

# Sustainable Food Security Strategy: Study of Land Suitability of Rice and Sago Commodity in Kampung Wapeko, Merauke District, Papua Province, Indonesia

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**Abstract.** Food resilience is a condition of the fulfillment of food in sufficient quantities, safe for consumption, distributed evenly, and affordable. Carrying capacity is an important factor in fulfilling these aspects. The carrying capacity in this study is assessed from the suitability of land and community acceptance of the commodities developed in Kampung Wapeko. Rice is a commodity that is currently a concern of the Government to be developed in Wapeko. Meanwhile sago is a local food commodity that has been consumed and processed by indigenous people of Wapeko for generations. Based on land suitability analysis, this study shows that rice commodity has a level of land suitability marginal (S3) until not appropriate (N). Meanwhile, sago commodity has appropriate land suitability level (S1) until marginal fit (S2). Analysis of community acceptance of rice and sago commodities shows that rice has become the staple food of the community in Kampung Wapeko, while sago only as a food interlude. The results indicate that rice is more accessible because of the subsidy scheme, while sago is harder to reach, due to the reduced sago tree population and can only be taken at certain times. The sustainable food security strategy designed in this research is developing commodities in accordance with land use directives and creating self-reliance of local communities through the development of commodity cultivation in accordance with their knowledge systems

## 1 Introduction

Food is a basic need for human life, but the problem of the food crisis is still a problem in many countries. The main problem of global food is food availability that is not evenly distributed throughout the world. According to the Bruttland Commission report, global agricultural growth has the potential to meet food needs, but the problem of hunger often arises because of the lack of purchasing power compared to food availability itself. The growth of world cereal production has continuously exceeded the growth of the world's population, but every year many people do not get enough food.

Food needs in Indonesia continue to increase along with the high population growth,

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which is 1.35 percent per year. Food needs always increase along with the increase in population. According to Maps of World (2013) data, countries with high population such as China, India and Indonesia produce more rice. Indonesia is in third place with rice production of around 40.000.000 tons per year, according to the Central Bureau of Statistics, the population in Indonesia in 2010 was 237.641.326 people. With Indonesia's population growth rate of 1.2 percent per year, the population in 2017 is 256.603.179 million. Meanwhile, the need for rice in 2017 (including for industrial needs) of 40.030.096 tons / year is equivalent to 66.716.827 tons of GKG (Unhulled Rice). Indonesia's average rice consumption in the last ten years, namely 2007 to 2016 was 88.392 kg per capita per year.

With a conversion rate of 100.000 hectares per year, to achieve rice self-sufficiency, at least the government must be able to print 300.000 hectares of new rice fields per year. The need for food self- sufficiency and the need for new rice fields is encouraging the Government to form an exclusively food-based economic perspective, one of them in Merauke Regency, Papua Province. The social issues regarding this program should be examined [1] . In the other hand, the sago is a local food, and in the future becomes as a source of food and feed[2].

Based on the formulation of the problem, the following research questions arise:

1. How is land suitability, pest threat and environmental risk in Wapeko village for sago and rice commodities?
2. How is the community's acceptance in Wapeko village for the sago commodities and rice commodities?
3. What is the right strategy formulation for sustainable food security in Wapeko?

## **2 Materials and Methods**

### **2.1 Data**

The variables used in this study consist of three variables, namely land suitability, social acceptance, and food security strategies. Each variable has sub- variables, namely sub-variables of rice commodities, sub-variables of sago commodities, sub-variables of public acceptance of sago commodities, sub-variables of public acceptance of rice commodities, sub- variables of strengths, weaknesses, opportunities, and constraints of the development of rice and sago commodities.

### **2.2 Location**

The study was conducted in the village of Wapeko which is geographically located between the coordinates 7 ° 06 'LS - 8°30' LS and 139°80 'BT - 140°40' BT. Administratively, the study area includes in Wapeko Village, Kurik District, Merauke Regency, Papua Province.

The informants in this research are community leaders, academics, local governments, and companies involved in agricultural activities and who understand the problem of agricultural development in Wapeko village.

### **2.3 Analysis Methods**

The analysis of social acceptance is assessed based on three parameters, namely cultural adaptability, knowledge system and economic affordability. The assessment of the three

parameters was carried out on local community groups. The method used in analyzing social acceptance is a qualitative descriptive analysis method that describes people's perceptions and preferences.

Land suitability analysis is carried out by analyzing the land capability based on the classification of land capability according to the Law of the Republic of Indonesia Number 32 of 2009 concerning Carrying Capacity and Environmental Capacity. After knowing the level of land capability, the land is classified based on the land suitability classification according to FAO (1976) framework which distinguishes land according to the level of the order, class, subclass and unit. The Order is a state of land suitability globally. At the order level land suitability is distinguished between suitable land (S = Suitable) and inappropriate land (N = Not Suitable). Method of analysis of sustainable food security strategies.

Develop strategies using the method of SWOT Analysis (Strength, Weakness, Opportunity, Threat) by classifying the factors that become strengths, weaknesses, opportunities, and threats based on the results of the sustainability analysis of rice and sago commodities.

### **3 Results and Discussions**

The Central Government established Merauke as one of the national food granaries because Merauke was one of the regions that had successfully carried out the transmigration program and developed agriculture in the eastern region of Indonesia. Merauke was one of the transmigration destinations because since the Dutch colonial administration (1939-1958), the area had been developed into a food storage area for the South Pacific region through the Kumbé Rice program. One of the areas that are developing the food estate in Merauke is the Wapeko village located in the Kurik District. Through the rice estate program in Wapeko, in 2015 the Government harvested the first harvest on an area of 300 hectares with a harvest of only 4-5 tons per hectare. The constraints faced by farmers today include water availability due to conflicts of interest with fish finders and high salinity in the dry season. While the constraints in developing rice estate are human resources both in quantity and quality, infrastructure and landownership.

Indigenous Papuans are divided into six five indigenous territories, namely Mamta, Saireri, Ha Anim, La Pago, Me Pago, and Bomberai. Merauke Regency is included in the custom area of Anim Ha. The custom area of Anim Ha consists of 17 (seventeen) tribes that have different languages and cultures. The seventeen Ha Anim tribes are Malind, Asmat, Citak, Yaghai, Moraori, Kanum, Yei, Kimam, Mandobo, Jair, Kuruwai, Muyu, Kombai, Yaghai, Mitak, Wiyagar and Yelmek. Of the seventeen tribes, the indigenous population that has indigenous territories around the city of Merauke is the Malind tribe. The Malind tribe consists of seven large clans, namely Gebze (bird clan), Kaize, Ndiken, Samkakai (kangaroo clan), Mahuze (sago clan), Balagaize, and Basikbasik.

Distribution and population density in Merauke Regency are basically influenced by location factors, potential and ease of relationship between these locations. Merauke Regency with an area of 45,071 Km<sup>2</sup>, the level of ease of connection is still relatively low. The concentration of the population is still dominant in urban areas where transmigration is located.

Wapeko village is one of the villages in the Kurik district, which is inhabited by an indigenous tribe, the Malind tribe. In 2002 the original population of Wapeko Village was moved back to their customary territory, after eighty-four years they fled to the village of relatives in Ivimahad village due to the cholera epidemic. Kurik District. Wapeko village is divided into three neighborhood units (RT) with a total of 88 families with a population of

267 people. There is an elementary school in Wapeko village, but education is still lacking in Wapeko village, because many school- age children do not go to school. Only one or two people from Wapeko have completed elementary school education and continue to junior high school level and there are no Wapeko children studying in college.

Wapeko village has a supporting Puskesmas with a village midwife officer. The diseases that are commonly experienced by Wapeko residents are fever, malaria, stomach ache, skin and lung pain. There have not been any cases of malnutrition or mal nutrition in Wapeko Village. Most of the people of Wapeko work as sago trimmers, hunters, and fish finders, but there are also people who have started farming.

Sago is the local food for Papuan people [3]. In Papua, about 50 varieties of sago have been identified that stretched out all over Papua from bird head of Papua going down to the low land area of Merauke in the southern of Papua province [4]. Sago useful as raw material of food such as noodle and flavoring and bioethanol [5]. Moreover, other parts of the tree can be used as construction materials.

Based on the lithology of the distribution of rock units, Wapeko village is above the expanse of rock units, namely young river deposits; young swamp deposits; and the old swamp deposits characterize the area as a floodplain, with a thick enough cover, sedimentation still active and peat. The constraints faced by farmers include availability of water due to conflicts of interest with fishers and high salinity in the dry season. While the constraints in developing rice estate are human resources both in quantity and quality, infrastructure and land ownership.

Following are the results of the land suitability analysis based on lithology and slope distribution:

**Table 1.** Land Suitability Analysis

<b>Lithology</b>	<b>Slope</b>	<b>Rice</b>	<b>Sago</b>
Young river sediments	<3%	not suitable	very suitable
Deposition of young River	3-8%	not suitable	quite suitable
Young Swamp Deposition	<3%	marginally appropriate	suitable
Deposition of Young Swamp	3-8%	marginal suitable	very suitable
Old Rawa sediments	<3%	marginal	quite suitable
Old Rawa sediment	3-8%	marginal suitable	quite suitable

Rice is a commodity that does not grow naturally in the Papua region. But Papuans have consumed rice since the New Order Government. "At that time the rice commodity had been known to the interior of Papua, this was marked by the history of the harvest which had been carried out in Wamena in 1980. In addition to the intensification of rice commodity agriculture, the Government also distributed rice to underprivileged people through the Raskin program. The distribution of rice that has been carried out since the New Order Government has influenced changes in the pattern of consumption of most

communities in the Papua Region.

## 4 Conclusion

Land suitability analysis in Wapeko shows that the rice commodity has a high resistance value or marginal compliance to be developed. In addition to obstacles based on growing conditions, the development of rice commodities also faces obstacles from the biotic environment. Efforts to improve the suitability have the potential to damage the ecosystem balance in Wapeko. Based on the observed social situation, the social life of the people in Wapeko is a combination of modern life and traditional society. The Wapeko community is still in the first phase of the Indonesian pre-literacy era, namely the phase of hunting and gathering food. Meanwhile, the migrant community has arrived at the cultivation phase. Gap between these two phases has an impact on the different knowledge systems that are owned. To be able to do cultivation, the people of Wapeko need time to be able to adapt to the changes that occur in their area. The strategy used to achieve sustainable food security is the development of commodities based on the principles of environmental sustainability, socially acceptable, economically beneficial, and can be supported by technology.

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