

## **The Development of Papuan Farmers Economy Based On the Potentials of Land Resources, Ecology And Cultures In Keerom Regency**

Untung Turua<sup>1</sup>, Setia Hadi<sup>2</sup>, Bambang Juanda<sup>3</sup>, Endah Murniningtyas<sup>4</sup>

<sup>1</sup>Geography Studies Program, Department of Social Sciences, Cenderawasih University, Indonesia

<sup>2</sup>Regional Land Rural Development Planning, Agricultural Institute of Bogor, Indonesia

<sup>3</sup>Regional Land Rural Development Planning, Agricultural Institute of Bogor, Indonesia

<sup>4</sup>Natural Resources and Environment, National Development Planning Agency, Indonesia

---

**Abstract:** This research analyses potential of land resources, village ecology, and culture of Papuan farmers in making use of land resources in Keerom regency, for the development of Papuan farmers' economy. The class of land suitability was found through the study of document Studies for Agriculture Technology Papua Province, office of agriculture, and also the office of forestry and plantation of Keerom regency. The mapping of commodities was found through the analysis of the map and field survey with the approach of landform and the analysis of geomorphology, and the identification of ecology potentials. The culture of papuan farmers was found through Focused Group Discussion (FGD) and direct contact with the villagers. The result shows that the class of land suitability for the mapping of commodities of crops, horticulture and plantation, are spread in the districts of Arso, Arso Timur and Waris. Keerom Papuan farmers have not maximally used the farming land because they are still depending on the natural resources. The use of technological tools by papuan farmers is still low. Papuans also do not have capitals for the next planting season, compared with non Papuan farmers. Social capital is so strong that have negative impacts to the income.

**Keywords:** land resources, ecology, culture, and economic development

---

### **I. Introduction**

Geographically, Keerom regency lies in the low land which is rich with natural resources consisting of a variety of flora and fauna which have economic values, and some of them are used by the local people as food resources. The potential of natural resources can ideally become main power to support the development of agriculture, because most of the lands, based on the analysis of the land suitability, are potential for the development of agriculture. This condition should become the strengths of the development of the farmers' economy. However, the potential becomes the weaknesses because of the human resources which are not ready, and the local people are becoming too lazy with these rich natural resources.

Keerom regency has an area of 937.100 ha (9.371 km<sup>2</sup>) and the potential area for crops, horticulture, and plantations is 748.993 acre or 87,36% of the total area of Keerom regency. This potential has not been used for economic production by the local people, mainly by the Papuans from Keerom themselves who are the traditional owners of the land. This was caused by the level of Papuans' formal and non formal education, and the level of skills in agriculture which is still much lower compared with non Papuans. The majority of Papuans do their agriculture with nomad system or moving from one place to another. The commodities planted tend to be the varieties of local plantations which have the minimum risk of failure, because the varieties chosen is suitable with the micro environment which is specific, with the method of agriculture which maximize the condition of natural resources to minimize the risk of failure. The strategy has been used to ensure the sustainability of the productions of the varieties of plantations which do not need special treatment.

Boissiere et.al in Kartiksari, Marshall and Beehler (2012) stated that Papuans, who consist of 300 ethnic groups, generally live from crop cultivation and from forest products. The group of Papuan who are totally hunter-collector are not found in Papua anymore, because this group of people have cultivated a variety of plantations, besides hunting and collecting forest products. Richard (1985) proposes several traditional systems of agriculture used in Papua, from the nomad system in high land to the wet land system in the low land. Most of the farmers only depend on nutrient by collecting wild plants and show much knowledge of the condition of the environment.

Economic capacity according to Connell and Wall (2004) is the supply of resources in every location which supports economic development. The definition of the economic capacity implies activities which can produce goods or services through the use of technology, man power, capital and other intensive resources. Bryant (1994) in Connell and Wall (2004) identify 8 attributes related to economic capacity (1) supporting

environment, (2) capital (3) natural resources, (4) infrastructure and artificial resource(5) man power and management, (6) markets, (7) information, (8) and enterpreneurships

With the existing condition, Papuan farmers need to be supported and empowered in order for them to be more skillful in the future, and have the view of market orientation. This research aims at: (1) analyse the potentials of the suitability of the land in relation to the development of economic capacity of Papuan farmers, and (2) analyse the village ecology and life style (culture) of Papuan farmers in making use of the potentials of farming area in Keerom regency.

## II. Method

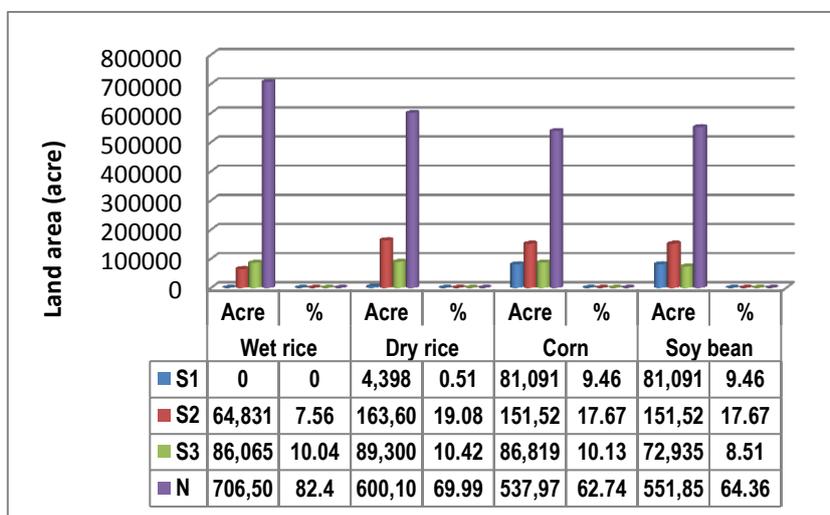
The suitability of the farming area was found from the analysis of secondary data which include: map, literature, and the report of BPTP Papua Province. The analysis of geology map, and digital map (landform map) was to evaluation the map of land suitability of Keerom regency. Field check was done by the approach of landform and the analysis of geomorphology. The suitability of farming area was classified into 4 classes: highly suitable (S1), moderately suitable (S2), marginally suitable (S3), and not suitable (N). The result of the analysis was used to determine the mapping of commodities in 3 sample districts. The potentials of village ecology was found from field survey, while the culture of Papuan farmers was found from FGD and direct interactions with the local people in the villages. The capacity of farmers was found from t test between Papuan farmers and non-Papuan farmers, andfarmersacrossthe districtarea.

## III. Findings And Discussions

The size of the area suitable for crops, horticulture, and plantationsin Keerom regency is 748,993 acre (87, 26%), while the rest of the area which covers 108.411 acre (12.64%) cannot be used for agriculture due to the biophysics factors.

### 1.1. The Suitability of land for the Commodities of Crops

The classes of the suitability for wet rice field, dry rice field (gogo), corn, and soy bean on the area of 319, 429 acre (37.26%) can be seen in Figure 1. The farming area in Keerom spread in the coluvialplains, coluvialfans, and floodplains(along the rivers). The main source of water is the rain, because there has not been any irrigation system, with the intensity of 2 times harvest in a year.



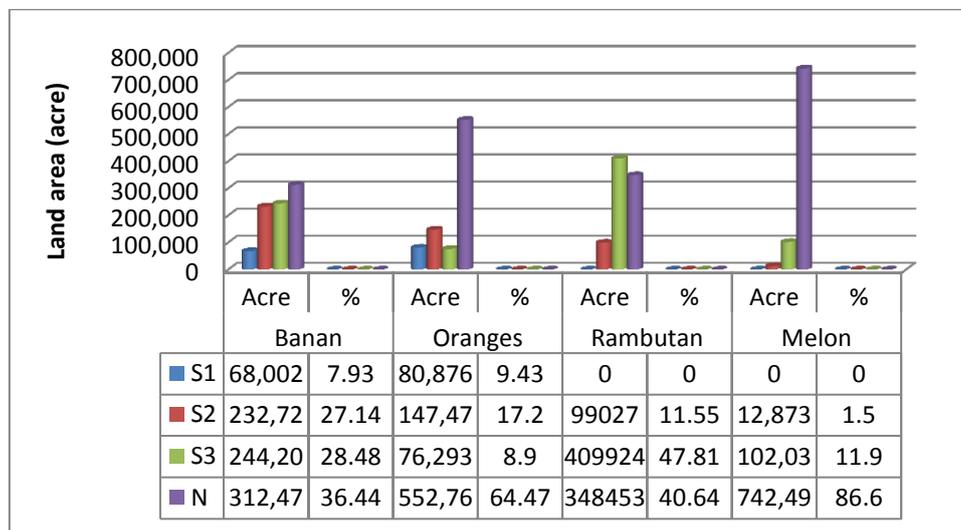
Source: BPTP Provinsi Papua (2006), dan field survey (2013).

Figure 1. The class of the area suitabilityfor crops

The land suitability of the area for dry rice field (gogo) is 257.298 acre. The dominat class of the suitability of the are is moderately suitable (S2). The frequency of harvest is once a year. Corn can grow in the dry and wet area as large as 319,329 acre (37.26%). The class of the suitability of the largest area for corn is moderately suitable (S2), followed by marginally suitable(S3), area wich is highly suitable S1. The cultivation of corn in the dry land is done in raining season and can be done 2 times a year. While the cultivation in the wet area is done in the dry season. Also, the cultivatin of soy bean can be done both in the dry and wet area with the frequency of 1 time a year. While in the wet area can be done in the dry season with the same frequency.

### 1.2. The land Suitability for Commodities of Horticulture

The suitability of area for horticulture are both in the wet and in the dry area of 544,934 acre (63.56%). The suitability class highly suitable (S1) covers the smallest area compared with S2 and S3. Oranges occupy the largest area of S1 (9.43%). The largest area of moderately suitable (S2) is for banana (27.14%), and the smallest is Melon (1.50%), which can be seen in Figure 2.



Source: BPTP Provinsi Papua (2006), dan field survey (2013).

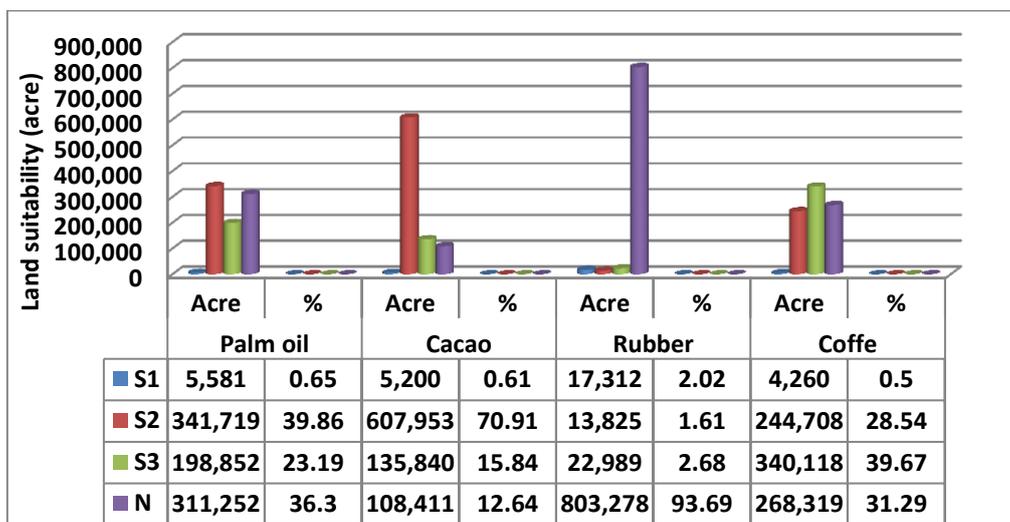
Figure 2. The class of land suitability for horticulture

The class of land suitability for Rambutans is marginally suitable(S3) as much as 47,81%. Lemons, banana, melon, and rambutans can be grown in the dry area, because these horticulture plants do not need much water.

### 1.3. The land suitability for commodities of plantations

The land suitability for commodities of plantations is on the area of 748,994 acre (87.36%). The area of moderately suitable (S2) is the largest (39.86%), followed by marginally suitable(S3) which is 23.19%. The smallest area is that of highly suitable (S1) with 0.65%. The factors which cause the land to be not suitable (N) are blocked drainage, swampy area, and slopiness of >25%. The land suitability of moderately suitable (S2) is the largest, with Cacao planted in the largest area (70.91%), palm oil trees(39.86%) and rubber is planted in the smallest area (1.61%). Commodities planted in the largest area of marginally suitable(S3) is coffee (39.67%) followed by palm oil trees (23.19%) and the land suitability with the smallest area is rubber (2.68%).

The class of land suitability of highly suitable (S1) is the class with the smallest area for all commodities. Coffee is planted in the smallest area (0.50%) and rubber is planted in the largest area (2.02%). The factors causing the land to be not suitable (N) are blocked drainage, swampy area, and slopiness of > 40%.



Source: BPTP Provinsi Papua (2006), and field survey (2013).

Figure 3. The class of land suitability for plantation

### 1.4. The mapping of Agricultural Commodities

The mapping of agricultural commodities in this research was based on the quality and the size of the land. The analysis based on document and map determined the priorities for the development of commodities of both crops and plantations in order for the training and empowerment to the farmers to be focused to get optimum agriculture products.

#### 1.4.1. The mapping of commodities in the districts of Arso and Arso Timur

Some areas of the districts of Arso and Arso Timur which cover 108,688 acre can be used for agriculture of wet area and dry area. The wet area in Arso Timur covers 18,901 acre (13.68%) with the slopiness of < 8% categorising in Zone IV, consisting of Subzone IV/Wr-1, IV/Wr-2, and Subzone IV/Wr-3, while dry area is on zone IV, III, and zone II with 89,685 acre (64.91%), for horticulture and plantations.

The land suitability for crops in the dry area is on Zone IV/Dfh of 20,155 acre (14.59%), with the slopiness of < 8%. The commodities of crops suggested are dry rice field (gogo), soy bean, corn, peanuts, and sweet potatoes. Commodities of plantations suggested are cacao, palmoil trees and horticulture suggested are banana and junk fruit.

**Table 1. The mapping of commodities for the districts of Arso and Arso Timur**

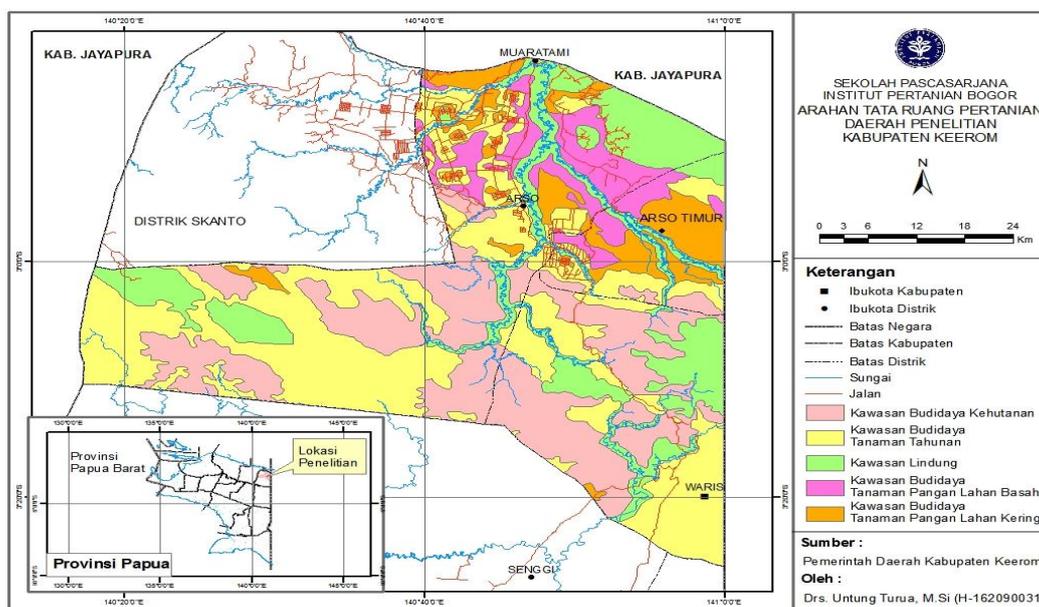
**Table 1. The mapping of commodities for the districts of Arso and Arso Timur**

| The mapping of commodities | Zona      | Agriculture system/ Alternatives of commodities   | Size    |        |
|----------------------------|-----------|---|---------|--------|
|                            |           |   | Ha      | %      |
| (1)                        | (2)       | (3)   | (4)     | (5)    |
| Crops in wet area          | IV/Wr-1   | Wet rice field, soy bean, corn, vegetables, oranges   | 15.664  | 11,34  |
|                            | IV/Wr-2   | Wet rice , soy bean, corn, vegetables, oranges, onions  | 1.883   | 1,36   |
|                            | IV/Wr-3   | Wet rice, soy bean, corn, vegetables, oranges, melon, banana.                                       | 1.354   | 0,98   |
| Crops in dry area          | IV/Dfh    | Dry rice (gogo), soy bean, corn, peanuts, sweet potatoes, palm oil trees, cacao, banana, junk fruit | 20.155  | 14,58  |
| plantations in dry area    | III/Def-1 | cacao, palm oil trees, dry rice, soy bean, corn,  | 13.009  | 9,41   |
|                            | III/Def-2 | Palm oil trees, rubber, white pepper, dry rice, corn  | 441     | 0,32   |
|                            | III/Def-3 | Cacao, coffe robusta, dry rice, soy bean, corn.   | 563     | 0,41   |
| plantations in dry area    | IV/De-1   | cacao   | 4.128   | 3,00   |
|                            | IV/De-1   | Palm oil trees  | 11.095  | 8,02   |
|                            | II/De-1   | Cacao   | 17.729  | 12,82  |
|                            | II/De-1   | Palm oil trees  | 2.193   | 1,59   |
|                            | II/De-1   | Cacao, palm oil trees   | 11.487  | 8,31   |
|                            | II/De-1   | Coffe robusta, cacao  | 8.885   | 6,43   |
| Total of area              |           |   | 108.686 | 100,00 |

Source: BPTP Provinsi Papua (2006), and field survey(2013).

**Explanation table:**

1. II = zone II (slope 15-40%); III = zone III (slope 8-15%); IV = zone IV (slope <8%);
2. W = wet area; D = dry area; e = plantations; j = forest; r = wet rice; h = hortikulture; f = crops.



**Figure4. The mapping of commodities for the districts of Arso and Arso Timur**

Figure 4 presents the spread of land resources in the regions of Arso district, Arso Timur and Waris. The distribution of land suitable for dryland plantations spread evenly over the three districts of wetland plants cultivation area which is only found in the districts of the capital of Arso regency and Arso Timur. The spread of the land shows that the economic development of the indigenous Papuan farmers are not limited by the availability of land resources.

**1.4.2. The mapping of commodities in the districts of Waris**

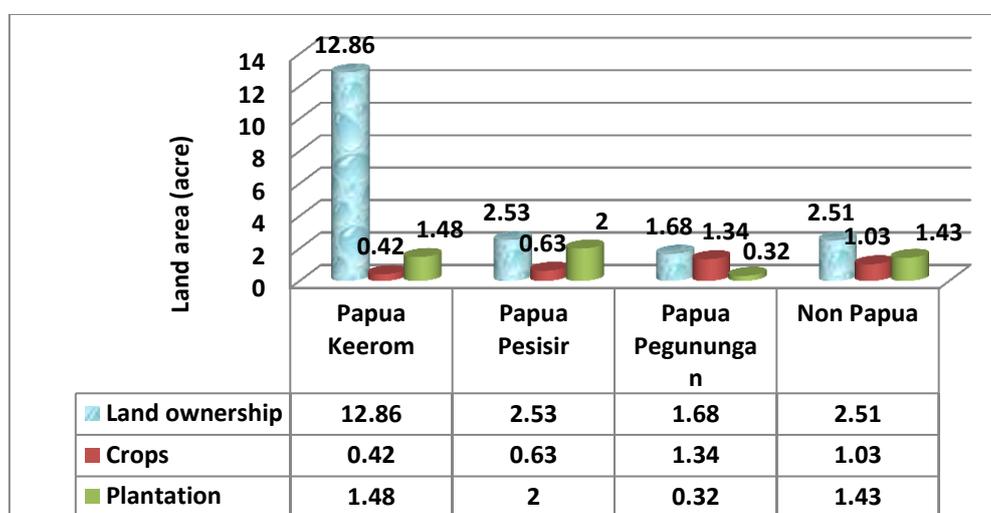
The identification of the mapping of agriculture commodities on some of Waris district (68,683 acre) is categorised into 4 agriculture system and 14 areas of commodities. Dry agriculture system in Waris district of 52.158 acre (75.94%) is on Zone IV, III, II, and I. The commodities suitable with the condition of the area are crops, plantations, and horticulture. Based on the size of the potentials area (suitability) for crops, horticulture and plantations, and the mapping of agriculture commodities suitable for the cultivation in the districts of Arso, Arso Timur and Waris, the Papuan farmers should have more opportunities to use the larger farming area for their economic growth. However, the research in the location showed a contradictory fact. The Keerom Papuan who have larger farming area (average of 12.86 acre) can only use 0.42 acre for crops, and 1.48 acre for plantations. plantations owned by Papuan farmers in the districts of Arso and Arso Timut, are generally palm oil trees prepared by PTPN II. The plantations land is now not used but leased by others.

**Table 2. The mapping of agriculture commodities in Waris district.**

| The mapping of commodities                    | Zone                         | System of agriculture/ Commodities alternatives  | Size   |        |
|---|------------------------------|--|--------|--------|
|   |                              |  | Acre   | %      |
| (1)   | (2)                          | (3)  | (4)    | (5)    |
| Agriculture of dry area (crops & plantations) | III/Def-1                    | Palm oil trees, rubber, white pepper, gogo, corn | 406    | 0,59   |
|   | III/Def-2                    | Cacao, palm oil trees, gogo, soy bean, corn.     | 1.646  | 2.40   |
| Agriculture of dry area (plantations)         | IV /De                       | Cacao  | 1.059  | 1,54   |
|   | III /De                      | Cacao  | 176    | 0,26   |
|   | II /De-1                     | cacao  | 2.740  | 3,99   |
|   | II /De-2                     | Cacao, palm oil trees                            | 6.860  | 9,99   |
|   | II /De-3                     | Cacao, robusta coffee                            | 6.881  | 10,02  |
|   | II /De-4                     | Palm oil trees, rubber, white pepper             | 899    | 1,31   |
|   | II /De-5                     | Robusta coffee, cacao                            | 17.999 | 26,21  |
| II /De-6                                      | Robusta coffee, cacao, clove | 13.466   | 19,61  |        |
| I /De   | cacao                        | 25   | 0,04   |        |
| Forest and wet area                           | IV/Wj                        | Natural vegetation                               | 20.155 | 14,58  |
| Forest and dry area                           | II /Dj                       | Natural vegetation                               | 3.711  | 5,40   |
|   | I /Dj                        | Natural vegetation                               | 9.611  | 13,99  |
| Total area                                    |                              |  | 68.683 | 100,00 |

Source: BPTP Provinsi Papua (2006), and field survey (2013).

Identification of the size of the land owned and the use of the land for agriculture activities by farmers in the districts of Arso, Arso Timur and Waris show the level of extreme differences compared with the farmers from outside Keerom (Papuan farmers from highland and low land, and non Papuan farmers), which can be seen in Figure 5.



Source: Data analysis of field survey, 2013

**Figure 5. The average size of land ownership and the use of the land**

Figure 5, shows that the average size of land ownership of Keerom Papuan farmers is 12.86 acre, larger than owned by Papuan from lowland which is 2.53 acre, high land Papuan 1.68 ha, and non Papuan farmers 2.51 acre. The comparison of the size of the land ownership between Kerom Papuan farmers with Papuan farmers from low land and non Papuan farmers is (1 with 5), while compared with the papuan farmers from the high land is (1 with 7.5). The differences of land ownership in fact do not relate to the size of the land used for crops or plantations by Keerom Papuan farmers. The maximum use of the land is done by non Papuan farmers, Papuan farmers from high land, and Papuan farmers from low land.

### **1.5. The ecology of village and the life style of Papuan farmers.**

The skill of Papuan farmers in making use of the potential of natural resources and land resosurces is influenced by several factors: formal and non formal education, sociocultural factors, and the government' policy in allocating budget for village development.

The ecology of low land was grown by a variety of flora such as sago, red fruit (*Pandanus Conoideus*) and other vegetations as the place for fauna (deer, cassuary, pigs, kangaroo, and tree kangaroo) and a variety of birds, and fish in the swamp, which are needed by human. This has caused the dominant interaction between human and the ecology. Although geographically it is difficult to access, Papuans build houses for living because of the ecology (flora and fauna) give hope for living. The rich food resources which supply living needs has spoiled the local Papuans, so they do not think more of their future, thinking that life is easy.

Besides collecting forestry products, Papuans also do cultivation activities traditionally. They have low skill of cultivating and tend to plant commodities with low-risk failure, and they have perceptions that: (1) Rich natural resources in the forest is food resources for them (2). The natural resources is God's gift which cannot be used exsively (3) There must be balance between making use of the natural resources and the sustainability of the resources for the next generations. These perceptions are the local wisdom owned not only by a group of tribe in Keerom, but also perceived by most of the traditional people who are the traditional owner of land in Papua. The perception of most of Keerom Papuans is that life does not need to be exsive, but must fulfill some necessary needs such as: the food supply, housing, good relation between relatives and others, and remember God.

Living in group in a clan in a traditional area is typical in Keerom families. Social capital in each community is maintained well, because it is part of life requirements in the community. The commitment to love each other which is the social capital in the community is not only sharing food or sharing hunting animals or money to other families in special circumstances, but also participate in (1). Paying fine for the crime committed (2) paying traditional dowry (3) paying traditional fine for disobeying social norm. The participation is the life pattern in the community, so there is always attention to others because every one has possibilities of having difficulties in life.

Large amount of budget in the development program comes from sources: *Bantuan Keuangan Kepada Kampung (BK3)*. The financial aid for the head of districts, Rencana Strategis Pembangunan Kampung (Respek). Strategic plan for villages development, *PNPM Mandiri*, cheap rice, and other financial aids for development managed directly by the authorities and villagers. These aids have formed some villagers' thinking of 'projectation'. This phenomena has influenced the way the farmers work which is shown by the following (1) do not cultivate the agriculture continously (2) do not cultivate market oriented commodities (3) do not cultivate enough amount of agriculture commodities (4) Tend to cultivate small amount of commodities which they consume themselves (subsistent)

The size of land suitability and the spread as in Tables 1 and 2 is potential for economic development for Papuans. The important factors in the development of farmers' economic capacity are: (1) land resosurces (2) human resources (3) technology resources (4) capital resources.

#### **1.5.1. Land resources**

Land resources, spread along the area of the districts of Arso, Arso Timur, and Waris. The potential of land resosurces can be seen on the map of the land suitability and the mapping of commodities (map the spatial direction of agricultural) of crops, horticulture, and plantations. The fact shows that papuan farmers, although having the land of the average of 12.86 acre (Figure 4), they can only use 0.42 acre of the land for crops and 1.48 for plantations. The result of t-test on the size of land ownership shows p-value (0.000) smaller than  $\alpha$  5% ( $\alpha=0,05$ ) which means there are differences between the land ownership between Papuan and non Papuan on all sample groups (Papuan farmers' are larger than non Papuan farmers'), while the size of the land use for crops and plantations shows different tendency, that is the use of land by non Papuan farmers are larger than that by Papuan farmers. These differences were caused by two factors: (1) Non Papuan and Papuan farmers from other regencies percieved that the land is the only resource which must be used maximally for their life, while (2) Keerom Papuans perceive that their land already prepares food such as sago, coconuts, and other plants, and a variety of vegetables and fish in the swamp, which can be taken any time.

### **1.5.2. Human resources**

Human resources, the level of formal education of Papuan farmers in the level of Senior high school is 15%, greater than non Papuan (7.27%). Also the non formal education in crops plantation is that Papuan farmers 17.27%, greater than non Papuan which is 16.36%, and plantations of Papuan farmers is 10.91%, still greater than non papuan farmers which is 5%. The skill of non Papuan in agriculture, based on t-test, show that p-value is 0.000, lower than  $\alpha$  5% ( $\alpha=0,05$ ). It means that the skills of non Papuans is much better than Papuans'. Specifically, t-test of all Papuan farmers show that the farmers from high land (Wamena) are better than Keerom papuans.

### **1.5.3. Resources of technology**

Resources of technology, T-test on knowledge of non Papuan farmers in using production facilities shows p-value 0.000, much better than Papuans. The dominant tools used by Papuan farmers are tugal, besides spade and rake, while non Papuan farmers have used tracktors, spraying tank, and technology cuttings.

### **1.5.4. Social capital**

Social capital, besides the land, most of the Papuan farmers do not have capital, compared with non Papuan farmers in Arso district who always set aside some of their income from harvest for the capital of the next planting season.

T-test of the total income shows significant differences between Papuan farmers and non Papuan farmers. The average of total income of non Papuan farmers is greater than that of Papuan farmers, except between Arso papuans and non Papuan farmers in Arso Timur, in which the t-test was 1.383 with p-value 0.171, greater than  $\alpha$  5% ( $\alpha=0,05$ ).

Considering the background of Papuans who have the lack of skills in agriculture, and still use natural resources for their food supply, the attempt to develop economic capacity of Papuan farmers is should be done through to the development and empowerment of the skills and knowledge of the use of land resources and the ecology, and to promote the role of the culture in supporting the development of economy. For this purpose, the resources which need to be promoted is to activate the institution of farmer groups, the institutions of counseling, traditional institution, NGOs, and other stakeholders, to ensure that every villager has the views of using the resources maximally.

People must understand that prosperity will never be reached if not started with a systematic process. This needs to be done because this group of people have been used to get money easily without a process (for example by selling their land, illegal logging in the traditional land owners).

Training programs for agriculture and plantation to make use of the land resources based on the mapping of commodities is a good alternative because it is more focused and easily understood by farmers, so the excellence comparative of the mapping of commodities can be used maximally.

The program of economic development in every village such as those done in the financial aids for the head of villages, Respek, PNPM, which have been running need to be managed better. The improvement of the management is on the mechanism of the financial management in the level of local government, in order for the budget not to be given directly to the authorities of the villages. The mechanism of the financial management have so far caused the budget to be used for consumption, which have caused the people to depend much on the government. Considering the cultural background and the condition of the ecology and the potential of land resources in this area, the pattern of community development which need to be understood by the local government and other stakeholders is the application of incentive system in developing the people in this area. This offered economic development system seems to force the people, but in the long term they will be able to develop themselves of agriculture commodities which have proved to improve their income and their prosperity.

## **IV. Conclusion**

- 1.6. The potentials of land resources (the class of land suitability) for agriculture and the mapping of agriculture commodities in the districts of Arso, Arso Timur and Waris, have not been used well by Papuan farmers for increasing their income.
- 1.7. The large land owned by Papuans does not relate to the income received every month. T-tst shows that the income of Papuans in the districts of Arso, Arso Timur and Waris is lower than non Papuan farmers.
- 1.8. Keerom Papuan farmers still depend on the ecology to fulfill their food supply. This has influenced their way of using their land for agriculture.
- 1.9. Sociocultural factors, specifically the social capital (the local people know it with the term loving each other) which are strong are traditional payment, fine, dowry, and other living aspects, caused the social transfer in the community is very high. As a result, the income cannot be used as the capital for agriculture.

### **Acknowledgements**

Only to Allah SWT I ask for patronage and dignity for the people I respect: Dr. Ir. Setia Hadi, MS, Prof. Dr. Ir. Bambang Juanda, MS, and Ir. Endah Murniningtyas, M.Sc, P.hD, who have been willing to provide guidance, counseling, and academic advice. On this auspicious occasion I would like to convey my respect and thanks.

### **References**

#### **Journal Papers:**

- [1] Connell, David J. Dan Wall, Ellen. 2004. Economic Capacity Profiles. Prepared on behalf of Journal New Rural Economy 2 Project. Canadian Rural Revitalization Foundation.

#### **Books:**

- [3] [BPS dan Bappeda] Badan Pusat Statistik dan Badan Perencanaan Pembangunan Daerah 2012. Kabupaten Keerom dalam Angka 2012. Badan Perencanaan Pembangunan Daerah dan Badan Pusat Statistik. Keerom.
- [4] [BPS dan Bappeda] Badan Pusat Statistik dan Badan Perencanaan Pembangunan Daerah 2012. Indeks Pembangunan Manusia (IPM) dan Analisis Situasi Pembangunan Manusia (ASPM) 2011. Badan Perencanaan Pembangunan Daerah dan Badan Pusat Statistik. Keerom.
- [5] Djhot, Djekky R. 2013. Kebudayaan Masyarakat Papua. Central For Melanesia Studies University of Cenderawasih, Jayapura Papua.
- [6] Fauzi, A. 2010. Ekonomi Perikanan "Teori, Kebijakan, dan Pengelolaan. Jakarta. Gramedia.
- [7] Hadi, Setia. 2011. Menuju Desa 2030. Bogor (ID): Institut Pertanian Bogor.
- [8] Hanafie, Rita. 2010. Pengantar Ekonomi Pertanian. Yogyakarta. Andi.
- [9] Idrus, Muhammad. 2009. Metode Penelitian Ilmu Sosial "Pendekatan Kualitatif dan Kuantitatif. Jakarta. Erlangga.
- [10] Irwan, Zoer'aini Djamal. 2012. Prinsip-Prinsip Ekologi "Ekosistem, Lingkungan dan Pelestariannya, Jakarta. Bumi Aksara.
- [11] Juanda, B; 2009. Metodologi Penelitian Ekonomi dan Bisnis. IPB Press, Bogor.
- [12] Juanda, B; 2009. Ekonometrika: Pemodelan dan Pendugaan. IPB Press, Bogor.
- [13] Karma, Konstant; 2005. Pengembangan Ekonomi Kerakyatan di Papua "Dari Sederhana ke Kompleks", Jayapura.
- [14] Kartikasari, S.R., Marshal, Angdrew J dan Beehler, Bruce M. 2012. Ekologi Papua. Yayasan Pustaka Obor Indonesia dan Conservation International. Jakarta.
- [15] Koentjaraningrat. 2009. Pengantar Ilmu Antropologi. Jakarta. Rineka Cipta.
- [17] Nugroho, I dan Dahuri, R. (2004). Pembangunan Wilayah, Perspektif Ekonomi, Sosial, dan Lingkungan. Jakarta, LP3ES.
- [18] Rustiadi, E; Saefulhakim, S dan Panuju, Dyah R, 2009. Perencanaan dan Pengembangan Wilayah. Crespent Press dan Yayasan Obor Indonesia, Jakarta.

#### **Dissertation:**

- [19] Hafizrianda, Y. (2007). Dampak Pembangunan Sektor Pertanian Terhadap Distribusi Pendapatan dan Perekonomian Regional Provinsi Papua: Suatu Analisis Model Sistem Neraca Sosial Ekonomi [disertasi]. Bogor (ID): Institute Pertanian Bogor.