

Assessing the Effects of Rice Land Function Transfer on Farmer Quality of Life

Sari Anggarawati, Yunus Arifien, Anak Agung Eka Suwarnata*, and Taufik Luqmanul Hakim

Nusa Bangsa University, Bogor, West Java, 16166, Indonesia

Abstract. This study explores the impact of the conversion of paddy fields on farmers' quality of life in Parung Panjang District, Bogor Regency. Income level, condition of house construction, asset ownership, and source of income are the parameters of the quality of life in this study. The analytical method used was descriptive quantitative with the Wilcoxon signed rank statistical test. According to the Organization for Economic Cooperation and Development, the concept that is used as reference is the theory of quality of life from an objective perspective. In 2017-2019, paddy fields in Parung Panjang District shrunk by 104.50 hectares, and the survey showed that the conversion of paddy fields is due to the massive construction of housing complexes. The impact of the life quality showed improvement in condition and the area of the house buildings by 16.1%, on contrary the study found that the ownership of paddy fields was decreased by 48.4%. Additionally, there was a reduction in the level of the economy based on income per month by 67.7%.

1 Introduction

Land is a natural resource for food, housing, economic activities, and state administrative facilities. Increasing population, urbanization, and economic activities require infrastructure and other supporting facilities that cause land conversion, especially agriculture. The increasing needs and demands for a better quality of life for the people encourage the expansion of land for housing, offices, and other infrastructure. The expansion of land is expected to be converted from agricultural land [1]. Conversion of land is a change in the function of some or the entire region of the land from its original function (as planned) to be the other functions that harm the environment and the potential of the land itself [2]. One of the land conversion activities that occurs is on agricultural land. The conversion of agricultural land has negative impacts that threaten national food security, decrease agricultural production, increase rural poverty, waste investment, and environmental impacts [3].

Based on the agreement figures of the Ministry of Agriculture of the Republic of Indonesia, the results of research in nine provinces of Indonesia's rice production centres, West Java Province, experienced a conversion of 3,662 hectares of paddy fields per year. Paddy fields, especially Bogor Regency, experienced a decrease of 8,440 ha (18.45%) in 8

* Corresponding author: 1985.agungeka@gmail.com

years [4]. Paddy fields have been shrinking since 2010, with an area of 45,740 hectares to 37,300 hectares in 2017.

According to information from the Agricultural Training Center I Parung Panjang Region (2021) [5], 4 out of 11 villages have experienced a significant conversion of agricultural land into housing, namely Jagabita, Lumpang, Cikuda, and Cibunar Villages. The average land in Bogor Regency is quite productive and fertile with organic fertilizers by farmers that contain sufficient pH, Cat-ion Exchange Capacity (CEC), and P to increase the productivity of paddy rice [6]. Several variables positively affect agricultural productivity, such as land productivity, total agricultural machine power, and conversion from agricultural land to built-up land [7]. The data also shows that as much as 40% of the available paddy field area in Bogor Regency, including in Parung Panjang District, is planted with *Jajar Legowo* system rice. The average income of *Jajar Legowo* rice farmers is IDR3,452,381 in one growing season with an area of 1,000 m² [8]. The land conversion occurred due to several factors, such as internal factors, where land prices and locations in the conversion land area had a significant effect. In contrast, external factors were population size and land conversion regulations [9].

The conversion of agricultural land results in changes in the quality and quantity of agricultural land, impacting the economic level and types of sources of income for farming communities. Apart from the economic level, the source of income also influences the health-related quality of life (HRQOL) of farmers in areas affected by the conversion of agricultural land [10].

Based on this background, it is interesting to study in detail the impact of the conversion of agricultural land, especially paddy fields, on farmers' quality of life, especially in Parung Panjang District, Bogor Regency.

2 Method

The research location was determined purposively in Parung Panjang Subdistrict, Bogor Regency, Indonesia, at the end of 2021, by selecting villages that experienced the highest number of land conversions, namely Cikuda, Lumpang, Kabasaran, and Cibunar Villages [11].

The population in this study are people who use paddy fields as a livelihood, so they are directly related to the impact of land acquisition for paddy fields in the four villages. The sampling technique was Snowball Sampling [11]. The sampling was grouped based on landowners, landowning farmers, sharecroppers, and farmworkers whose land was converted. The first step is plotting the study location experiencing land conversion. Furthermore, primary data collection was completed by completing questionnaires, interviews, and observations. The questionnaires were used to compare the quality of life before and after the conversion of paddy fields. Parameters of quality of life collected and analyzed relate to housing conditions, asset ownership, number of sources of income, and the economy.

The quality-of-life parameters in the study consist of economic parameters referring to the minimum work wage level of Bogor Regency in 2021 with aspects of income level and ability to finance life and family. The building condition parameter refers to the characteristics of the building according to the Indonesian Central Bureau of Statistics with aspects of the physical condition of the building, building area, and land area. Asset ownership parameters are seen from the aspect of personal and commercial asset ownership. Parameters of sources of income are profession, side job, and business unit.

Secondary data was derivate from the Department of Food Crop Agriculture, Horticulture and Plantation, and the Bogor Regency National Land Agency, covering the

area of land that has changed function, the type of change in land function (sector), and other official sources.

Data analysis in research uses the Time Value of Money formula. The Time value of money is separated into future value and present value [12]. The money value of farmers' income before the conversion of paddy fields is calculated using the future value formula, namely:

$$Fvn = Pv (1 + i)^n \quad (1)$$

Where:

Fvn : Future value at the end of the year and (Future Value n)

Pv : Present value (Price Value)

I : Interest rate

n : The year

Furthermore, the Wilcoxon signed rank test analysis aims to measure the significance of the difference between 2 groups of paired data on an ordinal or interval scale, but the data is not normally distributed. The Wilcoxon Signed Rank Test is an alternative test to the paired t-test or paired t-test if it does not meet the normality assumption. This test is also known as the Wilcoxon Match Pair Test. The Wilcoxon test is more sensitive than the t-test in determining differences between population means. The basis for deciding on the Wilcoxon signed rank test is as follows:

- If the probability (Asymp. Sig) < 0.05, then the null hypothesis (Ho) is accepted, and the alternative hypothesis (Ha) is rejected.
- If the probability (Asymp. Sig) > 0.05, then Ha is accepted, and Ho is rejected.

This study used the Wilcoxon signed-rank test to analyze the differences in each aspect/item in the quality-of-life parameters before and after the conversion of paddy fields. Data analysis using the Wilcoxon signed rank test method was done using the SPSS version 25 program.

3 Result

3.1 The dynamics of the conversion of paddy fields in Parung Panjang District

Table 1. Paddy field area of Bogor Regency and Parung Panjang District [14].

	Years		
	2017	2018	2019
Bogor Regency			
Land area (hectare)	47,154	46,786	46,559
Change (hectare)	-	(-368)	(-227)
Percentage change	-	(-0.78%)	(-0.49%)
Parung Panjang District			
Land area (hectare)	1,591.50	1,591.50	1,487.00
Change (hectare)	-	-	(-104.50)
Percentage change	-	-	(-6.57%)
Land Area of Parung Panjang District to Bogor Regency			
Percentage of land area	3.38%	3.40%	3.19%
Percentage change	-	-	46%

The conversion of paddy fields in Parung Panjang District occurs systematically with an 'enclave' pattern, namely a pattern of land conversion carried out simultaneously in a certain

area [13]. Data obtained from the Bogor Regency Horticultural Food Crops and Plantation Office (2017, 2020) shows no decrease in the number of paddy fields in Parung Panjang District in 2018, while in 2019, there was a decrease of 104.50 Ha. Table 1 shows the total area of paddy fields that have shrunk in Bogor Regency in 2019 is 227 Ha. By comparing the total area, it can be seen that in 2019, 46% of the total area of shrinking paddy fields in Bogor Regency occurred in Parung Panjang District.

The results in the field show that the conversion of paddy fields is mostly converted into property or housing complexes. The impact that might arise is that greenhouse gases (GHG) have broad environmental effects by trapping heat and causing climate change and air pollution [15], the risk of flooding in the region [16], or, conversely, drought occurs [17].

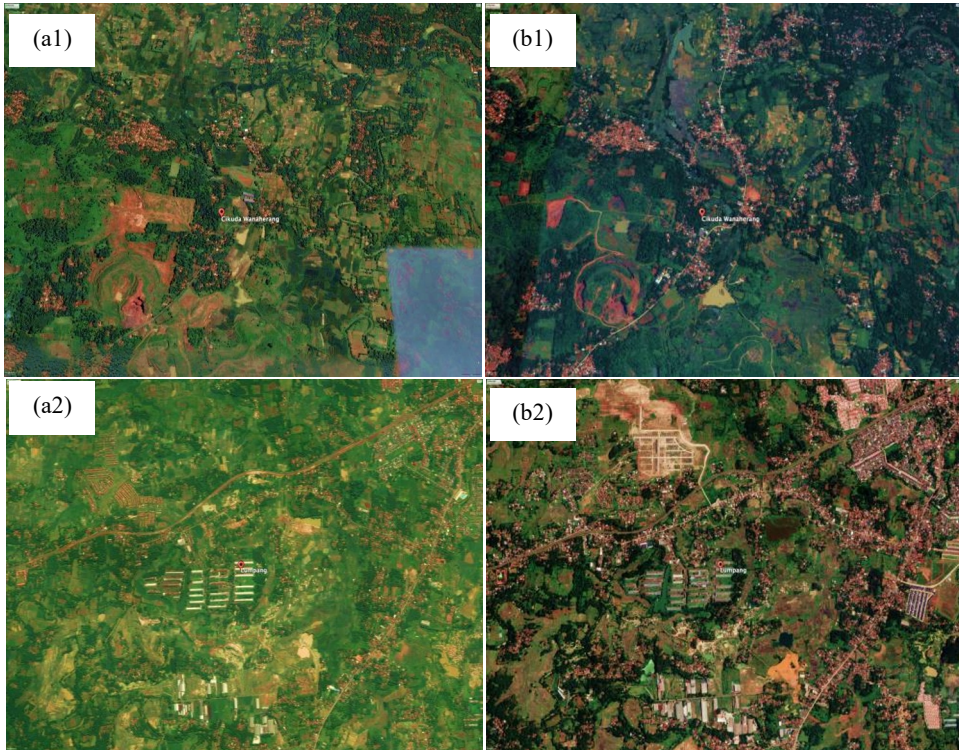


Fig. 1. The transformation of land before (a) and after conversion (b) in Cikuda Village (a1 and b1), in Lumpang Village (a2 and b2), Parung Panjang District area [18].

Table 2. Reasons for selling paddy fields

Respondent group	Reasons for selling paddy fields			
	Need money	Concurrent release	Inheritance	Buy land
Landowner		2	1	1
Farmers own land	1	11		1
Amount	1	13	1	2
%	6%	76%	6%	12%
Total				17

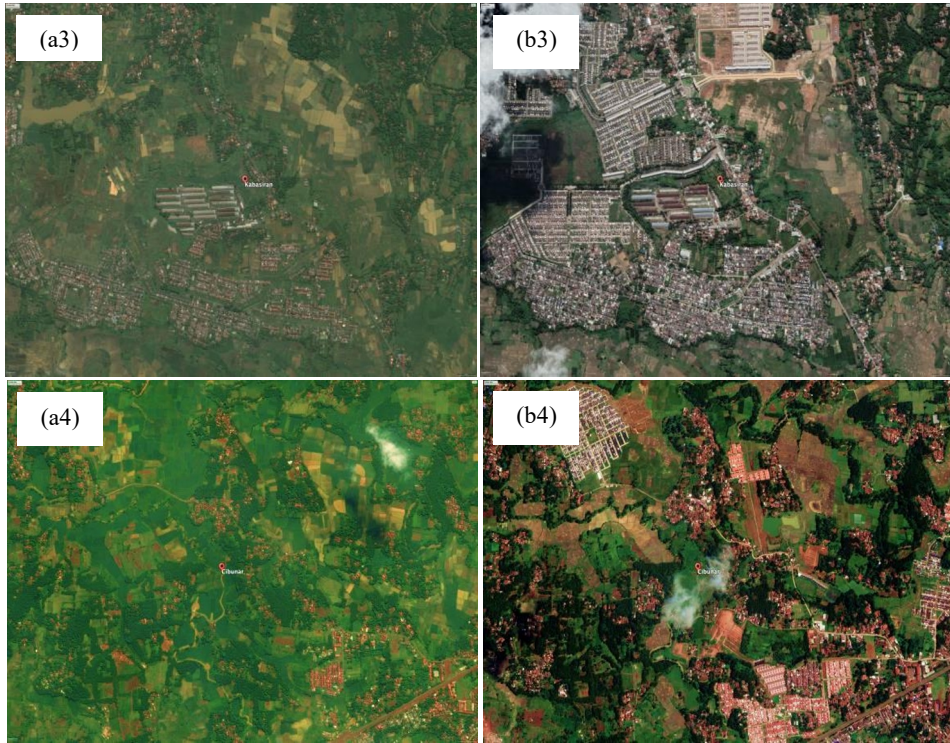


Fig. 2. The transformation of land before (a) and after conversion (b) in Kabasiran Village (a3 and b3), in Cibunar Village (a4 and b4), Parung Panjang District area [18].

Based on Table 2, up to 76% of respondents sold the rice field because of simultaneous land acquisition, while as much as 12% had reasons to purchase more paddy fields elsewhere, 6% of respondents sold the land because they needed money, and 6% sold land to be distributed as inheritance. However, they all sold their land for reasons of being less fertile and productive. There are indications that the agricultural land that has changed its function is still fertile and productive. The most dominant factors encouraging the farmers to shift ownership of rice fields to other non-farmers are family economic pressures or difficulties, business capital needs, children's education costs, and formal events [19].

Changes in land use can be seen in Table 3. Two of the five respondents who owned the land no longer used it for agricultural purposes. Of the 12 farmers who owned the land, four changed to sharecroppers, and two no longer worked on the farm. Of the nine cultivators, there was no change in land use status. Of the five farm workers, only one remains a farm worker, while the other four no longer work on the farm.

Table 3. Changes in status before and after the conversion of paddy field functions

Before the conversion of paddy field functions	After the conversion of paddy field functions				
	Landowner	Farmers own land	Sharecropper	Farm workers	There isn't any
Landowner	3	-	-	-	2*
Farmers own land	-	6	4*	-	2*
Sharecropper	-	-	9	-	-
Farm workers	-	-	-	1	4*

An asterisk in Table 3 means there is a change. The reasons why there was no change in the group of sharecroppers included (1) lack of sufficient capital to run other businesses; (2)

do not have adequate skills other than farming, and (3) because of old age, they have no other choice.

3.2 Quality of Life Changes

First, the results of data analysis based on the physical characteristics of buildings, according to the Indonesian Central Bureau of Statistics, are divided into three types: permanent, semi-permanent, and non-permanent. Respondents who contract fall into the category of not owning a house. Changes in the condition of houses after the conversion of paddy fields can be seen in Table 4.

Table 4. Changes in the condition of houses after the transfer of rice field functions

Aspect	Increase	Constantly	Decrease	Z	Asymp. Sig. (2-tailed)	Hypothesis testing
Building conditions	5	26	-	-2.236 ^b	0.025	< 0.05 ^e
	16.1%	83.9	-			
Building area	5	26	-	-2.023 ^b	0.043	< 0.05 ^e
	16.1%	83.9%	-			
Land area of the house	1	29	1	-.447 ^c	0.655	> 0.05 ^d
	3.2%	93.6%	3.2%			

Wilcoxon Sign Test Rating

b. Based on negative ratings.

c. Based on positive ratings.

d. The Null Hypothesis (Ho) accepted

e. The Null Hypothesis (Ho) was rejected

Table 4 shows an analysis of 31 respondents, including five people (16.1%) respondents who experienced an increase in the condition of the building and the area of the house, one person (3.2%) respondents experienced a decrease in the area of the house's land and one person (3.2%) the respondent experienced an increase in the area of house land after the conversion of paddy fields.

Furthermore, the results of the Wilcoxon different test were the Asymp. The sig value for the condition of the house building is 0.025 (<0.05), the area of the house is 0.043 (<0.05), and the land area of the house is 0.655 (>0.05). Thus, there is a significant difference in the condition of the building and the area of the house before and after the conversion of paddy fields. At the same time, there is no significant difference in the condition of the land area of the house before and after the conversion of paddy fields.

Furthermore, an analysis of changes in quality of life is assessed from an analysis of asset ownership in conditions before and after the conversion of paddy fields, presented in Table 5.

Of the six items tested in the asset ownership parameter, only one item experienced a change, namely agricultural land ownership, because the test results showed an Asymp.Sig value of 0.005 (<0.05) means there was a real difference in agricultural land ownership in the conditions before and after the conversion of paddy fields. The changes occurred with an increase of 6.5% and a decrease of 48.4% of the respondents. The changes that occur tend to indicate a decrease in land ownership. The Paddy field area shrank by 79,500 m² from 134,600 m² to 55,100 m². The same thing also happened to the number of respondents who owned land, from 18 respondents to 11 respondents.

The results of the analysis based on income sources, showed that there was a decrease in the source of income for 8 (25.8%) respondents, and 4 (12.9%) respondents experienced an increase after the conversion of paddy fields. Meanwhile, 19 (82.9%) respondents had some sources of income that did not change. Statistically, the Asymp.sig value of the source of

income test is 0.356, higher than ($>$) 0.05, so H_0 is accepted; thus, it can be concluded that there is no real difference in the number of sources of income in the conditions before and after the conversion of paddy fields.

Table 5. Changes in ownership of private assets and commercial assets after the conversion of paddy fields

Items	Increase	Constantly	Decrease	Z	Asymp. Sig. (2-tailed)	Hypothesis testing
Motorcycle	4	26	1	-1.518 ^b	0.129	$> 0.05^d$
	12.9%	83.9%	3.2%			
Car	3	28	-	-1.633 ^b	0.102	$> 0.05^d$
	9.7%	90.3%	0%			
Pickup truck/truck	1	30	-	-1.000 ^b	0.317	$> 0.05^d$
	3.2%	96.6%	0%			
Agricultural Machinery	2	28	1	-1.069 ^b	0.285	$> 0.05^d$
	6.5%	90.3%	3.2%			
Commercial Building	2	29	-	-1.414 ^b	0.157	$> 0.05^d$
	6.5%	93.5%	0%			
Agricultural land	2	14	15	-2.817 ^c	0.005	$< 0.05^e$
	6.5%	45.1%	48.4%			
Average	2	26	2.8			
	6.5%	83.3%	9.1%			

Wilcoxon Sign Test Rating

b. Based on negative ratings.

c. Based on positive ratings.

d. The Null Hypothesis (H_0) accepted

e. The Null Hypothesis (H_0) was rejected

The results of the analysis based on the number of sources of income, showed a decrease in the number of sources of income for 8 (25.8%) respondents, and 4 (12.9%) respondents experienced an increase after the conversion of paddy fields. Meanwhile, 19 (82.9%) respondents had several sources of income that did not change. Statistically, the Asymp.sig value of the source of income test is 0.356, higher than ($>$) 0.05, so H_0 is accepted; thus, it can be concluded that there is no real difference in the number of sources of income in the conditions before and after the conversion of paddy fields. The source of income test results is intended to interpret something other than the amount of income. In this parameter, the difference is only the number of sources tested, not the amount of income from these sources.

Furthermore, it is analyzed related to the level of the economy, which is measured based on the average income of respondents per month in conditions before and after the conversion of paddy fields. The amount of money is equalized first by calculating the future value. In this way, the data on the amount of money before land conversion is converted to the present value of money so that the value is comparable.

The results obtained from the analysis of 31 respondents, as many as 21 (67.7%) respondents experienced a decrease in income, and 10 (32.3%) respondents experienced an increase in income. Statistical analysis of the Wilcoxon Signed Ranks Test different tests shows an Asymp.Sig value of 0.042. This value is less than (<0.05), so it can be concluded that there is a significant difference between income per month in conditions before and after the land is converted.

The increase in average income occurred in the landowner group with a value of IDR 10,355,616.82 before the conversion of the rice fields to IDR 10,440,000.00 after the conversion of the rice fields. In the group of land-owning farmers, the average income

before the conversion of paddy fields was IDR 3,156,810.68 to IDR 2,274,166.67 after the conversion of paddy fields. Likewise, with sharecroppers and farm laborers, there was a decrease in the average income after the conversion of paddy fields.

From the results of observations and interviews, it was found that the increase in income experienced by landowners was due to (1) already having non-agricultural business units with relatively stable income, such as plastic milling factories, brick-making factories, and non-agricultural business units so that they did not affect monthly income. This research results align with Kihende and Ogundeji's research, which states that creating jobs outside of agriculture will complement jobs on agricultural land and increase household income [20], (2) having qualified resources and knowledge in managing finances and the business unit undertaken. Meanwhile, landowners, sharecroppers, and farm laborers experienced a decline because (1) they still depended on agricultural land, (2) skills outside the agricultural sector are limited, so they have limited abilities, (3) limited capital to open other businesses. A financial decline can create financial pressure for farmers, thereby reducing the life satisfaction of these farmers [21].

According to Jussaume's research results, non-agricultural household owners perceive their physical quality of life as more positive than part-time farmhouse owners. The data from his research also shows that non-agricultural residents in Japan do not feel that part-time farmers should be forced out of agriculture. Their quality of life indicates that both agricultural and non-agricultural residents recognize that there are few viable lifestyle alternatives currently available to most Japanese part-time agricultural household residents should they be forced off agriculture entirely.

4 Conclusions and suggestions

4.1 Conclusions

In the 2017-2019 period, paddy fields in Parung Panjang District shrank by 104.50 hectares, and the survey shows that the conversion of paddy fields is due to the massive construction of housing complexes. The impact of the quality of life studied showed an increase in the condition and area of the house by 16.1%, a decrease in ownership of paddy fields by 48.4%, and a reduction in the level of the economy based on income per month by 67.7%.

4.2 Suggestions

The suggestion for further research is to study how land conversion activities deepen the quality of life affected by the conversion of paddy fields, as well as explore community groups that are vulnerable to changes in the function of paddy fields.

Relevant agencies as parties that influence agricultural policy can consider the importance of the existence of paddy fields as a very important production factor in agriculture and understand the needs of farmers as actors of production and the needs of agricultural products, especially food crops, as supports for social, economic and political stability.

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