BHUMI: Jurnal Agraria dan Pertanahan
Volume 10, Number 1, May 2024

ISSN: 2442-6954
e-ISSN: 2580-2151
Doi: https://doi.org/10.31292/bhumi.v10i1.753

Analysis of The Impact of Agricultural Land Conversion Towards Food Security in The Special Region of Yogyakarta Province

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Received: April 30, 2024; Reviewed: October 9, 2024; Accepted: October 22, 2024

Abstract: The Special Region of Yogyakarta is known as a student city, a tourist destination, a place to work, and a place to live. Population growth and rising living standards have driven land demand for housing and economic activities, forcing land conversion. The shift from agricultural to non-agricultural land use has significant impacts, particularly on food supply in the region. This research aims to analyze the effect of agricultural land area on food security in Yogyakarta. The method used includes Supervised Classification analysis to determine the distribution and rate of land conversion, and correlation analysis to assess the cost of food security. The results show that wetland conversion has led to a loss of rice production in Yogyakarta amounting to 13,726 tons per year, or 123,534.73 tons over the past nine years. However, food security in the region remains unaffected despite the conversion of wetland areas.

Keywords: Agricultural land conversion, Food availability, Food security, Supervised Classification

INTRODUCTION

The increase in population and living standards has led to a growing demand for land for housing and other economic activities. This land is often sourced from productive rice fields that have adequate infrastructure and are typically located near urban areas (Purwaningsih et al., 2015). Uncontrolled agricultural land conversion to non-agricultural use will result in reduced agricultural production. The trend of converting agricultural land to non-agricultural purposes will have a significant impact, especially on the availability of food raw materials in a region (Kumalasari et al., 2023), as food is a basic necessity for every human being. The higher the rate of land conversion, the more it will affect food security stability. Indirectly, land conversion reduces agricultural land area, which impacts the harvested rice area. This can affect rice productivity and, ultimately, the availability of rice. The availability of rice can serve as an indicator of food security in a region (Santosa et al., 2011).

The need for food is expected to continue rising along with population growth (Sunanto & Rauf, 2018). This population growth necessitates an increase in food availability and production, while agricultural land conversion continues to rise (Nanda et al., 2019). The unbalanced demand and availability of land have led to various land use issues,

including the reduction of agricultural land for settlements, industry, and other non-agricultural purposes (Isdiyana K. A., 2018).The unbalanced need and availability of land have resulted in several new land use problems, including reducing agricultural land for settlements, industry, and other non-agricultural purposes (Isdiyana K. A., 2018). The increasingly high intensity of development demands large land areas for various development needs and forces the conversion of agricultural land to non-agricultural land with all the consequences (Isdiyana K. A., 2018). These developments have made it increasingly more work for farmers to avoid being forced to give up their land due to the practice of permitting land conversion based on Regency/City Regional Spatial Plans on the grounds of development interests that lead to land conversion (Isdiyana K. A., 2018).

Indonesia is a country with a very large population, and this number continues to increase every year (Badan Pusat Statistik, 2021). As a result, Indonesia is vulnerable to land conversion (Prabowo et al., 2020). With the advancement of time, the existence of agricultural land is increasingly threatened by development and population growth. This situation creates significant challenges regarding rice availability and the widespread conversion of agricultural land into non-agricultural uses, such as residential areas, industries, retail spaces, and tourism. These changes weaken food security, as productive agricultural land is turned into land for housing or other constructions (Ngongo et al., 2023).

Food security in Indonesia still faces various serious challenges, closely related to global issues concerning food security, as outlined in Sustainable Development Goal (SDG) number 2: Zero Hunger. The challenges are not only related to national production capabilities in meeting food needs but also influenced by weak domestic demand due to high dependency on imports and the lack of a systematic portfolio strategy in national food security policies. Although free trade and regionalization were expected to provide opportunities for Indonesia to expand the market for local food products, in reality, imported products dominate the domestic market (Miyasto, 2020). The issue of food security arises due to the problem of food insecurity; this occurs because of the impact of changing the function of agricultural land to non-agricultural land. Conversion of agricultural land is increasing yearly; if this situation continues and there is no special treatment, it will cause various impacts, including food insecurity (Nurpita et al., 2018). Land is a part of land on the earth's surface with broad characteristics and functions, and various kinds of wealth are contained therein (D.Dewinta, 2017).

The Yogyakarta Special Region Province has its attractions, including educational centers, tourist destinations, residential destinations, cultural development destinations, etc. This causes development due to the drastic increase in population growth, requiring additional space. This development is good for increasing the standard of living and welfare of the community. However, if development is not balanced with the availability of land, the impact will be very severe, especially regarding food security. Therefore,

considering the importance of food security and the fact that Yogyakarta is still classified as a poor region, the government is making significant efforts to improve food availability by prioritizing higher domestic production (Prasada & Rosa, 2018).

Based on the book of the Yogyakarta Special Region Province in 2022 figures, the population growth rate has increased from 0.58% to 1.61% in 2020 - 2021. The phenomenon of land conversion is essential to control or control because in Law Number 41 of 2009 Regarding the Protection of Sustainable Food Agricultural Land (LP2B), article 19 defines that LP2B is part of the determination of the Detailed Spatial Planning Plan (RDTR), which must be protected. The research referenced by the author is a study by Anisa Nurpita et al., 2018 (Nurpita et al., 2018), which revealed that before land conversion, Temon Subdistrict in Kulon Progo Regency had a food insecurity rate of 87%, which increased to 90% after land conversion. Food security in the area also declined, from 13% before land conversion to 10% afterwards.

Land conversion has been occurring in various provinces in Indonesia, including in the Special Region of Yogyakarta. As a student and tourist city, Yogyakarta has experienced an increasing demand for land for non-agricultural purposes such as housing, investment, warehousing businesses, industrial centers, and the tourism sector (Prihatin, 2015), driving the conversion of agricultural land to non-agricultural land. The Special Region of Yogyakarta has seen consistent conversion of paddy fields since 1990 until 2015. According to data from the Yogyakarta Central Statistics Agency (2016), the area of paddy fields in the region decreased by 4.82% over the last decade (2006-2015), with an average annual decline rate of 0.48%.

Based on data from BPS on rice field areas in D.I. Yogyakarta for 2015-2019, significant fluctuations were observed across various districts/cities. Sleman Regency, which had the largest area in 2015 (21.856 ha), experienced a decline to 18,129 ha in 2018 before slightly increasing to 18,295 ha in 2019. In contrast, Gunung Kidul saw a significant increase, from 7.718 ha in 2015 to 31,869 ha in 2018, and continued to grow to 31.973 ha in 2019. Bantul experienced steady growth from 14.116 ha in 2015 to 14.945 ha in 2019, while Kulon Progo also increased from 9.806 ha in 2015 to 11,053 ha in 2018, though it slightly declined to 11.008 ha in 2019. The City of Yogyakarta had the smallest area, remaining consistent at around 50 hectares. Overall, the rice field area in DIY peaked in 2018 at 75.963 ha and increased slightly to 76.272 ha in 2019, mainly driven by the significant rise in Gunung Kidul. These notable fluctuations highlight varying trends between regions in DIY, particularly the decline in Sleman and the sharp increase in Gunung Kidul.

The additional area of rice fields apart from the Gunung Kidul area is also in the Bantul Regency area. The Bantul Regency Government is utilizing critical or unproductive land in the area to plant crops and increase the area of rice fields to strengthen food security (Alamsyar, 2022). In parts of the Bantul Regency, several lands have not been managed

well, so the Bantul Regency Government utilizes these lands for the community's welfare (Assidiq, 2022). This additional agricultural land offsets the JJLS development plan, which will pass through the Bantul district and displace rice fields. So, the Bantul Government is opening critical land into agricultural land with an irrigation system, and the Bantul Regency is one of the national food-supporting districts. Every year, it experiences gradual increases and decreases. This is due to differences in data collection by the Central Statistics Agency from 2016 to 2017 and 2018 to 2021, which were verified by the Agency using the KSA (Area Sample Framework) method. This difference was caused by the increase in land area in 2018. The area of rice fields in Gunung Kidul Regency experienced a significant increase. This was one of the factors that caused the difference in land area in the previous and following years.

The Yogyakarta Special Region Province has a special Regional Regulation on the Protection of Sustainable Food Farming Land. The D.I.Yogyakarta Provincial government issued Regional Regulation Number 6 of 2021 concerning Amendments to the Regional Regulation of the Special Region of Yogyakarta Province Number 10 of 2011 concerning the Protection of Sustainable Food Agricultural Land. Article 1 Paragraph 11 explains that Sustainable Food Agricultural Land Protection is a system and process for sustainable planning, determining, developing, utilizing, fostering, controlling, and monitoring food agricultural land and its areas. That is why research related to the impact of converting agricultural land to non-agricultural land is fundamental; it can be used as an indicator to determine food security.

Agricultural land in the Special Region of Yogyakarta Province has experienced land conversion over the last nine years. Based on data from BPS D.I. Yogyakarta, land conversion has decreased gradually over the last nine years. Changes in the area and rate of conversion of agricultural land in D.I.Yogyakarta can be seen in Table 1. The area of rice fields in the last nine years has increased and decreased. Changes in rice fields yearly due to printing or opening new rice fields and land conversion activities amount to 2,663 hectares, with an average conversion of rice field areas of 23,965 hectares per year. The rate of land conversion that occurred in the last nine years is relatively high, namely 4.94% per year. The high conversion rate of paddy fields indicates the potential for significant losses in rice production so that food availability could be reduced. The high conversion rate of rice fields is also due to regional development plans, both provincial and district plans. This causes a reduction in rice fields. For this reason, several DIY Province districts are acting to clear or print rice fields to adjust regional spatial plans. One is the Gunung Kidul Regency area, which is taking action to replace rice fields where rice fields have been converted. The action of the Gunung Kidul Regency agricultural office to increase the area of rice planting land and make Gunung Kidul Regency a rice granary for the particular region of Yogyakarta.

The data shows that the land conversion rate over the past nine years has been relatively high, reaching 4,94% per year. This high rate of paddy field conversion indicates a significant potential loss in rice production, which could reduce food availability. The rapid rate of paddy field conversion is also driven by regional development plans at both the provincial and district levels, leading to a reduction in paddy fields. In response, several districts in the Special Region of Yogyakarta have taken action by creating new paddy fields to align with regional spatial plans. One example is Gunung Kidul Regency, which has initiated measures to replace the lost paddy fields due to land conversion.

Given the background of this research problem, it is crucial to conduct a study on the impact of agricultural land conversion on food security, as Yogyakarta is a student city that attracts a significant number of people for education, work, and other purposes. The influx of residents has increased the demand for housing development, resulting in the conversion of agricultural land. This, in turn, has led to a decline in rice production, contributing to uncontrolled food security issues.

METHODS

Yogyakarta Special Region is a province in Indonesia located in the southern part of Java Island and is in direct contact with Central Java Province and the Indian Ocean. With the capital Yogyakarta D.I.Yogyakarta Province is located at 7°33' - 8°12' South Latitude and 110°0'110°50' East Longitude. With an area of 3,185.80 Km2 or 0.17% of Indonesia's area. D.I.Yogyakarta Province is divided into 5 level II regions: (a.) Yogyakarta Municipality, (b.) Bantul Regency, (c.) Gunung Kidul Regency, (d.) Kulon Progo Regency, and (e.) Sleman Regency. This region has an area of 3,185.80 Km2, or 0.17% of the total area of Indonesia. Administratively, this region borders directly on Magelang Regency to the northwest, Klaten Regency to the northeast, Wonogiri Regency to the southeast, Purworejo Regency to the west, and the Indian Ocean to the south. The distribution of the Yogyakarta Special Region province is shown in Figure 1.

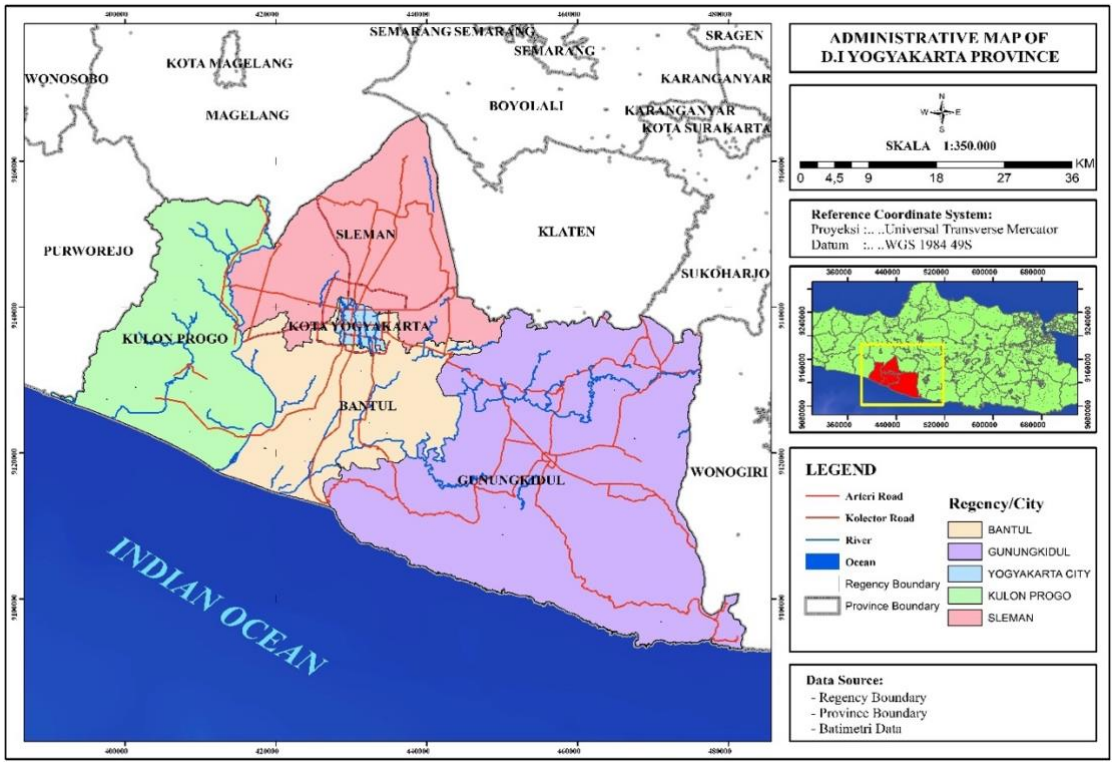

Figure 1. Administrative map of Yogyakarta Special Region Province.
Source: Author, 2023

The data that will be used in this research is secondary data obtained from agencies related to the problem being researched. Detailed data is shown in Table 1.

Table 1. Secondary Data Used

No	Secondary Data	Function	Source
1	Landsat 8 Imagery 2014-2022	Used to create a map of the level of spatial distribution of agricultural land conversion and its influencing factors	USGS Earth Exploler
2	Rice Productivity Data 2014-2022	Used as an analysis of the rate of land depreciation and as an analysis of lost paddy production	BPS & Satudata Indonesian Agriculture by Province
3	Data on the area of agricultural land for paddy fields 2014-2022		
4	Data on Monthly Per Capita Expenditures of DIY Residents for Grains 2014-2022	Used as an analysis of population consumption and food needs	BPS of Yogyakarta Special Region Province
5	Rice Price Data 2014-2022		
6	Population Data 2014-2022		

7	GKG Production Data 2014-2022	Used for analysis of rice production and food availability	BPS of Yogyakarta Special Region Province & Food Ingredients Balance by Province in Indonesia
8	Rice and Paddy Conversion Data 2014-2022		

Source: Personal Data.

Data processing in this research uses image interpretation. Land use classification utilizes the multispectral image classification method known as supervised classification. This method offers the advantage of controlling informational classes based on training samples and providing control over classification accuracy. However, the drawback of this method is that data interpretation may be forced, the selection of training samples may not always be representative, and there may be unidentified spectral classes. This study employs the type of supervised classification called maximum likelihood. Maximum likelihood has the advantage of quantitatively evaluating the variance and correlation of spectral response patterns when classifying unknown pixels.

Partial method was used in this research. This method is used to calculate the rate of land conversion. With the following formula:

$$V = \frac{Lt - Lt_{-}^{1}}{Lt_{-1}} X\ 100\%$$

Note:
V = Land Use Transfer Rate (%)
Lt = Land Area in Year t (Ha)
Lt_{-1} = Land Area in the Year Before t (Ha)

The rate of conversion of agricultural land can be determined from the difference between the land area in year t and the area of agricultural land in the year before t, then divided by the area of agricultural land in the previous year and multiplied by 100%, the value of V (rate of land conversion) < 0 means it has occurred shrinkage (Arisa Nurelawati, Joko Sutrisno, 2018).

Calculation of Lost Rice Production is used to determine the amount of loss of rice production due to the conversion of paddy fields by using data on rice productivity (tons/ha) and the area of conversion of paddy fields (ha) (Prasada & Rosa, 2018).

$$PPH = Pdvt\ X\ At$$

Information :
PPH = Lost rice production
Pdvt = Rice productivity
At =Area of land conversion

Calculation of food security is used to determine the impact of changing the function of rice fields on food security. Population food security can be achieved if the amount of food available in an area can meet the community's food needs. In calculating food security, the calculation cannot be separated from 3 aspects, namely:

Food Available

This calculation is calculated using the following formula:

Available food = Rice production – Rice conversion factor.

Rice conversion factors are rice for seed needs, food needs, non-food industrial needs, and scattered rice.

Food consumption and food needs

The food consumption of the population in DIY Province can be seen from data on the monthly per capita expenditure for grains. The calculations in this analysis use the following formula:

$$Consume\ rice = \frac{Data\ on\ monthly\ per\ capita\ population\ expenditure}{The\ \ prevailing\ price\ of\ rice\ in\ the\ year}$$

Population food needs = per capita consumption data X population

Food security

Food security is seen from the food surplus or deficit that occurs in the Yogyakarta Special Region Province using the following calculations:

Surplus = Food available > or = Food Requirements (food security)

Deficit = Food available < Food needs (food insecurity)

Food figures with a significant surplus value indicate a high level of food security; the higher the food deficit, the lower the level of community food security (Prasada & Rosa, 2018).

This research uses correlation analysis. The correlation test is a reciprocal or causal relationship. The correlation test in statistics is an analytical technique used to determine whether there is a relationship between the two variables tested: the independent variable (Rate of land conversion) and the dependent variable (Availability of rice). See Figure 2 to make it easier to understand the research flow.

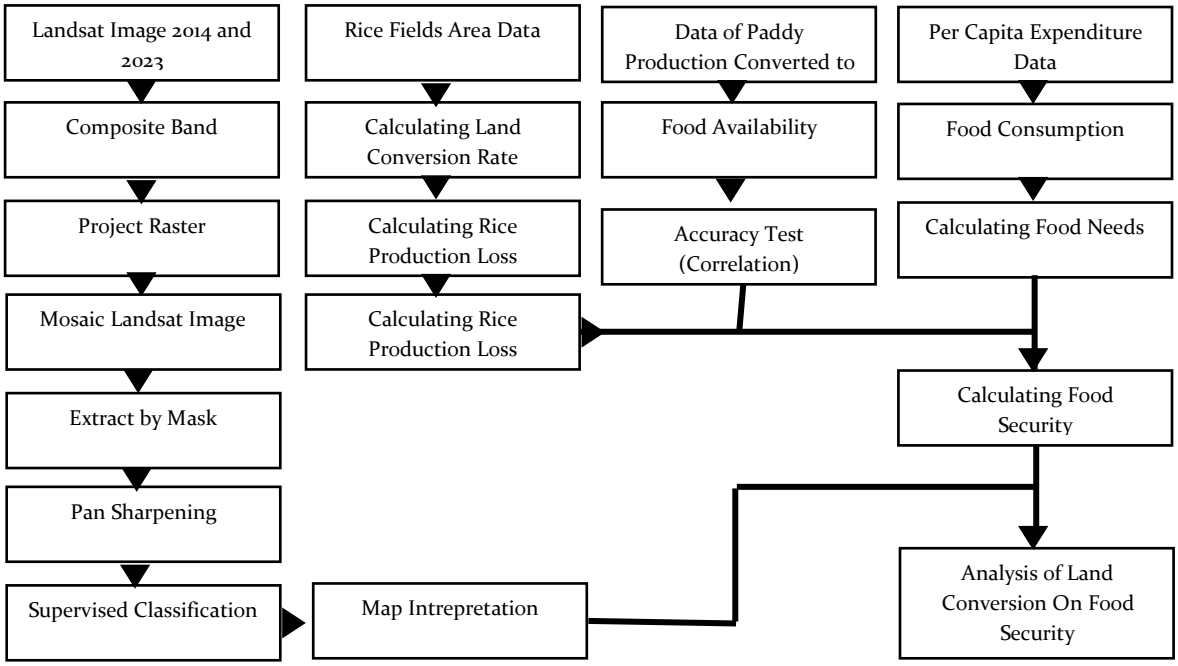

Figure 2. Research flow diagram.
Source: Author (2024).

RESULTS AND DISCUSSION

Level of Spatial Distribution of Land Function Transfer Rate

Figure 3 shows the results of Landsat image interpretation in 2017 and 2018. It can be seen that there has been an increase in the area of rice fields in the Bantul Regency and Kulon Progo Regency areas with a light green interpretation color. The increase in land area that occurred in these two regions was due to regional or provincial development plans so that the two regions replaced converted rice fields by opening critical land into rice fields, provided that the iron or aluminum elements in the critical land were not high so that plants such as rice, secondary crops, and horticulture can grow well without any toxic content due to high levels of iron or aluminum.

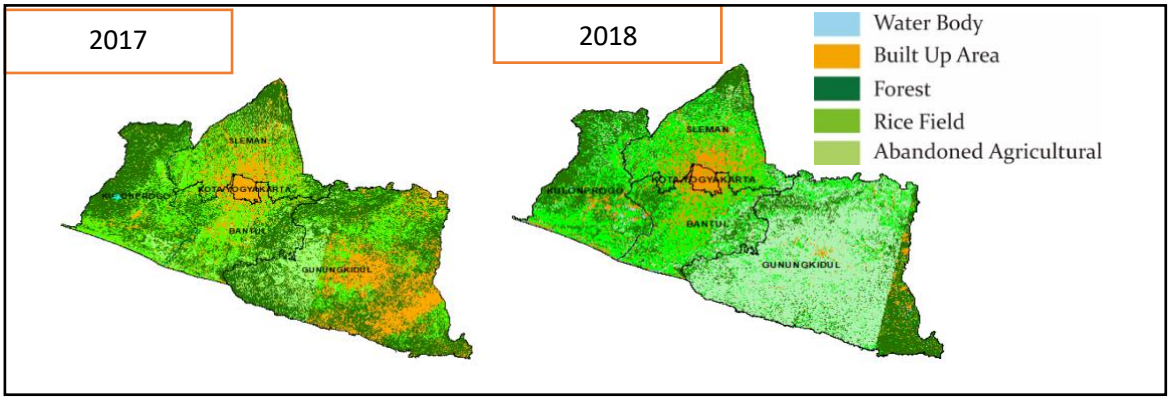

Figure 3. Landsat image interpretation in 2017 and 2018
Source: Author, 2024.

Meanwhile, the Kulon Progo Regency and Bantul Regency areas are the centers of natural tourism in DIY, for example, Parangtritis Beach, Baros Beach, Glagah Beach, Gumuk Pasir, Paragliding, Pine Forest, and so on. Thus, the conversion of agricultural land in this area has changed to building settlements in the form of hotels, villas, or other accommodations. In this area, some activities cause high levels of land conversion, namely, the construction of the Yogyakarta International Airport (YIA), which is in Kulon Progo Regency and is traversed by the Southern Cross Route in the areas of Gunung Kidul Regency, Bantul Regency, and Kulon Progo Regency.

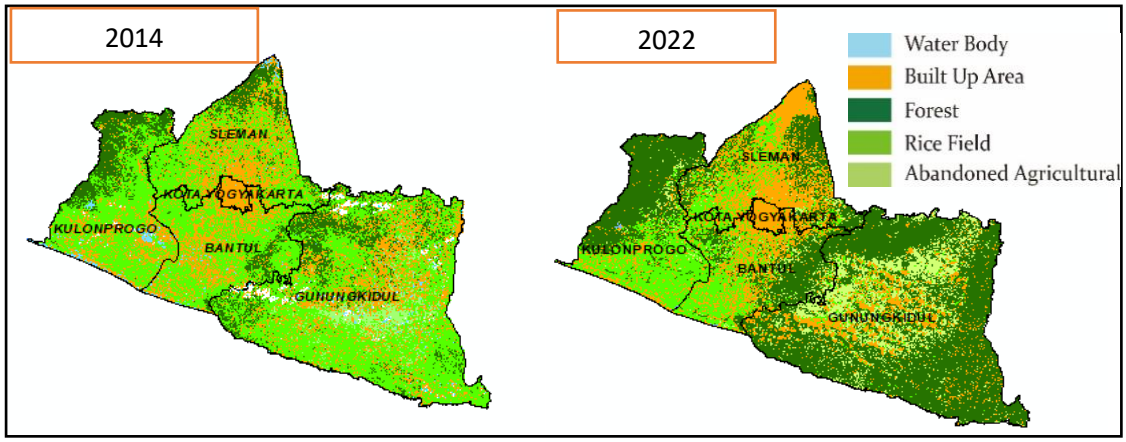

Figure 5. Landsat image interpretation in 2014 and 2022
Source: Data Processing 2024.

Land Function Transfer on Food Security

Land conversion is one of the negative factors in achieving food security. The change from agricultural land to non-agricultural land increases the rate of land depreciation, causing a decrease in rice production. So that there is an impact on meeting food needs. Suppose people's food needs are met properly. By seeing that the value of availability is greater than the value of needs, it can be said that the community is food secure. Community food security can be achieved if the available food exceeds demand and vice versa. Food security is seen from the surplus or deficit in food available in the region.

The condition of food security in DIY can be seen in Table 2. From 2014 to 2022, DIY Province experienced a food surplus with an average surplus of 435,810 tons. This shows that the influence of the high rate of land conversion over the last nine years has not affected the food production of the people who are well affected.

Table 2. Food Security in DIY

No.	Year	Food needs (ton)	Food Availability (ton)	Percentage of Needs (%)	Difference (ton)	Information
1	2014	217.820	558.806	39	340.986	Surplus
2	2015	210.141	578.182	36	368.041	Surplus
3	2016	206.628	551.116	37	344.488	Surplus
4	2017	195.023	550.120	35	355.097	Surplus
5	2018	218.234	321.501	68	103.267	Surplus
6	2019	224.278	334.191	67	109.913	Surplus
7	2020	220.903	327.876	67	106.973	Surplus
8	2021	229.510	348.632	66	119.122	Surplus
9	2022	231.220	351.870	66	120.650	Surplus
Total		1.953.756	3.922.294		1.968.538	
Average		217.084	435.810	54	218.726	

Source: Data Processing 2024.

The correlation calculation results shown in Table 3 show that land conversion in DIY Province has not affected the region's food security decline. In fact, the level of community food security is increasing from year to year. This is due to the decrease in consumption and population in 2020 and the increase in rice stock availability. This land conversion continues to significantly impact rice production, which will be lost from 2014 to 2022.

Table 3. Calculation of the Correlation between Land Depreciation and Rice Availability.

	X (conversion of rice fields)	*Y (Availability)*
Column 1	1	
Column 2	-0,349724075	1

Source: Data Processing 2024.

Different conditions can be seen per district. Land conversion greatly impacts regional food security, including the Bantul Regency and Kulon Progo Regency. This is caused by development in these two areas. One of them is the construction of the YIA airport and the construction of JJLS, which has caused a decrease in the area of rice fields and an increase in the conversion rate of rice fields. An example of built areas can be seen in Figure 6. Meanwhile, food security for Gunung Kidul Regency is not affected by the conversion of rice fields. In this region, rice production is greater than in the two regions, so rice production is greater than in other regions. Because of this, the availability of food in the Gunung Kidul Regency area is sufficient. The availability of rice in Gunung Kidul Regency is 113,955 tons. The correlation test results between the conversion of paddy fields to food availability can be seen in 2024 Table 7.

Figure 6. Example of a built area. Figure A shows NYIA in Kulon Progo Regency, and Figure B shows JJLS road in Bantul Regency.
Source: (Kompas, 2020) (A); Authors, 2024 (B)

The condition of food security in DIY Province for the last nine years has remained in surplus, but in the next ten years, will DIY Province still experience a surplus or deficit if the average loss of rice production is 13,809,000 kg/year and public consumption this year is 58, 2 kg/yr while the loss of rice production is very large. The percentage of fulfilling DIY needs in 2022 is approaching 66% from the average criticality of 75%. Food criticality is different from food insecurity. Food criticality is the need for food that increases over time so that it exceeds the availability of food, while food insecurity is a condition of regional and individual incapacity which is reflected in the availability of sufficient food, both in quantity and quality, safe, diverse, nutritious, equitable and affordable and not contrary to the religion, beliefs, and culture of society (Badan Pangan Nasional, 2022). This is due to a decrease in population in 2020, food reserves from 2020, and the availability of rice, which also increased due to rice reserves in the previous year.

For this reason, future projections are needed. However, in the last nine years, DIY rice production has experienced random production patterns, so it cannot be used to calculate linear regression projections for the next ten years, whereas calculating linear regression projections requires stable production pattern data. So, this calculation cannot be used to analyze whether there will be a surplus or deficit in the next ten years.

In the projected population growth of DIY in 2035, the population of DIY will be 3,973,787 people. The increase in population could affect food security in 2035 because as the population increases, the demand for land will automatically increase. Meanwhile, DIY Province has an average of 66,477 ha of rice fields. The average land area has decreased in the last nine years, so rice production in DIY Province has experienced large losses.

Table 4. Correlation Test of Bantul And Kulon Progo Districts

	X (conversion of rice fields)	***Y (Food Availability)***
Conversion of rice fields	1	
Food Availability	1	1

Source: Data Processing 2024.

The conversion of agricultural land that has occurred so far has not been balanced by integrated efforts to develop land through the use of marginal land. This causes agricultural land to shrink and impacts rice production, so it is necessary to control the conversion rate of food agricultural land by protecting sustainable food agricultural land. For this reason, the DIY government monitors the conversion of agricultural land and suppresses greater depreciation of rice fields. By Law Number 1 of 2009 concerning the Protection of Sustainable Food Agricultural Land, "To the Government and Regional Governments to establish Sustainable Food Agricultural Land (LP2B) to provide sufficient agricultural land to ensure food sufficiency, independence, and sovereignty.

Sustainable Food Farming Land (LP2B) totaling 72.409,79 Ha located in Sleman Regency, Bantul Regency, Kulon Progo Regency, and Gunung Kidul Regency, there is no change in land use (Dinas Pertanian dan Ketahanan Pangan DIY, 2022). In order to maintain regional food security, there needs to be a stock of food availability through increasing productivity in the region, establishing protected LP2B land for processing using organic fertilizer, and implementing an irrigation system.

Food security is an important aspect of human life. Apart from changes in land use, climate change is also estimated to affect world food security (Molotoks et al., 2021). Various efforts exist to maintain food security to protect the success of food independence (Humas Pemda DIY, 2023). In China, the steps taken include complying with the agricultural land protection system, optimizing agricultural efficiency and production, encouraging superior varieties' production, and accelerating modern agriculture's development (Liu & Zhou, 2021).

CONCLUSIONS

The distribution rate of agricultural land conversion in DIY has decreased gradually yearly. This is due to the increase in the area of rice fields from 2018 to 2021 in several areas of DIY Province, such as in the Gunung Kidul area, because there are regional or provincial development plans causing the Department of Agriculture to take action to increase the area of rice planting land on critical land to become rainfed land by the intercropping system, Kulon Progo, and Bantul areas due to the opening of YIA and the JJLS Plan for these two areas to open critical land into rice fields to replace diverted agricultural land. Land in both areas uses an irrigation system for cultivating the land.

The analysis results of the land conversion rate on food security in DIY Province. In the past nine years, this region has experienced a surplus, and agricultural land conversion rate has not affected food security conditions. However, the conversion of agricultural land has significantly impacted lost rice production. The percentage of meeting needs calculated by the total needs and availability of food in DIY in 2022 is approaching the food criticality figure of 66% from the average criticality of 75%.

RECOMMENDATIONS

The suggestions given by the author for further research are: 1) For the Government. The government can pay more attention to or carry out more supervision on agricultural land that will be used for LP2B or agricultural buffer land; in this way, food security will be maintained, and the ongoing land conversion can be suppressed. To achieve food security, the government can donate or provide access to farmers, such as good quality organic fertilizer, rice seeds, and land processing equipment such as tractors for farmers cultivating LP2B land. 2) For Academics. Research and studies can be carried out further to analyze other variables that need to be carried out. Such as conducting recitations on aspects of food security besides food availability. So that further research can provide updated findings so that they can become input for the government on how to maintain LP2B and Regional Food Security.

ACKNOWLEDGMENTS

Thank you to all parties who have helped in this research. Thank you to BPS, lecturers, and friends.

REFERENCES

Alamsyar, A. (2022). Dampak Alih Fungsi Lahan Sawah Terhadap Produksi Padi Sawah. *Agrotekbis2*, *10*(1), 176–185. http://repository.umsu.ac.id/handle/123456789/380%0Afile:///C:/Users/ACER/AppData/Local/Mendeley Ltd./Mendeley Desktop/Downloaded/Alamsyar - 2022 - Dampak Alih Fungsi Lahan Sawah Terhadap Produksi Padi Sawah.pdf

Arisa Nurelawati, Joko Sutrisno, R. U. F. (2018). Tren Alih Fungsi Lahan Sawah di Kabupaten Klaten. *Seminar Nasional Dalam Rangka Dies Natalis UNS Ke 42 Tahun 2018 "Peran Keanekaragaman Hayati Untuk Mendukung Indonesia Sebagai Lumbung Pangan Dunia,"* *2*(1), 41–50.

Assidiq, Y. (2022). Tambah Areal Pertanian, Bantul Optimalkan Pemanfaatan Lahan Kritis. *ReJogja*. https://rejogja.republika.co.id/berita/r7e7zs399/tambah-areal-pertanian-bantul-optimalkan-pemanfaatan-lahan-kritis

Badan Pangan Nasional. (2022). Statistik Ketahanan Pangan 2021. *Pusat Data Dan Informasi Pangan Badan Pangan Nasional*, *01*, 1–23.

Badan Pusat Statistik. (2021). *Statistik Indonesia 2021* (Direktorat). Badan Pusat Statistik.

D.Dewinta, L. W. (2017). Dampak Alih Fungsi Lahan Pertanian Terhadap Ketahanan Pangan Di Kabupaten Cianjur. *Jurnal Wilayah Dan Kota*, *04*(02).

Dinas Pertanian dan Ketahanan Pangan DIY. (2022). *Laporan Kinerja Instansi Pemerintah Dinas Petanian dan Ketahanan Pangan Daerah Istimewa Yogyakarta*. *0274*.

Grafton, R.Q., Daugbjerg, C. & Qureshi, M.E., 2015. Towards food security by 2050. Food Sec. 7, 179–183. https://doi.org/10.1007/s12571-015- 0445-x

Humas Pemda DIY. (2023). *DIY Berkomitmen Tangani Alih Fungsi Lahan Pertanian*. https://jogjaprov.go.id/berita/diy-berkomitmen-tangani-alih-fungsi-lahan-pertanian

Isdiyana K. A., B. K. H. (2018). Terjadinya Alih Fungsi Lahan Di Indonesia. JU-Ke, 2 no 2(Desember 2018), 122–130.

Kompas. (2020, August 28). Melihat YIA Kulon Progo yang disebut Jokowi sebagai Bandara Terbaik di Indonesia. Https://www.Kompas.Com/Tren/Read/2020/08/28/170400365/Melihat-Yia-Kulon-Progo-Yang-Disebut-Jokowi-Sebagai-Bandara-TerbaikDi?Pageall.

Kumalasari, D., Sarwono., N, Rita. (2023). Analisis Dampak Alih Fungsi Lahan Pertanian Ke Non Pertanian Terhadap Ketahanan Pangan di Kecamatan Gondangrejo Kabupaten Karanganyar Tahun 2011-2020. Jurnal Indonesia Of Enviroment and Disaster, https://doi.org/10.20961/ijed.v2i2.702 - (Vol 02, No 01 – 2023).

Liu, Y., & Zhou, Y. (2021). Reflections on China's food security and land use policy under rapid urbanization. *Land Use Policy*, *109*(August), 105699. https://doi.org/10.1016/j.landusepol.2021.105699

Miyasto. (2020). Strategi Ketahanan Pangan Nasional guna Meningkatkan Kemandirian dan Daya Saing Ekonomi dalam Rangka Ketahanan Nasional. Jurnal Lemhannas RI, 2(1), 17–34.

Molotoks, A., Smith, P., & Dawson, T. P. (2021). Impacts of land use, population, and climate change on global food security. *Food and Energy Security*, *10*(1), 1–20. https://doi.org/10.1002/fes3.261

Nanda, L. P., Mulyo, J. H., & Waluyati, L. R. (2019). Analisis Ketahanan Pangan Rumah Tangga di Kabupaten Lampung Tengah. Jurnal Ekonomi Pertanian Dan Agribisnis, 3(2), 219–232. https://doi.org/10.21776/ub.jepa.2019.003.02.1

Ngongo, Y., deRosari, B., Basuki, T., Njurumana, G. N., Nugraha, Y., Harianja, A. H., Ardha, M., Kustiyo, K., Shofiyati, R., Heryanto, R. B., Rawung, J. B. M., Sondakh, J. O. M., Senewe, R. E., daSilva, H., Hutapea, R. T. P., Mattitaputty, P. R., Kenduballa, Y. P., Kotta, N. R. E., Seran, Y. L., … Nugroho, H. Y. S. H. (2023). Land Cover Change and Food Security in Central Sumba: Challenges and Opportunities in the Decentralization Era in Indonesia. *Land*, *12*(5). https://doi.org/10.3390/land12051043

Nurpita, A., Wihastuti, L., & Andjani, I. Y. (2018). Dampak Alih Fungsi Lahan Terhadap Ketahanan Pangan Rumah Tangga Tani di Kecamatan Temon Kabupaten Kulon Progro. *Jurnal Gama Societa*, *1*(1), 103. https://doi.org/10.22146/jgs.34055

Prabowo, Rossi. at al. 2020. Pertumbuhan Penduduk dan Alih Fungsi Lahan Pertanian. Media Agro: Jurnal ilmu-ilmu pertanian. Vol. 16. No. 2. 2020, 26 - 36.

Prasada, I. M. Y., & Rosa, T. A. (2018). Dampak Alih Fungsi Lahan Sawah Terhadap Ketahanan Pangan Di Daerah Istimewa Yogyakarta. *Jurnal Sosial Ekonomi Pertanian*, *14*(3), 210. https://doi.org/10.20956/jsep.v14i3.4805.

Prihatin, R. B. (2015). ALIH FUNGSI LAHAN DI PERKOTAAN (STUDI KASUS DI KOTA BANDUNG DAN YOGYAKARTA). Aspirasi: Jurnal Masalah-Masalah Sosial, 6(2), 105–118.

Purwaningsig, Y., Sutomo., Istiqomah, N. (2015). Analisis Dampak Alih Fungsi Lahan terhadap Tingkat Ketahanan Rumah Tangga Petani di Karanganyar, Jawa Tengah.

Jurnal Agraris, 1(2). DOI:10.18196/agr.1213.

Qureshi, M.E., Dixon, J. & Wood, M., 2015. Public policies for improving food and nutrition security at different scales. Food Sec. 7, 393–403 https://doi.org/10.1007/s12571-015-0443-z.

Santosa, I Gusti Ngurah dkk. 2011. "Dampak Alih Fungsi Lahan Sawah Terhadap Ketahanan Pangan Beras". Urgensi dan Strategi Pengendalian Alih Fungsi Lahan Pertanian". National Seminar Proceding (ISBN: 978-602-19247-0-9) : 1 - 10. Bengkulu. July 2011.

Sunanto, & Rauf, A. W. (2018). Respon Petani Terhadap Pelaksanaan Displai Padi Gogo VUB Pada Lahan Sub Optimal. Jurnal Sosial Ekonomi Pertanian, 14(2), 143–160.

Yasar, M., Kamarudin, M. K., Idris, N. D. M., Kiswayadi, T. D., Salima, R., & Foo, J. (2022). Identification of paddy field conversion rate in relation to food security in Aceh Besar District, Aceh Province, Indonesia. *IOP Conference Series: Earth and Environmental Science*, *1116*(1). https://doi.org/10.1088/1755-1315/1116/1/012045