

Extraction of The Environment and Potential Development In Supporting Food Estate In Kulon Progo Yogyakarta District

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Abstract.

Local food, including traditional food and regional specialties, has a strategic role in efforts to strengthen the food estate, especially in the consumption aspect. The background to this research is based on food needs and food variety in each region which are increasing due to increasing population. One of the government's missions that is currently being promoted is to develop rural areas which can be achieved through community empowerment to increase productivity and diversity in the use of resources and the living environment of the area. Regarding local food in Kulon Progo Regency which focuses on exploring potential, especially in the use of environmental resources and land owned which can support agricultural productivity in Kulon Progo Regency. This research method is descriptive quantitative with the help of ArcGIS software. The results showed that the food insecurity map of Kulon Progo Regency was included in the safe category. In an effort to develop local food potential, the use of beach sand is recommended.

Keywords: Food Estate, Economic Valuation, Extraction of The Environment, Development

INTRODUCTION

Covid-19 which occurred at the end of 2019 in China spread to all countries in the world. All aspects carried out by the Indonesian government to prevent the spread of Covid-19. Efforts made by several countries to prevent the spread of Covid-19 such as lockdowns and also through Large-Scale Social Restrictions. This effort was successful, but disrupted many sectors that support people's lives, including the agricultural sector (Wulandani & Anggraini, 2020).

Global Network Against Food Crisis (GNAFC) report as a result of the climate crisis, lack of resources and coupled with the Covid-19 pandemic. By 2021, the figure surpasses all previous records as reported by the Global Report on Food Crisis (GRFC), with nearly 193 million people experiencing acute food insecurity and requiring urgent assistance in 53 countries/territories, according to GRFC 2022 findings. These figures show an increase of almost 40 million people compared to the previous high reached in 2020 (GNAFC, 2022). The Food and

Agriculture Organization (FAO) added that in 2050 there will be a food crisis due to crop failure due to climate change (FAO, 2018).

Economic growth and development have an impact on environmental changes such as the declining quality of the natural environment and the declining quality of natural resources as a support for community needs. Industrial growth which is quite high on the one hand makes a positive contribution to the Indonesian economy, on the other hand industrial progress creates environmental problems if the suitability and environmental convenience factors are ignored (Wang, Cardon, Liu, & Madni, 2020). Therefore, it is important to manage economic programs that support sustainable environmental quality.

Food is the human right of every individual to obtain sufficient, safe and affordable quantities. The right to adequate food is more than the right to safe food. Adequacy refers to quantity, quality and suitability, taking into account cultural aspects as well as individual physiology (UNHR, 2010). Therefore, efforts to strengthen food security must continue to be developed by taking into account local resources, institutions and culture. Local food, including traditional food and regional specialties, has a strategic role in efforts to strengthen food security, especially in the consumption aspect, in this case regional diversification, because these food raw materials are available in certain locations. Besides that, the food recipes that are owned are quite diverse, both those that have been passed down for generations and those that have just been discovered.

Developing a food estate is one way to maintain food security in Indonesia. The phenomenon that is happening right now is the need for food as a basic human need which will continue to increase over time (Wiguna & Asyiwati, 2023). With the development of the food estate area, farming management is no longer carried out in the traditional way of doing business, but by expanding economies of scale, implementing agricultural innovations, and developing farmer legal entities (Ministry of Agriculture, 2021).

Kulon Progo Regency is a district that is part of the Special Region of Yogyakarta. Kulon Progo Regency has a population that is increasing every year. The increase in population means that more and more agricultural land will be converted into settlements. The problem is not only land conversion, but food is the next problem that must be considered when increasing the population. As for the population growth in Kulon Progo Regency.

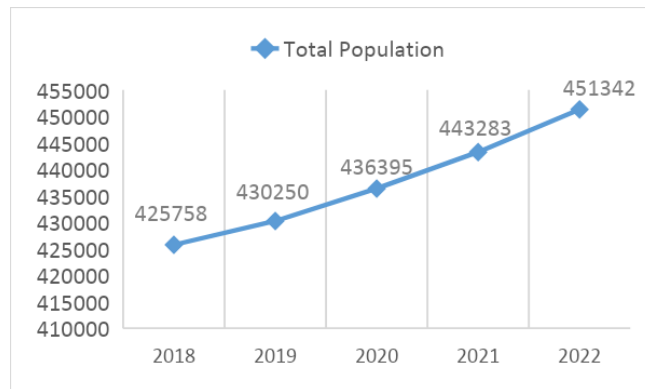


Figure 1. Population of Kulon Progo Regency 2018-2022

The Kulon Progo Regency Government is currently discussing the follow-up to the preparation of the Sustainable Food Agriculture Land (LP2B) map. Even though it is still in its early stages, this regulation is considered to be able to guarantee the availability of local food needs. Based on Law Number 18 of 2012 concerning Food, what is meant by food is everything originating from biological sources such as agriculture, plantations, forestry, fisheries, animal husbandry, water and aquatic products. Both processed and unprocessed which are intended as food or drink for human consumption, including food additives, food raw materials, and other materials used in the process of preparing, processing, and or making food or drink, while local food is food that is consumed by the local community in accordance with local potential and wisdom. Furthermore, processed food or processed food is food or drink that is processed in a certain way or method with or without additives.

Local food in the form of food ingredients, both primary and secondary commodities. According to the Food Security Agency of the Ministry of Agriculture, there are quite a lot of local food types and efforts are being made to spread them throughout the region. Some of the high economic values include: rice, corn, meat, eggs, and fish. However, some local food is still in the form of food potential that has not been utilized by the wider community, including: sago, tubers, rabbit meat, and so on. In many areas the existence of local food has not been cultivated intensively, both in cultivation and post-harvest business. This of course depends on local government policies. For this reason, if the policy has been taken, socialization regarding the policy is very necessary.

Food administration is organized to meet basic human needs that provide fair, equitable and sustainable benefits based on food sovereignty, food self-

sufficiency and food security. Food administration aims to: 1) increase the ability to produce food independently; 2) provide food that is diverse and meets the requirements for safety, quality and nutrition for public consumption; 3) realizing food sufficiency, especially staple food at reasonable and affordable prices according to the needs of the community; 4) facilitating or increasing access to food for the community, especially food and nutrition insecure communities; 5) increase the added value and competitiveness of food commodities in domestic and foreign markets; 6) increasing public knowledge and awareness regarding safe, quality and nutritious food for public consumption; 7) increasing the welfare of farmers, fishermen, fish cultivators, and food business actors; and 8) protect and develop the wealth of national food resources. Therefore it is necessary to have a study related to local food in Kulon Progo Regency which focuses on exploring potential, especially in terms of local food processing or processed food based on local food. In addition to looking at conditions and potential, this study also looks at trends in the development of local food processing and efforts to improve its quality and image. Furthermore, the results of this study can be used as a planning component, assessor in making policies related to local food potential in Kulon Progo Regency.

LITERATURE REVIEW

Environment Kuznet Curve

The paradigm of rural development has undergone significant changes. The old paradigm of rural development is very simple and closely related to the problem of modernizing the agricultural sector and taking direct benefits resulting from the modernization of the agricultural sector. In the end it was realized that completing rural development requires an approach from various aspects. Where in an inclusive manner village development is carried out with many aspects such as economic and social approaches such as community involvement and political issues.

According to Kuznets (1995) estimates that changes in the relationship between per capita income and income inequality will take the form of an inverted U curve (Prasetya, 2021). The argument that economic growth is ultimately beneficial for the environment is still debatable because economic growth encourages the concept of development paths, namely the gradual relationship between environmental quality and economic growth (Dinda, 2004). The environmental Kuznets curve (EKC) is one of the most common methods

for analyzing environmental performance. EKC has been widely used to study the relationship between crop yields and environmental degradation (Leal & Marques, 2022). Before the emergence of EKC, the earth's concern was in absorbing waste, both urban waste and industrial waste. However, with the existence of EKC environmental problems changed from a scarcity of environmental resources to an unavoidable need for increased income to overcome pollution (Gill, Viswanathan, & Hassan, 2018).

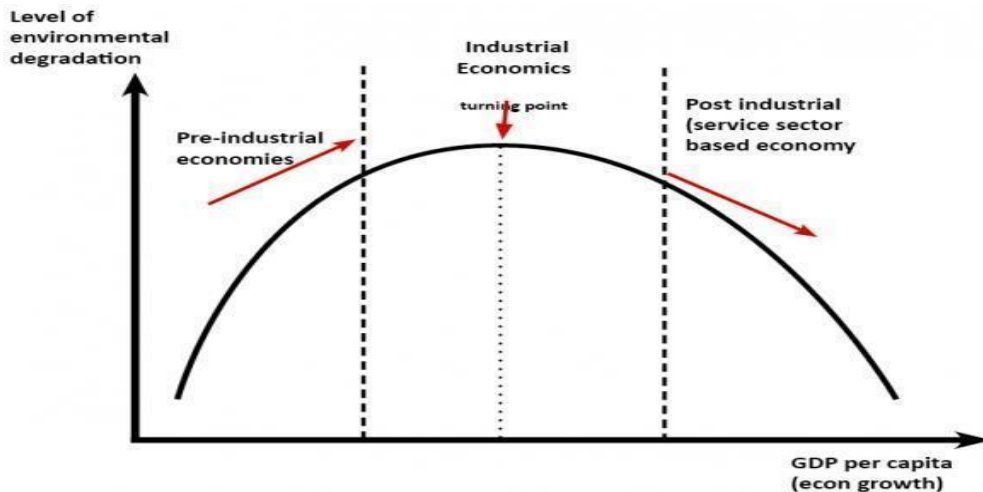


Figure 2. Environment Kuznet Curve

Panayiotou, one of the proponents of the EKC hypothesis, argues that: At higher levels of development, structural changes towards information-intensive industries and services, coupled with increased environmental awareness, enforcement of environmental regulations, improved technology, and increased environmental spending, have led to a decline in the level of development gradually, and environmental degradation will decrease gradually (David, 2004). The EKC hypothesis has the important conclusion that developing countries should take advantage of rapid economic growth rather than implementing pro-environmental policies. Because economic growth ultimately leads to achieving environmental and economic goals, while pro-environmental policies will only slow down economic growth (Webber & Allen, 2010; Sarkodie & Strezov, 2018).

Opportunity Cost

According to Martin, et al (2019), opportunity cost is usually defined as the inversion cost of available resources against the best available inversion

alternative. It is usually determined by the expected profitability of the inversion in terms of future benefits, which is ultimately related to the net present value (npv) and/or the internal rate of return (IRR). Opportunity costs are very sensitive to several parameters, which opens up a wide spectrum of scenarios that can be analyzed. The main parameters are electricity price, discount rate, estimated operative residual value, lifetime expectation and degradation rate, fixed and variable costs, and of course the initial investment. For the latter, important oscillations are forecast due to commercial tensions that exist globally, so that is probably the most important factor to study in the future (Sujatmika, Kussujaniatun, Wijayanti, & Hartati, 2022).

According to Prawirisentono (2007) on Panjaitan & Natalia, (2017) opportunity cost is the potential benefit that must be sacrificed for choosing another option. Opportunity cost is the benefit that is sacrificed when choosing one of several alternative opportunities to obtain an advantage, or the sacrifice that is made when choosing one of several alternative opportunities to obtain an advantage or benefit, that is the advantage that becomes (Koyongian, Tinangon, & Elim, 2016).

RESEARCH METHODS

This research method is a quantitative descriptive method. The data used is secondary data. Data collection instruments use documentation and observation. Observation is by conducting field studies to look for potential and problems faced so that they can support the planning being handled. Comparative, namely by making comparisons with various related aspects to obtain the characteristics of local food problems faced from upstream to downstream systems in Kulon Progo Regency. Map of food insecurity and the distribution of the number of farmer groups in Kulon Progo Regency was made using ArcGIS software.

RESULTS AND DISCUSSIONS

Food Security Map of Kulon Progo Recency

Efforts to achieve excellent human quality are closely related to food and nutritional factors, and achieving food and nutritional adequacy depends on the level of food provided and consumed in terms of quantity, quality, variety of food and nutrition available. This is in line with the policy direction of developing a food security system based on diversity of food resources, institutions and local

culture to ensure the availability of food and nutrition in the required quantity and quality at an affordable level. Given the increase in income and increase in production in the regions, it is regulated by law (Chaireni, Agustanto, Wahyu, & Nainggolan, 2020).

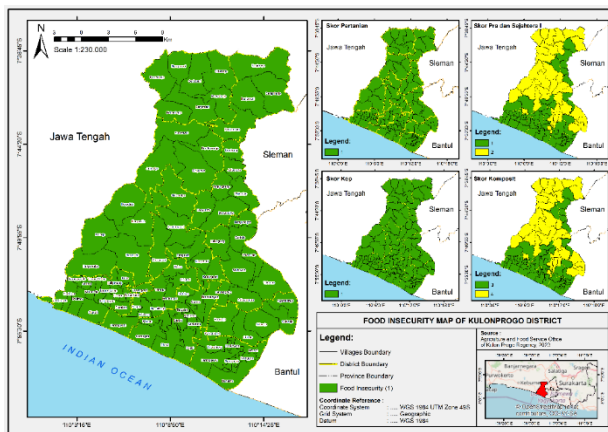


Figure 3. Map of Food Insecurity of Kulon Progo Regency in 2022

Figure 3 above shows that the color of all villages in Kulon Progo Regency is green. The green color means that the food security of all villages in Kulon Progo Regency is safe. One of the main meanings of "safe" status is that Kulon Progo Regency has sufficient food availability to meet the needs of the local community. This means that the food supply in the area is sufficient, and people have adequate access to the various types of food needed to meet their nutritional and basic needs. The "safe" category also shows that Kulon Progo Regency has a good level of food security. This means that the region can cope quite well with challenges such as fluctuations in food prices, climate change, or supply disruptions without experiencing a food crisis.

The "safe" status also reflects that the agricultural sector in Kulon Progo Regency is capable of producing sufficient yields to meet local needs. This can include the production of food crops, vegetables and livestock. When food is considered "safe," this also means that local people have access to economically affordable food. This can help improve people's welfare because they can meet their food needs without excessive financial difficulties. One of the most important meanings of "safe" status is that the level of hunger and malnutrition in Kulon Progo Regency tends to be low. This shows that local people have access to sufficient food to maintain their health. The "safe" status also reflects

sustainable agricultural development efforts and good management of natural resources to ensure future food availability.

Potential (Production and Processing) of Local Food in Kulon Progo Regency

Food is the human right of every individual to obtain sufficient, safe and affordable quantities of food. Therefore, efforts to strengthen food security must continue to be developed by taking into account local resources, institutions and culture. Local food, including traditional food and regional specialties, has a strategic role in efforts to strengthen food security, especially in the consumption aspect, in this case regional diversification, because these food raw materials are available in certain locations. Besides that, the food recipes that are owned are quite diverse, both those that have been passed down for generations and those that have just been discovered. The following is Food Availability Based on Types of Food Ingredients for Consumption of Population of Kulon Progo Regency in 2021 Per Capita.

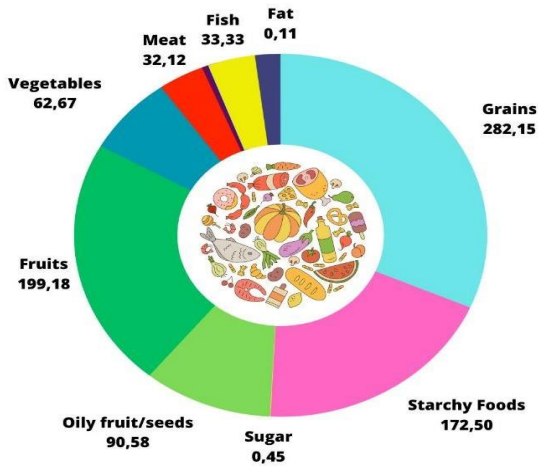


Figure 4. Food Availability Based on Food Resources for Consumption, Kulon Progo Regency Citizens per Capita on 2021

Based on Figure 3, it shows that food availability for consumption by the population of Kulon Progo Regency in 2021 is dominated by grains with an amount of 282.15 kilograms/year. This means that every resident in Kulon Progo Regency has a food supply of 282.15 kg/year of grains. The high availability of grain food is because the staple food of the Kulon Progo people is rice which comes from rice. On the other hand, rice production in Kulon Progo Regency has increased, but the increase is not very significant. In terms of rice production, Kulon Progo Regency from 2020-2022 tends to experience a decline in

production. The following is an overview of rice production in Kulon Progo Regency.



Figure 5. Rice Production in Kulon Progo Regency in 2018-2022

Based on data on rice production in Kulon Progo Regency which tends to decline, seeing the decline in rice production from year to year, it is time for Kulon Progo Regency to make efforts to develop local food potential for the food security of its community. Based on research findings, Rinjanta et al., (2018) found that Kulon Progo Regency has at least 49 local food products consisting of tubers, nuts and vegetables. These local food ingredients can be developed as 1) food raw materials as sources of carbohydrates, vegetables and snacks, 2) potential industrial ingredients, and 3) potential alternative raw materials. The following is a table of local food names and potential that can be developed in Kulon Progo Regency:

Tabel 1. Lists of Plants and Potential Use of Local Food in Kulon Progo Regency

No	Plants (Local)	Potential
1	Uwi, Gembili, Corn, Pumkin, and Banana	Carbohydrates raw ingredients
2	Ganyong, Breadfruit, dan aren	Flour raw ingredients
3	Gadung, Kumpul/bothe, Garut, Cassava, Ubi Jalar/Munthul, Banana, and Breadfruit	Snacks raw ingredients
4	Koro, Kecipir, Kapri, Tolo Beans	Protein raw ingredients
5	Waluh, jipang, Pumpkin, Eggplant, Tomato, Red Chili, Cabbage, Chinese Cabbage, Spinach, Bitter gourd, Kale, Beans, Cucumber, Carrot, Radish, Kluwih, Papaya	Vegetable raw ingredients
6	Suweg and Iles-iles, Buckwheat	- Industry material - Alternative fuel

Source: Rinjanta et al., (2018)

Based on the research data, the Kulon Progo Agriculture Service has designated Ganyong, Talas, and Irut (Garut) as local food crops. The following is the production of local food crops in Kulon Progo Regency in 2018-2022.

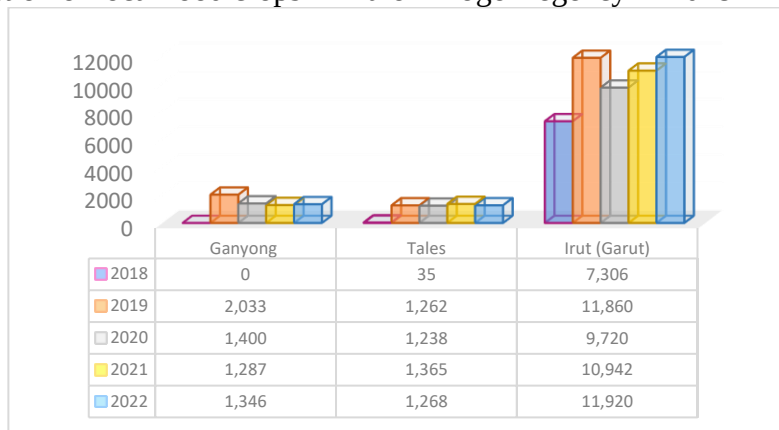


Figure 6. Kulon Progo Regency Local Food Production 2018-2022 (ton)

The most dominant local food production is Irut (Garut) compared to Ganyong and Talas local food. The production of the three foods from 2018-2022 did not experience significant growth, even the amount of production was unstable. Even though the amount of local food production is still not stable or has experienced a significant increase, local food should be developed so that it becomes a substitute for the staple food commonly consumed by the community.

Arrowroot plants have very high economic value and can be found in almost all parts of Indonesia. This plant is very easy to cultivate because it is easy to manage and grows well in vacant land. Simple technology can be used to increase the added value of these commodities (Kusmiyati, 2013). Arrowroot tubers are then processed into flour or modified starch. Tubers in the form of flour can be fortified with various nutrients needed. By turning the arrowroot tubers into flour, they are easy to make and extend their shelf life, so they can be stored for months or even years. Utilization of arrowroot tubers in the form of flour makes it easy to process them into various types of ready-to-eat food and can be customized according to taste (Yuwono, 2015; Rahmayanti et al., 2018). The results of Kurniawan et al., (2015) research found that arrowroot tuber flour can be processed into instant noodles which have the characteristics of being springy, elastic, not easily broken, and the brightness of the color increases (tends to be darker).

Talas is a food ingredient that has many uses. In addition, talas also has high economic value, is very useful as a source of carbohydrates, fats and

vitamins, and has good fiber content (Simamora, Yulian, & Turmudi, 2018). Because of its very high starch content, talas tubers are used as rice or as a substitute for rice, so it is the hope for consumption by the Indonesian people, Amala & Rahmawati (2018). Research by Amala & Rahmawati (2018) found that talas can be used as Onigiri. Onigiri is a typical food from Japan. The percentage of success in making talas onigiri is 100 percent. Talas flour can be processed into various products such as dry, semi-moist and wet products. Dry products can be made with 100 percent talas flour, such as pastries. Semi moist products like brownies can also be made with 100 percent talas flour. Wet products such as kue rampur can be made by mixing wheat flour or other flours (Wahjusaputri, Bunyamin, & Nastiti, 2016).

Ganyong is one of the root crops whose production is prioritized and developed to support food security (Ministry of Agriculture, 2017). Canna is a tuber plant that was used as food before people recognized rice or cassava. is a potential source of carbohydrates, with total carbohydrates reaching 93.79 percent of dry weight (Sariyati & Utami, 2018). As a food ingredient, canna is usually steamed, fried, baked, or as a mixed food ingredient (Hasanah & Hasrini, 2018).

Based on its availability, the potential for ownership of local food products as sources of carbohydrates and protein with relatively large opportunities makes Kromprogo Regency an important source of food production, especially a source of carbohydrates to substitute for sources of rice and vegetable protein. This is supported by the availability of various types of local products such as uwi, gembiri, gadung, swegu, kimple, arrowroot, soybeans, benguku, cycads, and breadfruit which are available during the dry season. On the other hand, marijuana is available during the rainy season. The presence of these various local ingredients, regardless of the season, further supports food security in Kulon Progo Regency. Moreover, the distribution of these products is almost even in Kulon Progo Regency (Rinjanta et al., 2018). Even though local food is abundant, there is a lack of using local food as a source of carbohydrates or even making local food the main food. So far, many people still make food commodities such as rice and corn for carbohydrate needs. According to Rinjanta et al., (2018) the causes of obstacles in increasing production and decreasing consumption of local food are:

1. Long-term agricultural policy bias towards rice.
2. People's habitual bias for rice consumption as a staple food.

3. Difficulties in linking policy aspects to practice.
4. Scarcity of information on local food production in all districts.
5. Threats from competitors in the form of fast food products in the local market.
6. Past policies are counterproductive.

Utilization of Beach Sand for Increasing Local Food for Kulon Progo in an effort to Support the Food Estate

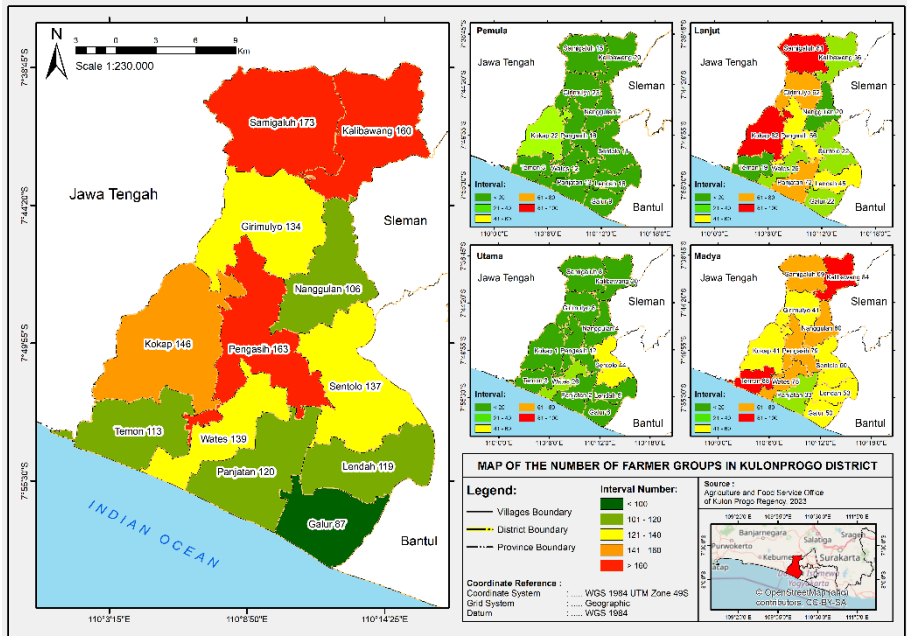
Land conversion, known as the conversion of agricultural land to non-agricultural land, is very difficult to control because basically the land absolutely belongs to the farmer and all decisions regarding its use are in the hands of the farmer. The agricultural climate, which often faces uncertainty in both production and prices and is unable to provide a decent source of livelihood for farmers, encourages farmers to convert their land for non-agricultural activities or to other parties. Using it in various non-agricultural sectors. Rice fields in strategic locations such as roadsides often have a much higher tax burden, disproportionate to agricultural income on relatively small land (DIY DPRD Secretariat, 2017).

Currently, Kulon Progo district has a local food harvest area consisting of Ganyong, taro and other tubers which is still in the small category compared to the area harvested for rice and secondary crops. Efforts to increase production must be supported by increasing the area of agricultural land. Given that land is a limited natural resource. Kulon Progo and Bantul districts lose at least 1,337.7 hectare of agricultural land each year (DIY Agriculture Office, 2007). So that it requires the Kulon Progo Regency government to see land opportunities that can be used for farming. One of the lands that can be used as agricultural land is beach sand land.

The Kulon Progo coastline is a coastline with a width of ± 1.8 kilometers, divided into 4 sub-districts and 10 villages, with almost 100 percent sandy beach conditions and groundwater depth ranging from 1.5 meters to 3.0 meters. The Progo coastal area has a very dry climate with a maximum temperature of 38°C and an average temperature range of 32° - 36° degrees celsius, with annual rainfall of 1,500-2,000 millimeter and very sparse vegetation (Gunawan, 2009). A very wide expanse of sand dominates the southern region of Kulon Progo. Uniquely, the sand does not only extend to the beach area, but also up to 2,000 meters from the beach. In general, coastal land has several advantages, including covering a large number of areas (Hasibuan, 2015).

So far, farmers in Kulon Progo Regency have used sandy beach land for farming. Kulon Progo Regency sand land farmers use sand land for farming red chilies, watermelons, shallots and watermelons (Istiyanti, Khasanah, & Anjarwati, 2015). Of the total sub-districts in Kulon Progo Regency, only Galur, Panjatan, Wates and Temon sub-districts carry out sand farming (Herputra, Sutrisno, & Rahayu, 2016). In addition to vegetable and fruit crops, sandy land can also be developed as a local food crop farming such as koro padang. According to the Head of the Food Crop Production Section Working Team, Kulon Progo Agriculture and Food Service, koro sword is an alternative to soybeans (Muhmudah, 2023). Several previous studies have conducted research related to the production of sword koro plants on sandy land, such as research by Darnawi & Darini (2016 and Darini & Kusdiarti (2017).

In addition to the vast sandy plains, Kulon Progo Regency has the potential for the spread of farmer groups in every sub-district. Farmer groups can play an important role in ensuring the availability of sufficient local food to meet the needs of local communities. This reduces dependence on food supplies from outside the region and increases food security in the face of emergency situations or supply disruptions.



Based on the results of research conducted by Dinarti et al., (2013). Farmers in the coastal sand fields of Kulon Progo Regency tend to have high collective intelligence. The collective intelligence of sandy farmers refers to the ability of groups of farmers working in areas with sandy soils to work together effectively, share knowledge and experiences, and make decisions together to improve their agricultural output and welfare. Farmers with high collective intelligence will be better able to adopt effective and innovative agricultural practices. This can result in an increase in overall agricultural productivity, which will ultimately have a positive impact on the food supply and food security of Kulon Progo Regency.

Farmers who collaborate and share knowledge will have a better understanding of how to manage agricultural resources wisely. This can help reduce land degradation, excessive water use, and other negative impacts on the environment. Farmers with high collective intelligence are better able to cope with challenges such as climate change, crop diseases and other crises. This will help improve food security and national security, as countries will be better prepared to deal with disruptions in food supplies. Farmers with high collective intelligence tend to be more aware of the environmental impacts of their agricultural practices. In this way, they can contribute to efforts to reduce negative environmental impacts and preserve natural resources.

CONCLUSIONS

1. The availability of food and nutrition has a very important role in efforts to achieve a good quality of life for humans. Factors such as quantity, quality, variety of food, and nutrition available and consumed have a major impact on the attainment of quality human beings. Kulon Progo Regency has a "safe" status in terms of food security, which indicates the availability of sufficient food to meet the needs of the local community. This also shows a good level of food security in the area.
2. Local food production, such as arrowroot, taro and ganyong, has great potential to be developed as an alternative staple food and various food sources. This can help reduce dependence on food from outside the region and increase local food security. Utilizing beach sand as agricultural land can be a solution to increase local food production. Farmers in Kulon Progo

Regency have used this land for various types of crops, and this can be a bigger opportunity to support food security.

3. Even though Kulon Progo Regency has great potential in developing local food and food security, there are still some obstacles that need to be overcome, such as policy bias towards rice commodities, people's habits, and scarcity of information on local food production. Overall, this study highlights the importance of local food development and efforts to increase food security at the local level to achieve a better quality of life for the people of Kulon Progo. With good management and cooperation between farmers and the local government, Kulon Progo Regency has great potential to improve food security and the welfare of its people.

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