer's needs; (c) complexity, which means an elusive innovation and farmers are not easily adopting compared to the innovation that is easily understood and used by farmers; (d) Triabilitaty indicates the ability of innovation to be tried on a small scale; and (e) observation, the ability of innovation to generate output that can be viewed by others.

Other than influenced by the characteristics of his own innovations, the speed of adoption for an innovation results were also affected by target communities and the instructor or companion. When
in the target community there are a number of individuals who have good mindset, have a social environment area, high education, and being a figures in the middle of the group or often called as an innovator, then the individual will be a good start for adopting an innovation. How decisions were made in adopting an innovation will also affect the pace of adoption. If the adoption decision made in person usually will be faster rather than shared decision-making. Changes can happen whenever there is a decision to make a change. Besides that, the speed of adoption is also determined by the instructor activity, especially on how to promote the innovation. The more convincing the instructor offers innovation, the adoption process will be sooner. And also when the instructor able to communicate effectively with the target group.

3. Results and Discussion

The result of the development programs implementation in Minas Jaya conservation village can be divided into two phases: (1) The Planning Phase, and (2) Implementation.

3.1 Planning Phase

In the planning phase, researchers conducted basic identification of farmer group partners’ characteristics, social capital, the types of plants that grow well in the study site, the types of animals that can be developed, the types of training and support tools needed. The purpose of these aspects is as a basic for designing plans and strategies for the conservation village program based agro forestry activities. Basic characteristic data partners farmer group members are shown in Table 1.

| NO | Respondents     | Sex | Age | EDUCATION LEVEL | Occupation                  |
|----|-----------------|-----|-----|-----------------|-----------------------------|
| 1  | Respondent 1    | M   | 46  | Bachelor        | Private employee            |
| 2  | Respondents 2   | M   | 46  | Junior High     | Honorary state employee     |
| 3  | Respondent 3    | M   | 34  | Elementary      | Farmer                      |
| 4  | Respondents 4   | M   | 58  | Junior          | Trader                      |
| 5  | Respondents 5   | M   | 67  | Bachelor        | Farmer                      |
| 6  | Respondents 6   | M   | 47  | Senior high     | Farmer                      |
| 7  | Respondents 7   | M   | 50  | Bachelor        | Farmer                      |
| 8  | Respondents 8   | M   | 49  | Senior high     | Farmer                      |
| 9  | Respondents 9   | M   | 44  | Senior high     | Private employee            |
| 10 | Respondents 10  | M   | 44  | Senior high     | Private employee            |
| 11 | respondents 11  | M   | 45  | Senior high     | Trader                      |
| 12 | respondents 12  | M   | 48  | Not school      | Farmer                      |
| 13 | respondents 13  | M   | 66  | Elementary      | Farmer                      |
| 14 | respondents 14  | M   | 27  | Bachelor        | Private employee            |

Based on the data in table 1, all the respondents are male. Age of respondents ranged between 27-67 years, but the majority are in the range age 44-50 years. The age range is often seen as physical
age that is still productive, and from the aspect of practice has had considerable practical experience. The education level of respondents there are 4 people graduate, and then 5 people from high school, 2 from junior high schools, 2 from elementary schools, and one person not attending school at all. The structures of the respondents’ education level are ideal with 4 people graduated from university level and the rest of high school until not attending school at all. The main job of respondents majority are farming, 7 people are farmer, then others are private company employees, merchants, and honorary civil servants. Furthermore, the condition of social capital owned by the people in Kampung Meranti can be represented by three aspects, namely (a) the existence of community leader in becomes leader, (b) the level of trust and obedience member to the leader, and (c) The level of solidarity in the community.

Table 2. Social Capital owned by the Conservation Village program partners

| NO | Respondents       | The existence of community leaders | The level of trust and obedience to the leader | Solidarity Level |
|----|-------------------|-----------------------------------|-----------------------------------------------|------------------|
|    |                   | Have | Not Have | High | Medi um | Low | High | Medi um | Low |
| 1  | Respondent 1      | v    | v        | v    | v       | v   | v    | v       | v   |
| 2  | Respondent 2      | v    | v        | v    | v       | v   | v    | v       | v   |
| 3  | Respondent 3      | v    | v        | v    | v       | v   | v    | v       | v   |
| 4  | Respondent 4      | v    | v        | v    | v       | v   | v    | v       | v   |
| 5  | Respondent 5      | v    | v        | v    | v       | v   | v    | v       | v   |
| 6  | Respondent 6      | v    | v        | v    | v       | v   | v    | v       | v   |
| 7  | Respondent 7      | v    | v        | v    | v       | v   | v    | v       | v   |
| 8  | Respondent 8      | v    | v        | v    | v       | v   | v    | v       | v   |
| 9  | Respondent 9      | v    | v        | v    | v       | v   | v    | v       | v   |
| 10 | Respondent 10     | v    | v        | v    | v       | v   | v    | v       | v   |
| 11 | Respondent 11     | v    | v        | v    | v       | v   | v    | v       | v   |
| 12 | Respondent 12     | v    | v        | v    | v       | v   | v    | v       | v   |
| 13 | Respondent 13     | v    | v        | v    | v       | v   | v    | v       | v   |
| 14 | Respondent 14     | v    | v        | v    | v       | v   | v    | v       | v   |
|    | Total             | 13   | 1        | 8    | 6       | 0   | 8    | 4       | 2   |
|    | Percentage        | 93   | 7        | 57   | 43      | 0   | -57  | 29      | 14  |

Based on the data in table 2 almost all respondents (93 %) stated that in Kampung Meranti society there are a number of public figures who became their leader. The level of trust and obedience to the leaders relatively good, 57% expressed "high", and 43% said "moderate". Also the level of solidarity is relatively good, 57% expressed a "high", 29% said "moderate" and 14% said "low". Thus, the general conditions of the people in Kampung Meranti social capital represented by these three
aspects are close to good. Van Rijn obtain a large and significant association between an aggregate measure of social capital and the adoption of agricultural innovations by farmers.

In Table 3, show the types of plants that grow well in Kampung Meranti. The plant types are classified into seven groups. Group of fruit is including cacao, jackfruit, durian, banana, petai, papaya, jengkol, orange, soursop, and more several others. Group of crops include sweet corn, cassava, sweet potato, taro, watermelon, and peanuts. Groups of vegetables include spinach, kale, eggplant, beans, cucumbers, squash, basil, lettuce, celery, and some other types.

Table 3. Types of Crop that Grow Well in Kampung Meranti

| NO | NAME       | Fruit Trees | Hevea Palm Oil | crops | Pepper | Chili | Vegetables |
|----|------------|-------------|----------------|-------|--------|-------|------------|
| 1  | Respondent 1 | V           | V              | V     | V      |       |            |
| 2  | Respondents 2|             |                | V     |        |       |            |
| 3  | Respondent 3 | V           |                | V     |        |       |            |
| 4  | Respondent 4 | V           | V              | V     |        |       |            |
| 5  | respondents 5| V           | V              | V     |        |       |            |
| 6  | respondents 6|             |                | V     | V      |       |            |
| 7  | respondents 7| V           | V              | V     | V      |       |            |
| 8  | respondents 8|             |                | V     |        | V     |            |
| 9  | respondents 9|             |                | V     |        | V     |            |
| 10 | respondents 10|           |                | V     | V      | V     |            |
| 11 | respondents 11|           |                | V     | V      | V     |            |
| 12 | respondents 12|           |                | V     | V      | V     |            |
| 13 | respondents 13|           |                | V     | V      | V     |            |
| 14 | Respondents 14|           |                | V     |        |       |            |
|    | Total       | 8           | 5              | 7     | 4      | 3     | 5          |
|    | Percentage  | 57          | 36             | 50    | 29     | 21    | 36         |

Based on the data in table 3 it can be seen that basically all seven types of plants can grow well in Kampung Meranti. Soil fertility level and agro climate aspect provide adequate support for the growth of these plant species. Furthermore, the data collection was also conducted to determine the types of animals that thrive well in Kampung Meranti. Based on information from the farmers, it is showed that chickens, ducks, goats, cows and buffalo live well in Kampung Meranti. Even some of the members have long experience in raising goats and cattle. Ruminants rearing animals in Kampung Meranti supported by the availability of grass much as the feed material. Moreover, data collection was conducted to determine the types of training required by farmer groups. There are 10 types of training suggested by members of farmer groups, including: training of agro-forestry, cultivation of fruit trees, nurseries of superior plants, organic fertilizer production, integrated pest management, manufacturing pesticide plant, goat farming, fish hatcheries, beekeeping and mushroom cultivation.
Based on the data collected in the table 1-3, and additional information such as the types of animals that thrive well in Kampung Meranti, as well as infrastructure needs and the types of training, the next is designing an agro forestry plan cultivation pattern. As an example, the respondent 1 agreed to begin planting varieties of fruits on a palm oil plantation area belonging to respondent 1 for 3 hectares. Respondent 1 stated a decisive willing to replace the palm oil crops with fruit trees agro forestry in order to improve environmental quality. However, the efforts to improving should not ignoring the economical aspects, therefore the respondent 1 also suggested the types of fruit which is considered to have good prospects of economic value. It was agreed the types of fruit trees to be planted are 9, which is banana, jengkol, durian, jackfruit, soursop, lime, lemon, rubber, and matoa. In addition, the livestock was agreed would raise goats.

Respondent 1 in Kampung Meranti is one of informal influential leaders. The level of education is bachelor. In the structure of the society the respondent served as chairman or RW. In the farmers’ group the respondent served as chairman of the farmer groups Siak Smart, the respondent also NGO activists who had worked in the WWF with the focus on the field of elephant conservation. In the last year were working in PT Indonesian Ecosystem Restoration in Jambi to handle the empowerment of agro forestry. Thus the first respondent was the most influential and has best knowledge of conservation and agro forestry among all group members partner. Therefore, respondent 1 is an entrance for the public service of the escort team Lancang Kuning University who is also a researcher in this study, to introduce the concept of conservation to the community village in Kampung Meranti.

At the practical level, the level of the leadership usually held by respondents 6 and 7. Respondents 6 is chairman of Tunas Maju group, and respondent 7 is chairman of Meranti Sejahtera group. Respondent 6 also having a long farming experience and supported by the current position which serves as chairman or RT. Respondents 7 is the former chairman or RT in different areas last year.

3.2 Implementation Phase

Phase of the program conservation village can be divided into four groups of activities that support each other, such as (1) the activities of Socialization and Trainings, (2) the activities of planting plants Fruits, (3) The activities of breeding goats, and (4) Fostering good relationships with government personnel.

(1) Socialization and trainings

Lancang Kuning University assistance team did socialization about the concept of agro-based conservation village to farmers groups’ partner. To reassure them, the team making an example of the calculations of agro forestry economical value compared with monoculture palm oil planting. For example, an alternative one, in a single hectare of palm oil planted with a spacing of 9 x 9 m, will include 143 trees. Take an example, a producing palm oil income on average is Rp. 2 million / ha / month, or an average per tree Rp. 14,000 / month. Another example from farmers’ own experiences there were planted jengkol and several other species, when planting jengkol with equal space like to the palm, the harvest of one jengkol tree can make money Rp. 1 - 1.5 million (simplified to Rp. 1.2 million / year), and harvesting jengkol once a year, the average revenue per tree per month Rp. 100,000 / month, then one hectare jengkol will produce Rp. 14.3 million / month. That's equivalent to 7x folding palm oil harvesting. Along with the socialization, the communication to absorb the aspirations of the types of assistance and activities that they expect were also done. The assistance teams also ask their commitment to make the conservation village program successful.

Agro forestry training activities conducted for all members of the farmer group. The activity began with the socialization of agro forestry that includes the understanding, the benefits to be obtained, the types of plants that can be cultivated with agro forestry, followed by the training on
raising goats. Socialization and training of plant cultivation conducted by a team of University of Lancang Kuning, while raising goats training conducted by experienced practitioners goat breeders.

Other training has been done is composting. Compost material in the form of litter and green leaves are taken from farmers’ lands, additional material is goat manure taken from the goat farmer village conservation program. Other materials such as EM4 purchased from the store. There were two types of fertilizer that made; one is dry compost (in a wooden box) and other is liquid compost (in a plastic drum). The resulting compost is used to fertilize crops grown on agro forestry land. Other training activity is manufacturing botanical pesticides. There were two types of botanical pesticides that made, one based on papaya leaves, and other based on ginger - turmeric. Women is taking an active role in manufacturing botanical pesticides.

(2) Fruits planting

As stated before the agro forestry plantings will be carried out on palm oil plantation land belonging to the respondent. Palm oil was already grown since 2009, so at that time the palm oil was 8-year-old. The distance between trees is 9 x 9 square meters, so there is still vacant land on the sidelines to be planted with other crops (especially fruit trees). As a proof to change the type of palm oil trees with fruit trees, the respondent one willing to cut 10 palm oil tree trunk. The others palm trees were allowed to remain until the tree can produce fruit that can be sold. In determining the combination fruit trees that will be planted, the members of farmer groups led by the chairman have discussion with farmer groups. The assistance team was also involved in the discussions. After the discussion, the members of farmers agreed to grow 9 species of fruit, which is kind petai, jengkol, durian, jackfruit, soursop, lime, lemon, rubber, and matoa.

Selecting a type is a strategy to set the pattern of harvesting results. While waiting the results of the first harvest of long-term fruit, such as banana, jengkol, durian, jackfruit and soursop, they also planting the mid-term fruit such as lime and orange that can be harvested after 2 years old. To support the cultivation of plants being cultivated by them today, which is chili and papaya, they also choose the type of goat that can give birth every year and the feces could be used to fertilize crops. For the next year plan, the cultivation of agro forestry systems will be expanded, they suggested to be provided thrasher compost material and animal cattle which could support agro forestry crops in a wider scale.

The land preparation consists of shrub cleaning, installation of plant stakes, making holes for planting, carrying seeds, organic fertilizer until planting was done by members of farmer groups, led by three chairman farmer groups. The nine types of fruit trees planted in a spread mixture on the sidelines of the palm oil tree. In the area of 3 hectares has been planted 450 fruit trees trunk. A number of tree seedlings for replanting reserves are provided.

In the first period of 1 month after planting, the plants conducted an intensive examination to determine the level of plant growth. If there are dead or damaged the immediate replacement will be done with new seedlings. The plant success evaluation was done after three months from planting. Based on the evaluation results, the success rate of plant growth is 93%. The percentage figures indicate a high success rate of planting.

(3) Raising goat activities

Assistance Teams provide goats as livestock for partner groups based on the suggestions and wishes of the partners. Goats are breeds are relatively easy to do by farmers and much easier to bring income for farmers. The assistance team has given 17 goats, goat types of beans, which consists of 15 female goats and two male goats. In addition the team companion also provides goat cage that was done with cooperation by the public. The goats breeding also show encouraging development. Having maintained for approximately 3 months, the number of goats has been increased to 28. That's because
at the time of purchase goats, there are seven breeding goats in a state of pregnancy, and giving birth in total 11 young goats.

(4) Fostering good relations with government officials

In order to assemble the cooperation and synergy, assistance teams also regularly communicate with village officials and the Head KPHP Jaya Minas Minas Tahura. Both these officials have a strategic position in decision-making on the implementation of the conservation village. In general, both Minas Jaya staff and KPHP Tahura were very welcome with conservation village program. Thus it is expected that in subsequent years a more tangible support will coming from these parties.

4. Conclusion

To adopt agro forestry system to replace the dominance of palm oil plant begins with the assessment phase. Information about agro forestry was coming from escort team Lancang Kuning University, along with a promise to provide assistance for facilities, and supported by information from informal leader from within their own communities, causing members of farmers became convinced of the chances of success for rural development programs of conservation to increasing their income. The attitude shown by the target group is willing to try the agro forestry patterns to replace the dominance of palm oil. The strategy pursued by farmers is to adopt agro forestry system with a set of pattern harvest plan results by selecting a combination of the types of commodities in accordance with the purpose. While waiting the results of the first harvest long-term fruits (petai, jengkol, durian, jackfruit, soursop), they choose the types of plants midterm that can quickly produce, such as lime and orange. To support the cultivation of plants being cultivated by them today (chili and papaya) they also choose the type of goats could give birth every year and feces can be used for short-term crop fertilizer. For the next year plan, the cultivation of agro forestry systems will be expanded, they also suggested to be provided thrasher material compost and animal manure of cattle.

5. Suggestions

Based on the conclusion above, to increasing the chances of rural development of conservation, which transform palm oil monoculture into agro forestry based on fruit trees, it needs strong support from the government to help provide fruit tree seeds of quality, along with cultivation assistance to succeed. Besides that also giving some livestock that support integrated farming systems to be done.

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