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Factors Influence Farmers' Decision to Convert Rainfed Lowland in South Sumatera, Indonesia

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Abstract. Wetland is one of the production factors which non-replaceable for rice cropping. Wetland conversion problems become an important policy issue since the late 80s. Wetland conversion not only have a negative impact on rice production which is the staple food of Indonesia's population (98%), but also to the socio-economic and environment. This study discusses the conversion of rainfed lowland in Ogan Komering Ilir Regency. Determining the location of study undertaken purposively; the regency has the widest rainfed lowland in South Sumatra Province, an area of 44.47%. This study applied binary logistic regression model to determine the factors that influence farmers' decisions in converting rainfed land. The findings indicate that grain prices at the farmer's level, number of family members, and dummy of soil fertility are significant variables influencing farmers' decision in converting rainfed lowland. Government needs to provide incentives for farmers in order not to convert rainfed lowland. Development of irrigation facilities is also considered important to increase cropping intensity of rainfed rice.

Keywords: farmers' decision, land conversion, rainfed lowland

1. Background

Wetland conversion to other uses is one of the important issues in the current agricultural development. This is due to wetland conversions have a significant negative impact, not only on rice production, but also to the socio-economic and environment. Based on land data of the last three decades, the average of wetland conversion in Java at 8 346.65 hectares per year and outside of Java 2 269.75 hectares per year, so that the area of land converted annually on average to reach an area 10 616.4 hectares per year (Purbiyanti, 2013). Although not as massive as Java, wetland conversion outside Java also seemed inevitable. The allocation of land will lead to the use of land resulting in higher rents (Barlowe, 1978). This condition is alarming, considering the rapid economic growth outside Java and the current rate of population growth outside Java are still reaching 1.36 % in the last decade (BPS, 2000-2010); both of these causes of land competition. Table 1 illustrates the rate of population and rainfed lowland growth in Ogan Komering Ilir Regency in the last five-years.

Table 1. The Rate of Population and Rainfed Lowland Growth in Ogan Komering Ilir Regency, 2006-2011

No.	Description	Rate of Growth per Year (%)				
		2006-2007	2007-2008	2008-2009	2009-2010	2010-2011
1.	Population	1.95	1.64	1.60	2.79	2.06
2.	Rainfed lowland	0.00	18.45	-18.60	0.00	-7.11

Sources : BPS Sumsel (2005-2011)

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South Sumatra is one of the national food storage outside Java was not separated from this condition. Moreover, South Sumatra has four dominant land typologies (BPS Sumsel, 2011), namely: lowland (38.24%), rainfed land (13.18%), technical irrigated land (5.82%), and tidal lands (29.95%). Statistics show that from 2008 to 2011 there has been a widespread decline in the rainfed land of 24.39% (BPS Sumsel, 2009-2011). The decreasing rainfed lowland outside Java, especially in Sumatra and Kalimantan, may be caused by the conversion or the conversion of agricultural land into plantations crops (Wahyunto, 2009). Attempt new printing areas are not necessarily able to replace the converted land. As one of the key factors in agricultural production systems, the availability of land is still a major challenge in the development of agriculture to this day because it is limited. Therefore, land conversion is a serious threat in efforts to achieve food security which leads to self-sufficiency. To that end, this study is important to analyze the factors that influence farmers' decisions to convert rainfed lowland in South Sumatra.

2. Literature Review

2.1. Land Conversion

Land conversion is defined as *net* land conversion. It means land area in the year *t* is the area of land previous year plus new paddy fields minus land conversion. Wetlands have important significance in determining national food security. Of several previous studies that wetlands conversion occurs as a result of high competition for land use and non-wetlands. Factors that affect wetland conversion are: economic factors (economic growth, industrialization and urbanization result, the purchasing power of farmers, and prices), social (such as population growth, land ownership, and so on), and ecology (such as: climate change, land degradation). Wetlands converted his usual allocated for residential use, the construction of public facilities, tourism, and so on (Purbiyanti, 2013).

Ilham *et al.* (2006) refers to several previous studies related reasons farmers convert wetlands in various areas, among others researches: Rusastra *et al.* (1997) in South Kalimantan, Syafa'at *et al.* (1995) in Java, and Jamal (2001) in Karawang, West Java. The results showed that the main reason farmers converted wetlands in South Kalimantan were the need for a high price, as well as a less efficient scale. Similarly, farmers in Java converted wetlands were due to the needs, the land was in an industrial area, and the price of land. Meanwhile, land sales price received by farmers in the process of conversion of land in Karawang, West Java, is significantly influenced by the status of the land, the number of workers absorbed in the land, distance from the tertiary canal, distance from the road, and the distance from the industrial area or residential.

Characteristics of wetland conversions are: 1) *Permanent*, meaning that the food problem will still be felt in the long term despite the conversion of land is not the case anymore ; 2) *Cumulative*, where the reduction of the area of wetland is permanent causing food problems caused by the conversion of wetland for a certain period will be the cumulative and 3) *Progressive*, meaning that once wetland conversion occurs at a location of the area of land converted in these locations will be greater due to wetland conversion occurring at locations along the vicinity. According Irawan (2005), there are 4 factors that cause wetlands conversion impact on the food problem cannot be immediately recovered: a) wetlands that were converted will not be able to go back to the rice fields (permanent); b) new wetland takes a long time about 5-10 years; c) resource can be used as wetlands become more limited; and d) Increased productivity of rice farming is also difficult due to stagnation of technological innovation.

2.2. Rainfed Lowland

Rainfed lowland is a source of irrigation rice fields depend entirely on rainfall in the local area. So, on the land can be accommodated (cistern) rain water, surface made flat and flat land, surrounded by galengan and water for irrigation is possible in the land for the time required. In general, the rainfed lowland planted to rice only once a year during the rainy season, while in the dry season, most of them experienced fallow until the next planting season. Rainfed lowland is one of the potential for agro food supply. For sustainable production in this area is needed sorting typology of land to choose technologies that can be applied. Segregation of land based on altitude, rainfall, evapotranspiration, types and soil properties, as well as site-

specific cropping. Sorting suitable varieties are also necessary to support the success of farming. (Sastrosoedardjo and Tohari , 2001).

Rainfed lowland is a provider of both food after rice irrigated land. Climate type of rainfed lowland according to the Oldeman's classification, including the type D and E with an average wet month is 3 months (Figure 1). Problems of agriculture in rainfed land, include: uncertainties intensity and distribution of rainfall, low soil fertility, weeds, pests and diseases, the narrow land ownership, low quality of agricultural products. The strategies that must be done is: accurate climate forecast, soil fertility enhancement, increased cropping intensity, and utilization of ground water or rainwater run-off through reservoir technology "*embung*"[1].

Sources : The average number of daily rainfall in Jakenan (Central Java) in 2008, 2009, 2010

Fig. 1: Rainfall Patterns Rainfed Lowland.

3. Method

Types of data collected in this study are primary and secondary data; time-series and cross-section types. The primary data of the survey obtained from interviews with 30 farmers using questionnaires as the approach. In the other hands, materials of secondary data obtained from the institutions associated with this study, both the central and local levels.

To answer the objective related factors that lead farmers took the decision to convert or not to convert his farm was answered by using binary logistic regression analysis. Mathematically it can be formulated as follows:

$$\left(\frac{Pi}{1-Pi}\right) = \alpha_1 + \beta_1 Log\,HG + \beta_2 LogHK + \beta_3 LogPT + \beta_4 LogLL + \beta_9 LogJK + \beta_5 LogLP + \beta_6 LogD1 + \mu_1$$

Where in:

P_1	=	Opportunity people to convert land
$1-P_1$	=	Opportunity people not to convert land
HG	=	Price of grain at the farmer level (Rp/kg)
HK	=	Latex price (Rp/kg)
PT	=	Total income of farmers (Rp)
LL	=	Area of land (ha)
JK	=	Number of family members (people)
LP	=	Long taking education (year)
D1	=	Dummy of soil fertility (acid = 1, no acidic = 0)

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4. Result and Discussion

The statistic of Omnibus test results known that sig = 0.001 which is less than 0.05, which means the decision: reject H_0. It can be concluded that the value of 19.052 G^2 with *p-value* 0.001 (model), which means with a confidence level of 95%, there is at least 1 independent variables that affect the dependent variable, so it can be concluded that the model can be used for further analysis. The results of the Hosmer and Lemeshow test output value sig = 0.245 is greater than 0.05 which means thank H_0, so the conclusion: with a 95% level of confidence, to believe that the logistic regression model used has enough/able to explain the data / fit. Partial test results indicate that the significant variables at the level of up to 30% are price of grain at the farmer's level (16.2%), number of family members (23.4%), and dummy of soil fertility (7%). Explanation of each variable is as follows:

Grain price at the Farmer's Level

Grain prices at the farmer's level significant influence on the level of 16.2% with a positive sign. Results of this study do not support the hypothesis that an increase in the price of grain at the farmer's level can be one of the incentives for farmers to keep trying to rice farming. These findings coincide with research of Purbiyanti (2013) which concluded that the combination of alternative policies and policy import prices suggests that prices of existing policies will not be effective if at the same time the government depends on the import policy, because that actually increases the availability of rice is imported policy there. Instead, the policy will be effective if the price of rice import policy eliminated in the long run.

Grain prices of at the farmer's level with a selling price of wet grain; more commonly known as dry harvest grain (GKP). The average price of grain at the farm level in September 2013 was Rp3 500.00/kg. The average production obtained is 2.669 tons. Rainfed rice farming in this area is done only one time in a year. This is because farmers plant rice in the rainy season only, so that the average rice farm receipts earned in a year is Rp7 828 000.00. After deducting production costs about Rp1 299 182.00, the average rice farming income earned during the year is Rp6 528 887.17 818.00 or about Rp17 000 a day. By using the World Bank poverty standard that is if the income of the poor day-to-day under 2 USD or approximately Rp20 000.00, assuming 1 USD = Rp10 000.00; the farmers of rice in this area are still under the poverty line.

Number of Family Members

The average number of family members is 3 sample farmers. Increasing the number of members will give consequence to increased family expenditure. In addition, increasing the number of family members also allow the fragmentation of land, so the land is getting smaller and harder to achieve efficiency in rice farming. Vast rainfed areas the average farmer who owned the sample is an area of 0.72 hectares, equivalent to "*1 bahu*". The majorities of the farmers' livelihood are as farmers and farm workers, although there is trade and builder. Sense of kinship and mutual assistance in this area are still good, so that several stages of rice farming done to work together, alternately helping other farmers.

***Dummy* of Soil Fertility**

Dummy variable of soil fertility affect significantly the level of 7%. The independent variables effect significantly in the opposite direction to the dependent variable. This indicates the increase in soil fertility will reduce the farmer's decision to convert his farm. A little number of day droughts resulting in paddy soil salinity increased. Less fertile land also led farmers provide fertilizer beyond measure. In addition, land is not flooded causing massive weed growth, thus requiring herbicides to eradicate. Dummy here means soil fertility soil fertility ever flooded and are not affected by flooding. Rainfed lowland which are located close to the river frequently flooded, which makes the soil acidic. Farmers in this area rarely use manure, they are more trusting of chemical fertilizers to address the less fertile land, though menur is very beneficial to improve soil physical and chemical properties. Besides the addition of manure, farmers also have to use drought-tolerant seed varieties. Farmers in this area have also been utilizing ground water with a simple pump system to irrigate their wetlands, while continuing to hope irrigation development be realized.

5. Conclusion

Government continues to run the efforts to reduce the rate of conversion of rainfed lowland; due to the importance of rainfed lowland also in the production of rice. The findings showed that the increase in the price of grain at the farm level is not enough to make the farmers not converting his farm. Government must optimize the efforts that have been made to improve the welfare of farmers, such as subsidizing agricultural inputs, working capital assistance, and mentoring, not to mention the construction of irrigation facilities. Development of irrigation facilities is also considered important to increase cropping intensity of rainfed rice. In addition, the government should also provide special incentives for farmers who still retain the rainfed lowland for rice farming.

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