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Study of Sustainable Food Agricultural Land (LP2B) Using Spatial Approach South Pringsewu District

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Abstract

This study aims to examine the distribution pattern and factors that influence the distribution of Sustainable Food Agricultural Land (LP2B) in the southern part of Pringsewu Regency in 2020. This study uses a descriptive research method. The population in this study were 9 sub-districts in Pringsewu district and the research samples were Pringsewu District, Gading Rejo District, Ambarawa District, Pardasuka District, and Pagelaran District. In this study data collection using observation, interviews and documentation techniques. Data analysis technique with a spatial approach (spatial) is used as a basis in describing and analyzing research results. The results showed: (1) The distribution pattern of Sustainable Food Agricultural Land (LP2B) in the southern part of Pringsewu Regency was clustered (2) Factors affecting the distribution of Sustainable Food Agricultural Land (LP2B) of Pringsewu Regency were physical factors and social factors. Physical factors are slope, rainfall, soil type, and water availability. Next, social factors are population, and conservation.

Keywords: *Distribution; LP2B; Pattern; Spatial Approach*

Introduction

Development is an activity carried out with a final goal that has the most abstract nature, namely the welfare of the lives of residents in the area (Prasetiyani & Widiyanto, 2013). Humans are living things that have the most complex needs than other living things on this earth. One of the basic human needs is food (Talumingan, et al., 2017).

Humans need food to be able to carry out life and activities on this earth. Indonesia, which is an agrarian country, with most of its population working in the agricultural sector, of course depends on agricultural land (Faiz & Rijanta, (2019). Agricultural land as a place of activity for farmers is decreasing. This is due to the increasing population pressure on land agriculture (Jocom, 2017).

One indicator of community welfare is the assurance of food needs as one of the most basic needs. As an agricultural country, Indonesia is a country whose population is mostly farmers. However, at this time agricultural land continues to experience shrinkage, both in quality and quantity (Mubarokah, et al., 2020). This is due to population pressure whose numbers continue to increase so that the ability of

land to support people's lives (land carrying capacity) in meeting food needs also continues to decline (Amiri, et al., 2020).

In general, Pringsewu Regency is one of the areas in Lampung Province which produces the largest rice commodity in Lampung Province (Fitriani, et al., 2011; Efendi & Susantun, 2014). The impact and benefit of the large amount of rice commodity produced is that it can meet food needs in the Pringsewu Regency and surrounding areas such as Tanggamus Regency, Pesawaran Regency and Bandar Lampung City. The rice commodities are quite varied from good quality such as fragrant pandan to low quality (Wahyudi, 2019). This situation also helps small farmers and farm laborers to get jobs because they work on rice fields which incidentally are Sustainable Food Farms.

The population in Pringsewu Regency is 400,187 people and is classified as a medium population density. Based on observations in the field, it can be seen that the condition of the population is crowded with a small area. The condition of the population in Pringsewu Regency is feared in the next few years will have a population explosion and can increase land use change (As-Syakur, et al., 2010; Indriani, 2019). In addition, this narrow area also affects the level of crowds in each sub-district in Pringsewu Regency (Salim, et al., 2019).

Law Number 41 of 2009 concerning the Protection of Sustainable Food Agricultural Land was drafted to control land conversion which is now rife (Nurventya, et al., 2018). This policy is expected to encourage the availability of less and less agricultural land. The increase in population as well as economic and industrial development has resulted in the degradation, transfer of functions, and fragmentation of food-agricultural land which has threatened the carrying capacity of the region nationally in maintaining food self-reliance, security and sovereignty (Prasada & Priyanto, 2020).

The area of Sustainable Food Agricultural Land (LP2B) that has been legally determined is considered a form of guaranteeing the right to food for every Indonesian citizen, however, this is contradictory if assessed from the point of view of a source of employment and a decent livelihood for farmers or parties who cultivate agricultural land (Priyanto, 2018). Farmers are always disadvantaged because the selling value of their products is relatively cheaper when compared to other food sources (Marinda, et al., 2020). Farmers are also less benefited, from this opinion, the view of farmers can reduce the carrying capacity of the potential of agriculture itself. It is also possible that there is a lack of understanding of farmers about the potential and carrying capacity in agriculture, so that the existing potential is not used optimally (Purba, et al., 2020). In addition to the unequal distribution of Sustainable Food Agricultural Land (LP2B), it can be revealed that there is a lack of information, advice, and knowledge to the surrounding community about Sustainable Food Agricultural Land (LP2B) (Perdagangan, 2013).

Information and knowledge for the community and the authorities regarding Sustainable Food Agricultural Land (LP2B) which should be introduced and socialized is a problem or obstacle and it is feared that it can increase changes in agricultural land use (Daulay, et al., 2014; Widowaty & Wahid, 2021). If the change in the use of agricultural land that has good agricultural potential and carrying capacity occurs, the agricultural land will be narrower and agricultural land that has been designated as Sustainable Food Agricultural Land (LP2B) which has good carrying capacity for agriculture will continue to decrease (Janti, et al., 2016; Hikmawan, et al., 2020). If agricultural land continues to decrease, the potential and agricultural yields in this region will decrease as well (Nurchamidah, 2017). Based on the data obtained, in addition to the lack of information, there is no research on Sustainable Food Agricultural Land (LP2B) in Pringsewu Regency and no database that provides information on Sustainable Food Agricultural Land (LP2B) in order to determine the distribution of Sustainable Food Agricultural Land (LP2B).

One of the objectives of the research is to present distribution information and as a medium or medium for information about Sustainable Food Agricultural Land (LP2B) and to find out the factors that cause the distribution of Sustainable Food Agricultural Land (LP2B) (Pratama, et al., 2018; Sirajuddin, 2020) in Pringsewu Regency which was studied specifically to discuss the analysis of the distribution of Sustainable Food Agricultural Land. (LP2B). Therefore, based on the problems that have been described, the researcher wants to discuss and analyze the distribution pattern of the Sustainable Food Agricultural Land (LP2B) and the factors that cause the distribution of the Sustainable Food Agricultural Land (LP2B) in five sub-districts which are classified as regions (Southern Part) to be designated as a research location.

There is no Sustainable Food Agricultural Land (LP2B) in Pringsewu Regency. Previous research conducted in the surrounding area only discussed space. In this study, one of the objectives of the researcher is to present information on the distribution and as a medium or medium for information about Sustainable Food Agricultural Land (LP2B) and to find out the factors that cause the distribution of Sustainable Food Agricultural Land (LP2B) in Pringsewu Regency which was studied specifically to discuss distribution analysis. Sustainable Food Agricultural Land (LP2B).

Based on the problems that have been described, the researcher wants to discuss and analyze the pattern of distribution of Sustainable Food Agricultural Land (LP2B) and the factors that cause the distribution of Sustainable Food Agricultural Land (LP2B) in five sub-districts which are classified as regions (Southern Part) to be designated as locations research researchers.

Method

The method used in this research is descriptive method. Descriptive research method according to (Jannah, 2019). research that is more directed at revealing a problem or awareness as it is and revealing the facts that exist, although sometimes interpretation or analysis is given. The population in this study was the Districts of Pardasuka, Ambarawa, Pagelaran, Pringsewu, Gadingrejo, Sukoharjo, Banyumas, Adiluwih, North Pagelaran. The sample used in this study was a purposive sample, namely the Districts of Pardasuka, Ambarawa, Pagelaran, Pringsewu, and Gading Rejo.

Data collection techniques used in this study are observation and documentation. The data analysis technique used in this research is the spatial approach. The procedure in research is to systematically search and compile data obtained from interviews, field notes, and documentation by organizing data into categories, describing them into units, synthesizing, compiling into patterns, choosing which ones are important and what will be studied. and make conclusions so that they are easy to understand (Sugiyono, 2013).

Results and Discussion

1. Distribution Pattern of Sustainable Food Agricultural Land (LP2B)

Sustainable Food Agricultural Land (LP2B) are scattered in areas close to roads, this can affect the existence of people living in the local area. The existence of people living around the area of Sustainable Food Agricultural Land (LP2B) is also influenced by the watershed that flows through irrigation for paddy fields. The following figure 1 shows the distribution of LP2B.

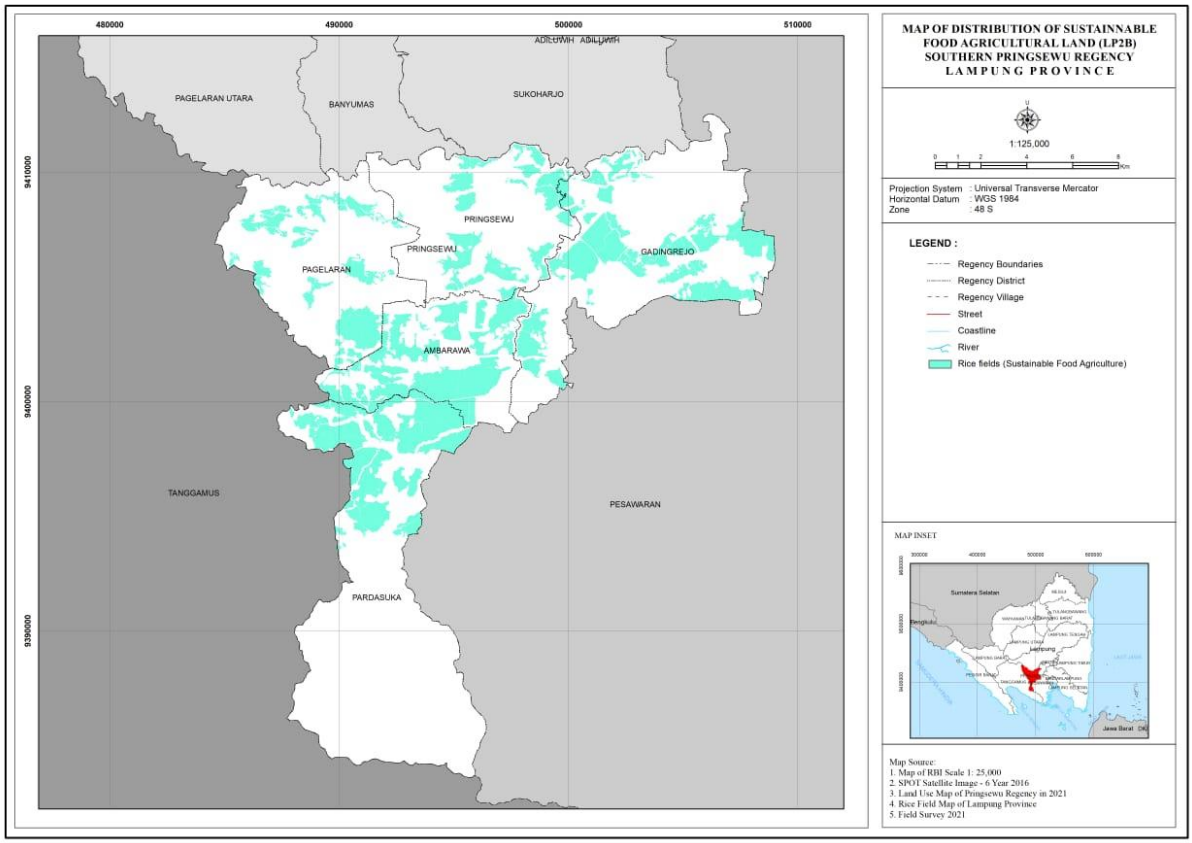

Figure 1. Distribution Map of Sustainable Food Agriculture (LP2B) Pringsewu Regency in 2020

Figure 1 shows that the distribution pattern of Sustainable Food Agricultural Land (LP2B) can be known after being calculated using the existing formula, the results will be classified in the following classification.

1. Type clustered or clustered, if T = 0
2. Random type or random, if T = 1
3. Uniform or uniform type, if T = 2.15

The classification above is based on the calculation of the nearest neighbor index (T), the formula used is as follows.

$$T=\frac{Ju}{Jh}$$

Source: (Bintarto, 1978)

Note:
T = nearest neighbor spread index
Ju = the average distance measured between one point and its neighboring points closest
Jh = the average distance obtained if all points have a pattern random
P = $1/(2\sqrt{p})$ Density of points in each km^2 i.e. number of points (N) divided by area in km^2 (A), so it becomes N/A.

Before determining the distribution pattern, it is necessary to know the closest distance from one point to another. The results of the recapitulation of the distance can be seen in the following table.

Table 1. Recapitulation of Closest Range of Sustainable Food Agricultural Land (LP2B).

Districts	Total unit	Total distance	The average distance of all points to the nearest neighbor	Area (km^2)	Point density	√Point density	^{2}√Point density	Average distance (if random pattern)	Index deployment nearest neighbor	Pattern
Pagelaran	8	5,82	0,72	72,47	0,11	0,11	0,66	1,51	0,47	*Clustered*
Gading Rejo	8	6,93	0,86	85,71	0,09	0,09	0,6	1,66	0,51	*Clustered*
Pringsewu	6	3,15	0,52	53,29	0,11	0,11	0,66	1,51	0,34	*Clustered*
Ambarawa	4	2,87	0,71	30,99	0,12	0,12	0,69	1,44	0,49	*Clustered*
Pardasuka	4	2,31	0,57	94,64	0,04	0,04	0,4	2,5	0,22	*Clustered*

Source: Results of Data Processing in 2021

Table 1 shows that the shortest distance for each area has an average of 1.41 km. While the distribution pattern found in the research area can be seen in table 2 of the results of the recapitulation of all calculations of the distribution pattern in each sub-district.

Table 2. Recapitulation of Calculation of Distribution Patterns in each District

No.	Point LP2B	LP2B Village name	Distance (km)
1	1 – 2	Candi Retno – Karang sari	1,58
2	3 – 4	Gemah Ripah – Pagelaran	1,91
3	5 – 6	Panutan – Lugusan	0,58
4	7 – 8	Bumi Ratu - Bumi Rejo	1,75
5	9 – 10	Magakarya – Sidoharjo	0,82
6	11 – 12	Pringsewu Selatan – Pajaresuk	1,71
7	13 – 14	Podomoro – Podosari	0,62
8	15 – 16	Gading Rejo – Wonodadi	1,31
9	17 – 18	Gading Rejo Utara – Tulung Agung	1,99
10	19 – 20	Blitar Rejo – Panjarejo	2,23
11	21 – 22	Bulurejo – Yogyakarta	1,40
12	23 – 24	Ambarawa Barat – Margodadi	1,55
13	25 – 26	Kresnomulyo – Sumberagung	1,32
14	27 – 28	Sidodadi – Sukorejo	1,41
15	29 – 30	Tanjung Sari – Wargomulyo	0,90

Source: Data Calculation Results for 2021

Table 2 shows that the distribution pattern of LP2B in each sub-district has an average index of 0.4. This means that the pattern belongs to the clustered pattern.

2. Factors affecting the distribution of Sustainable Food Agricultural Land (LP2B) in Pringsewu Regency.

1. Physical Factor

a. Slope

The slope of the slope is one of the factors that affect the distribution of Sustainable Food Agricultural Land (LP2B). The slope in the flat category, which is 0-8%, is very influential on rice plants. To see the distribution of the slope can be seen in Figure 2.

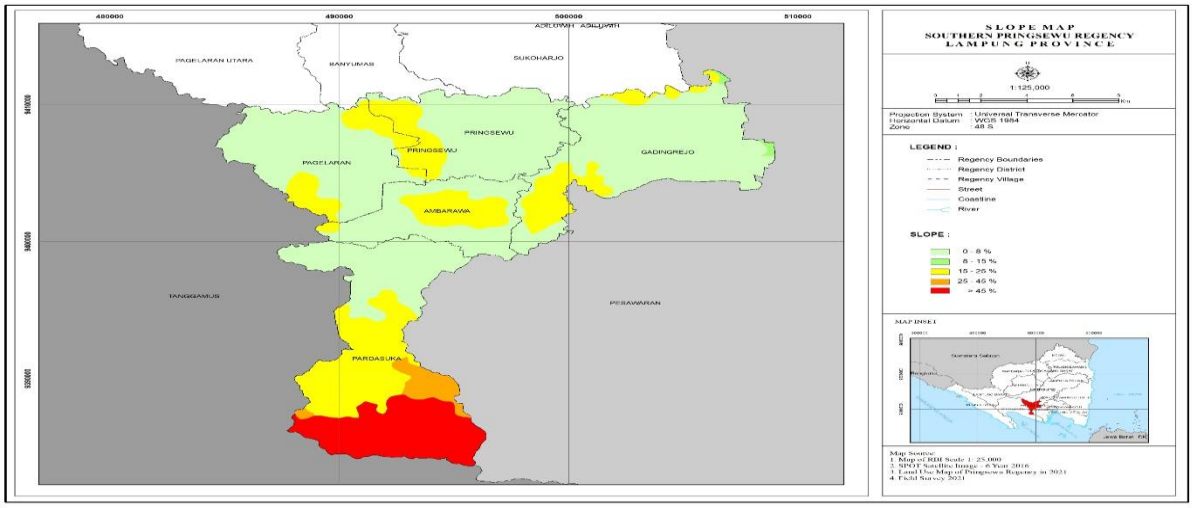

Figure 2. Slope Map of Sustainable Food Agriculture (LP2B)

Figure 2 shows that flat slopes dominate in Pringsewu Regency which is a Sustainable Food Agricultural Land. While in the southern part, it has a slope of more than 25% which is in Pardasuka District.

b. Rainfall

According to Arifin in the journal (Damar, 2015) rainfall is the amount of water that falls on the ground surface during a certain period if there is no removal by evaporation, drainage and infiltration, which is measured in units of height. Rainwater height of 1 mm means that rainwater on an area of 1 m2 contains 1 liter. The elements of rain that must be considered in studying rainfall are the amount of rainfall, and the intensity or strength of rain drops (Meyer, 2017).

Rainfall is the height of rainwater that does not evaporate, does not seep, and does not flow that collects on a flat place. The intensity of rainfall in each region has a different effect. For example, high rainfall intensity in a low or flat area has the potential to cause flooding. Meanwhile, the high intensity of rainfall in the area or highlands is one of the factors that can potentially cause landslides. The following figure shows the distribution of rainfall in the study area.

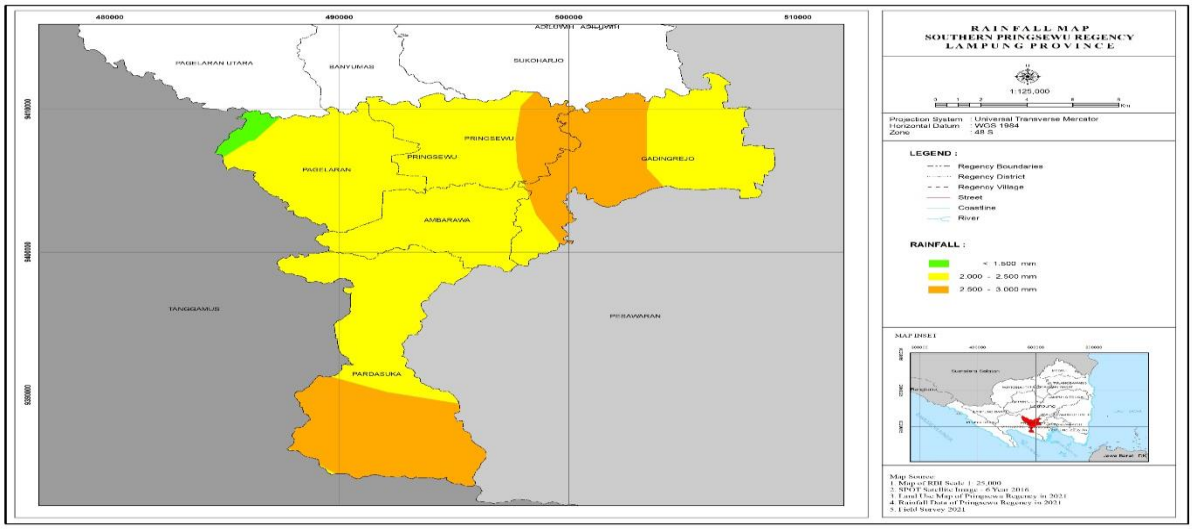

Figure 3. Rainfall Map of Sustainable Food Agricultural Land (LP2B)

Figure 3 shows that for the most dominating rainfall, namely wet rainfall between 2,500-3,000 mm, this rainfall affects the local area for favorable physical conditions for fertile crops. Supportive physical conditions affect crop yields. Rainfall is very influential on plants that live in an area, if these plants have low rainfall it will be difficult to live. There are 2 types of rainfall in Pringsewu Regency, namely wet and humid rainfall.

Type of soil

This type of rice plant is very suitable for alluvial and andosol soil types, it can be proven in Figure 2, namely the map of Sustainable Food Agriculture Land (LP2B) which is spread out and contains andosol and alluvial soil types. To see the distribution of soil types can be seen in Figure 4.

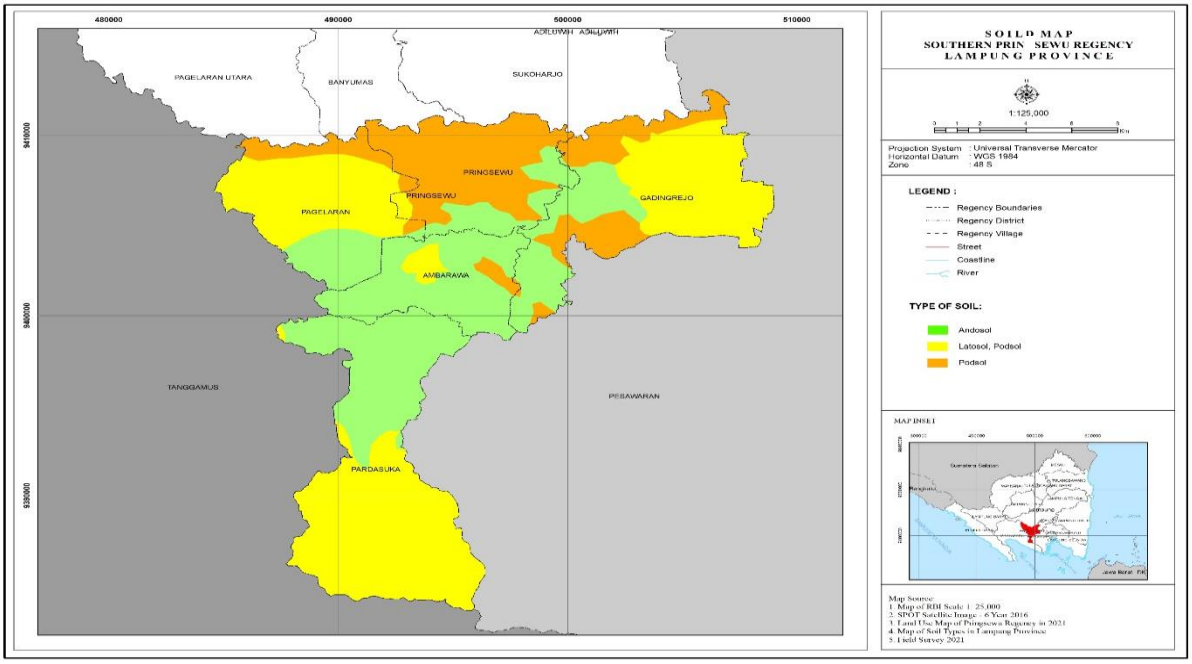

Figure 4. Map of Soil Types for Sustainable Food Agriculture (LP2B)

Figure 4 shows that the distribution of andosol soil types is seen in Pagelaran and Gading Rejo Districts, which are one of the types of soil suitable for rice cultivation. In addition, the type of alluvial soil that dominates in each sub-district also affects this type of rice plant. This type of soil is very dominant on land planted with rice. Sustainable Food Agricultural Land (LP2B). It is proven on the distribution map of the Land for Sustainable Food Agriculture (LP2B) that it can be seen that it is very much influenced by the soil that is on the land.

d. Water Availability

Availability of water is the amount of water available in an area. One way to support the availability of water is irrigation flow or irrigation plots. Irrigation channel is a carrier channel that takes water from the tapping building through the tertiary plot to the final distribution box.

Based on the type of irrigation canal is divided into 3, namely as follows:

1. Primary Channel
2. Secondary Channel
3. Tertiary Channel

The types of primary and secondary canals come from the authority of the Public Works Agency (Public Works), and the tertiary canals come from the Agriculture Service of Pringsewu Regency. The availability of water to irrigate all rice fields in Pringsewu Regency is as follows.

Table 3. Types of Irrigation Channels in Pringsewu Kabupaten

No	Irriagtion channel	Irigation source
1.	Way Tebu Sistem	Authority System
2.	Way Ngison	Works Authority of Lampung Province
3.	Way Padang Ratu	Works Authority of Lampung Province
4.	Way Napal	Works Authority of Lampung Province
5.	Way Gatel	Works Authority of Pringsewu Regency
6.	Way Semah	Works Authority of Pringsewu Regency
7.	Embung, Drilling Well, Long storage, Dam Trench	Works Authority of Pringsewu Regency

Source: Pringsewu Regency Agriculture Office 2021

Based on table 3, it can be seen that the irrigation canal is functioning properly and has been fulfilled in accordance with the ideal minimum of water availability from the regulations or requirements for minimum irrigation for rice fields, as evidenced by the yield of rice production which is quite in line with the target each year. The irrigation canals are monitored so that there are no problems in irrigating the irrigated rice fields in every sub-district in Pringsewu Regency. That way, the production of food crops every year is guaranteed and fulfilled. The distribution of the irrigation canals can be seen in the following figure 5.

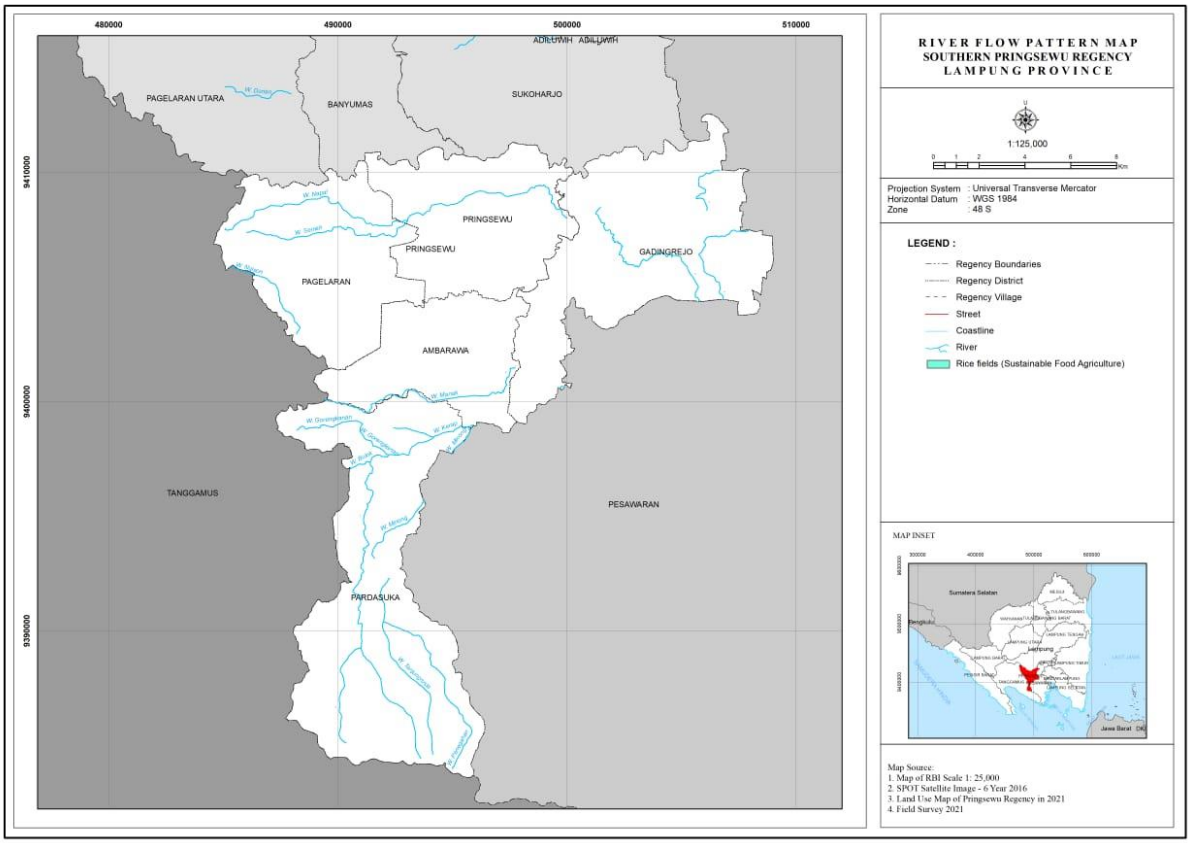

Figure 5. Map of Land Water Availability for Sustainable Food Agriculture (LP2B)

In Figure 5, it can be seen that the distribution of primary and secondary canal types comes from the authority of the Public Works Agency (Public Works), and the tertiary canal comes from the Pringsewu Regency Agriculture Office. The availability of water to irrigate all rice fields in Pringsewu Regency is the way sugar cane system, way ngison, way padang ratu, way napal, way gatel, way semah, reservoirs, drilled wells, storage and ditch dams.

2. Social Factor

a. Resident

Pringsewu Regency has an area of 625 km2 which is administratively divided into 9 Districts. Pringsewu Regency is generally engaged in the agricultural sector. In addition, Pringsewu Regency establishes Sustainable Food Agricultural Land (LP2B) as an effort to maintain agriculture on food sources. The total population of Pringsewu Regency is 400,187 people spread throughout the sub-districts in Pringsewu Regency. The population density in Pringsewu Regency is moderate at 647 people/km.

Population is one of the factors to determine Sustainable Food Agricultural Land (LP2B) because population is the main element or subject in agriculture, therefore the area designated as Sustainable Food Agricultural Land (LP2B) must have residents in it. Based on population density, affecting the amount of demand for food is increasing, therefore it is necessary to establish a consistent agricultural land.

b. Conservation

Conservation efforts carried out are making terraces on Sustainable Food Agricultural Land (LP2B) in Pardasuka District to reduce soil landslides that can harm farmers. The terraced rice fields have the function of reducing losses and not reducing rice cultivation on Sustainable Food Agricultural Land (LP2B) as a conservation effort. In addition to Pardasuka District, there are terraces in Pagelaran District according to the steep slope. Sustainable Food Agricultural Land (LP2B) which is classified as a steep slope or more than 30% is made up of rice fields using terraces.

c. Productivity

Productivity is the ability or carrying capacity of land to obtain the highest production yield per unit area in a certain time unit. Productivity results depend on the weather. Based on the information for the productivity data of Sustainable Food Agricultural Land (LP2B) in Pringsewu Regency not yet available, the data is combined with data from agricultural yields and agricultural area as a whole without separating the farms as LP2B.

According to data from the Agriculture Service in 2020, productivity data for lowland rice in Pringsewu Regency is 5.44 tons/ha. For the harvested area of paddy rice is 25,102 ha and the production yield is 136,555 tons. Agricultural land in Pringsewu Regency is able to produce rice production as the main food source, of course, it is supported by other factors such as soil type, water availability, slope, and rainfall.

d. Environmentally Friendly

Environmentally Insight is the use of Sustainable Food Agricultural Land (LP2B) which pays attention to the preservation of the environment and its ecosystem as well as the characteristics of cultivation and its area in realizing sustainable development. Based on the data that has been obtained, appropriate land use in paying attention to environmental, ecosystem, and cultural sustainability is planting plants according to the type of soil, slope, and rainfall in the area. Planting activities in the agricultural sector and the consistent determination of Sustainable Food Agricultural Land (LP2B) are activities that are environmentally sound.

e. Sustainable

Sustainability is the consistent and sustainable use of land to ensure the realization of self-reliance, resilience, and national food sovereignty by taking into account the next generation. Consistent use of land has been proven to have been carried out since the existence of a government regulation, this is definitely done because it is to ensure food in an area, especially Pringsewu Regency.

f. Cultivation Intensity

Planting Intensity is the frequency of planting food commodities on a stretch of land in one year. Planting Intensity (IP) is the area planted in a year divided by the area of irrigation. Based on information obtained from the Department of Agriculture, data to calculate cropping intensity in Pringsewu Regency, especially for Sustainable Food Agricultural Land (LP2B) plants are not yet available. The data available is only for paddy rice and others on agricultural land, so it cannot distinguish Sustainable Food Agricultural Land (LP2B) and agricultural land that is not Sustainable Food Agricultural Land (LP2B).

Conclusion

The conclusion in this study based on the research results is that the distribution of Sustainable Food Agricultural Land (LP2B) in Pringsewu Regency is clustered. Based on the results of research and calculations using the nearest neighbor analysis, the result is T = 0, which means that if the final result obtained is 0, then the distribution pattern is classified as clustered. While the factors that influence the distribution of Sustainable Food Agricultural Land (LP2B) are physical factors, namely slope, rainfall, soil type, and water availability, while social factors are population and conservation. The slope in Pringsewu Regency is relatively flat. Rainfall in Pringsewu Regency is classified as wet rainfall, namely 2000-2500 mm. There are 3 types of soil in Pringsewu Regency, namely andosol, latosol and pedsol. Availability of water in Pringsewu Regency there are 7 irrigation channels originating from rivers, reservoirs, wells, dams, ditches and long storage. The population of Pringsewu Regency is 400,187 affecting the distribution of Sustainable Food Agricultural Land (LP2B). Conservation in the form of terracing affects the distribution of Sustainable Food Agricultural Land (LP2B). Terraces are usually made in areas that have uneven slopes.

Anknowlegment

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