International Journal of Economics, Business and Management Research

Vol. 5, No.06; 2021

ISSN: 2456-7760

DETERMINATION OF PRIORITY LOCATIONS FOR THE IMPLEMENTATION OF RICE FARMING INSURANCE: A CASE STUDY ON DISASTER HAZARDS IN CILACAP REGENCY

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Abstract

In 2018, Cilacap Regency produced a total of 793,265 tons of rice, and was the second largest producer of the commodity in Central Java Province, after Grobogan Regency. However, Cilacap is very prone to flooding, thus is grouped into the high flood hazard category. The aim of this study is to determine the rice fields that need to be included in the Rice Farming Business Insurance program. It was conducted using an overlay and weighting or scoring method. The data were the Flood and Drought Hazard Maps obtained from the National Disaster Management Authority (BNPB), and the Rice Field Map obtained from the Geospatial Information Agency (BIG). The results showed that 17,251 ha of the rice farm land were in the priority I category, while 60,742 and 223 ha(s), were in the Priority II and III categories respectively. Furthermore, the sub-district that was most affected by the flood and drought was Kawunganten. In conclusion, the results can be used in the creation of priority policies for the Rice Farmers Business Insurance program

Keywords: agriculture insurance, rice, priorty location

1. Introduction

Historical records show that Indonesia was once an agro-based country that was, self-sufficient in rice production. At that time, the Government cared about the country's agriculture, and majority of the population were farmers.

Based on the BPS (Central Statistics Agency) records of 2019, 29.45% of Indonesia's population worked in the agricultural sector, while 18.91 and 14.09% in the trade and industrial sectors, respectively. However, the agricultural sector still contributed 12.37% less of the total contribution of the industrial sector, to the country's GDP (Gross Domestic Product). Therefore, when considering the major occupation of the population, Indonesia is still regarded as an agro-based country. However, with respect to GDP, the country is considered to be an industrialized nation.

Growth in population causes an increase in the need for food. Therefore, the Food and Agriculture Organization (2015) predicted that by 2050, an agricultural output of 60% would be needed to provide food for the world. Furthermore, developing countries would play a major role in the food production process, provided there are adequate agricultural facilities and infrastructure.

Vol. 5, No.06; 2021

ISSN: 2456-7760

Based on www.statista.com, Indonesia is the third largest rice producer, with a production of 36.6 million tons. Meanwhile, China and India ranks first and second with productions of 146 and 115 million tons, respectively. Rice is the staple food of the Indonesian society, therefore, the rise and fall in its price is the biggest contributor to inflation in the country. Moreover the stability of the price depends on production factors and market availability. Central, West, and East Java Provinces are some of the major rice producers. Furthermore, in 2018, Cilacap was the second rice producer after Grobogan Regency with a production of 793,265 tons. However, in 2019, the Regency recorded a decrease in production by 93,300 or 699,965 tons. It is believed that the decline occurred due to a reduction in the time available for farming. In mid-August 2019, BMKG (Meteorology, Climatology and Geophysics Agency) issued an official release which stated that the raining season in Indonesia could start between November and December, in 2019.

There are a lot of uncertainties in the agricultural sector due to both external and internal factors. The external factors are the conditions which are not controlled by farmers, such as natural disasters, plant pests, and climate change. The IPCC (2007) defined climate change as any alteration in climate caused by natural variability and human activities. Furthermore, the aspect of agriculture that is vulnerable to this change is the food crop sector. This is because the sector generally produces shallow-rooted seasonal crops. Sumampouw (2019) explained that climate change is an increase in the average temperature of the earth's surface and can threaten human survival.

Agricultural insurance is not new to many developed countries, because they have used the policy to maintain agricultural production and protect farmers. Indonesia only implemented this policy in 2015 with the issuance of the Minister of Agriculture Regulation No. 40 of 2015, which aimed to insure 1 million hectares of land. Agricultural insurance policies cover the risk of crop failure due to floods, drought, and attack by micro and macro organisms. Furthermore, farmers are required to only pay 20% of the insurance premium of IDR which is 36,000/ha/planting season. The results from the research by Suryanto et al (2020) showed that 93% of respondents were not willing to pay crop insurance premiums, therefore, agricultural insurance policies still required government subsidies. Based on the provisions of the terms of these policies a claim policy could only be implemented when the damage intensity reaches 75% of the total area of the rice farm. Furthermore, payment of claims for 1 ha of rice farm is IDR. 6,000,000.

2. Data and Method

2.1. Time and Research Location

This study was conducted in the rice fields of Cilacap Regency, Central Java Province, in 2020, as shown in Figure 1

Vol. 5, No.06; 2021

ISSN: 2456-7760

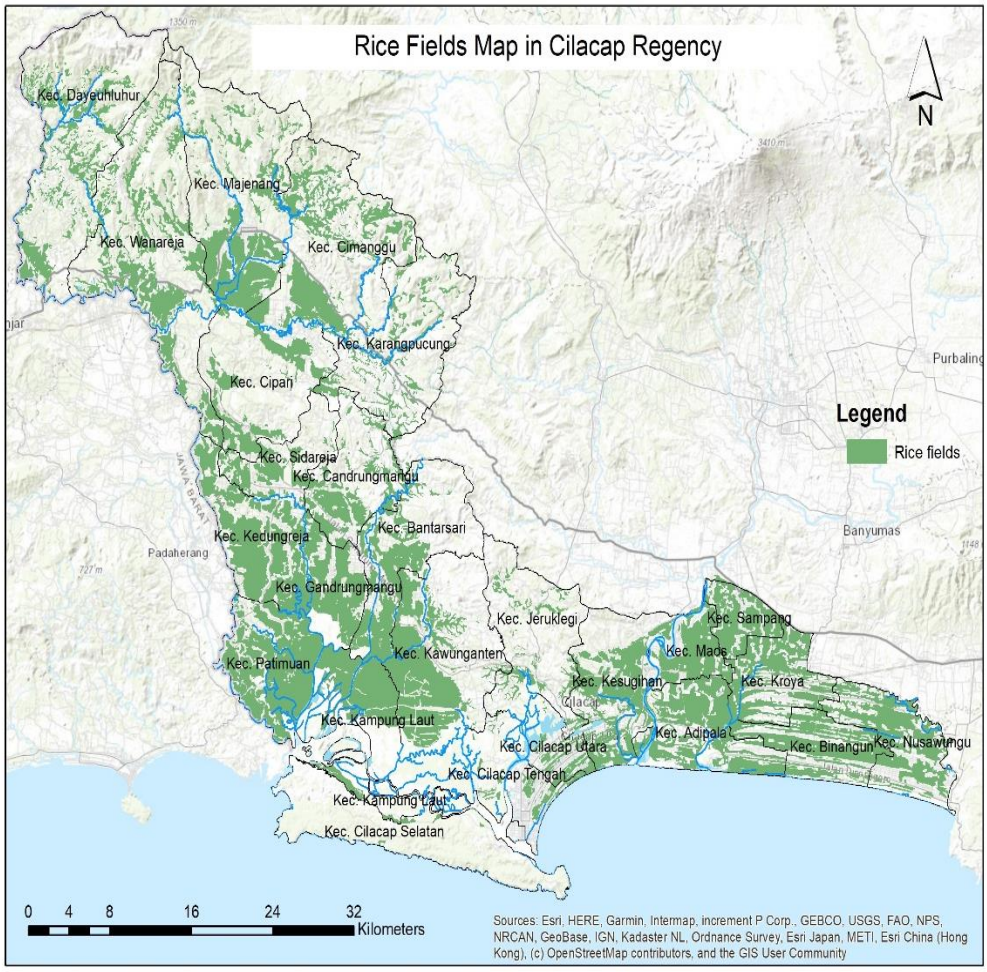

Figure 1. Map of Study Area

2.2. Tools and Materials of the Research

The data in this research were obtained form the Flood and Drought Hazard Map from the National Disaster Management Agency (BNPB), and the Rice Field Map from Topographic Maps, which were obtained from the Geospatial Information Agency (BIG). Furthermore, this study used the overlay method, and data analysis was carried out after all data/parameters had been obtained. Scoring is the assignment of weight/value to each particular factor by giving a score to each parameter in order determine the level of ability based on predetermined criteria. Therefore, by giving a score, the level of ability based on the levels of the parameters can be determined (Sholahuddin, 2015).

According to Law No. 19 of 2013, concerning the protection and empowerment of farmers, and the regulation of the Minister of Agriculture No. 40 of 2015, Agricultural Insurance bears the risk of crop failure caused by floods and droughts. This study attempted to map locations with the potential to be affected by these disasters because such locations really need protection against crop failure. The research flow chart is presented in Figure 2.

Vol. 5, No.06; 2021

ISSN: 2456-7760

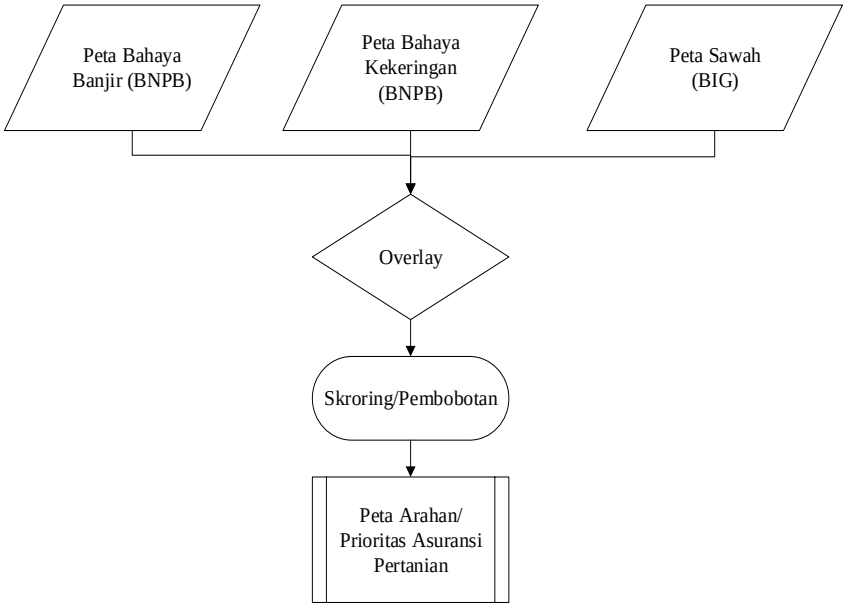

Figure 2. Research Flowchart

2.3. Parameter Scoring

The flood hazard parameters were obtained from BNPB, through www.inarisk.bnpb.go.id, where the flood hazard was divided into three categories. Furthermore, the categories were based on index values ranging from 0 to 1, which were simplified into low, moderate, and high flood hazard classes. This study provided a scoring where the high hazard level had the highest score and vice versa. Table 1 is the parameter scoring table.

Table 1
Parameter Scoring

NO	Flood Hazard Level	Score
1	Low	1
2	Moderate	2
3	High	3

NO	Flood Hazard Level	Score
1	Low	1
2	Moderate	2
3	High	3

Table 2
Classification of referrals/priority classes for the Rice Farmers Business Insurance program

NO	Class Referrals/Priorities for Rice Farming Business Insurance Program	Total Score
1	Priority I	5 - 6
2	Priority II	3 - 4
3	Priority III	1 - 2

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The scoring method was carried out by assigning a score to each parameter Furthermore, the scores were dependent on the experiment or empirical experience that was carried out. According to Bakosurtanal, 2010:27, the more a scoring method is tested, the more accurate it would be.

Vol. 5, No.06; 2021

ISSN: 2456-7760

3. Result and Discussion

3.1. Flood Hazard

The majority of Indonesia's population work in the agricultural sector. Furthermore, according to spatial data from the Geospatial Information Agency, Cilacap Regency has an agricultural land area of 78217.32 ha, which was the second largest in Central Java after Grobogan Regency. The regency is geographically positioned in the southern region of Central Java, and has the potential to become a major food producer. However, this Regency not only faced this treat, but also the possibility of drought.

Based on BNP, there are three classes of flood hazard in the Cilacap district, and they are shown in in Figure 3.

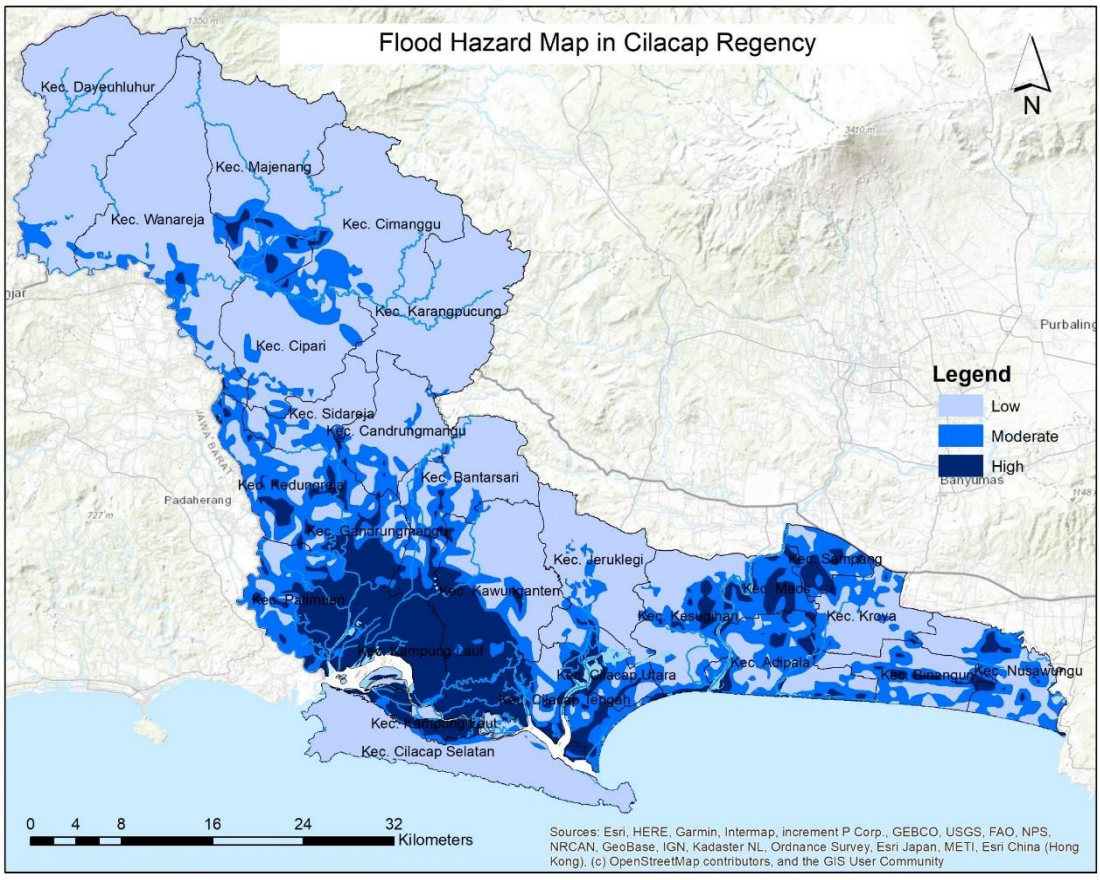

Figure 3. flood hazard map in Cilacap Regency

Based on the map from BNPB, which was analyzed and juxtaposed with the rice field map from BIG, the largest flood hazard area was in the low hazard class, and it had an area of 31,462.34 ha or 40% of the total agricultural land. Meanwhile, the area of agricultural land that was in the moderate and high flood hazard classes were 29,415.20 ha or 37.6%, and 17,339.79 ha or 22.2% respectively.

Agricultural land which has a high threat of flooding needs special attention in order to prevent crop failure.

The details of agricultural land that have a flood hazard are presented in the following table.

Vol. 5, No.06; 2021

ISSN: 2456-7760

Table 3. The threat of flooding to agricultural land

Flood Hazard	large (ha)	Percentage
Low	31.462,34	40,2
Moderate	29.415,20	37,6
High	17.339,79	22,2

Source: Data Analysis Results

3.2. Drought Hazard

Based on the BNPB hazard map, there are two drought hazard classes in Cilacap district as shown in Figure 4

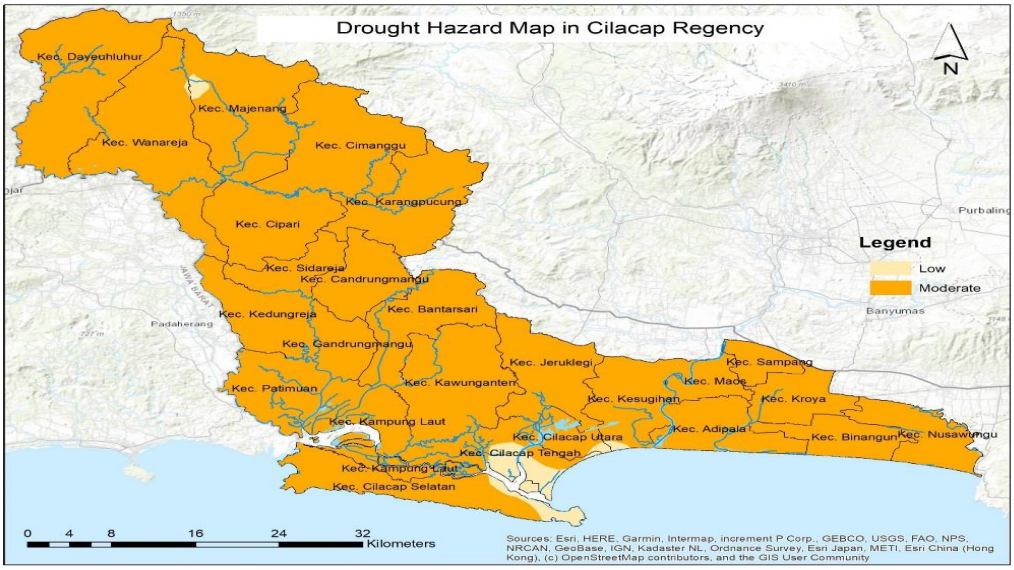

Figure 4. Drought hazard map in Cilacap Regency

In addition to the threat of flooding, Cilacap Regency's agricultural land was also threatened by drought hazard. However, the threat was in the low to moderate category The results of the BNPB Drought Hazard Map analysis and BIG Agricultural Land Map showed that almost all agricultural land (77. 524.67 ha or 99.1% of the existing agricultural land) were in the moderate drought hazard category, and only 692.67 ha or 0.9% was in the low category. Furthermore, there was no drought hazard in the high category.

The following is a table of drought hazards in Cilacap Regency.

Table 4 The threat of drought to agricultural land

Drought Hazard	Large (ha)	Percentage
Low	692,67	0,9
Moderate	77.524,67	99,1
High	0	0,0

Source: Data Analysis Results

Vol. 5, No.06; 2021

ISSN: 2456-7760

3.3. Agricultural insurance priority locations

The results of the overlay analysis, and scoring between the Drought and Flood Hazard Maps showed the priority locations for the Rice Farming Business Insurance program. Moreover the locations were determined based on the sum of the scores of each parameter on the flood and drought hazards. From the analysis, it was observed that 17,251.07 ha or 22.06% of agricultural land was included in the first priority, which means that the land needed to be insured by the Rice Farming Business Insurance program. This is because it was in danger of flooding and drought. The second priority included lands thay could be insured, provided the farmer permits it. Furthermore, the lands were 77.66% of the total agricultural land. Finally, the third priority included the lands which were safe, and they were 0.29%.

Table 5. Locations of the Rice Farmers Business Insurance program

Classes	Large	Percentage
Priority I	17.251,07	22,06
Priority II	60.742,38	77,66
Priority III	223,89	0,29

Source: Data Analysis Results

Insurance priority locations are made from scoring results, there are three priority classes of agricultural insurance locations shown in the figure

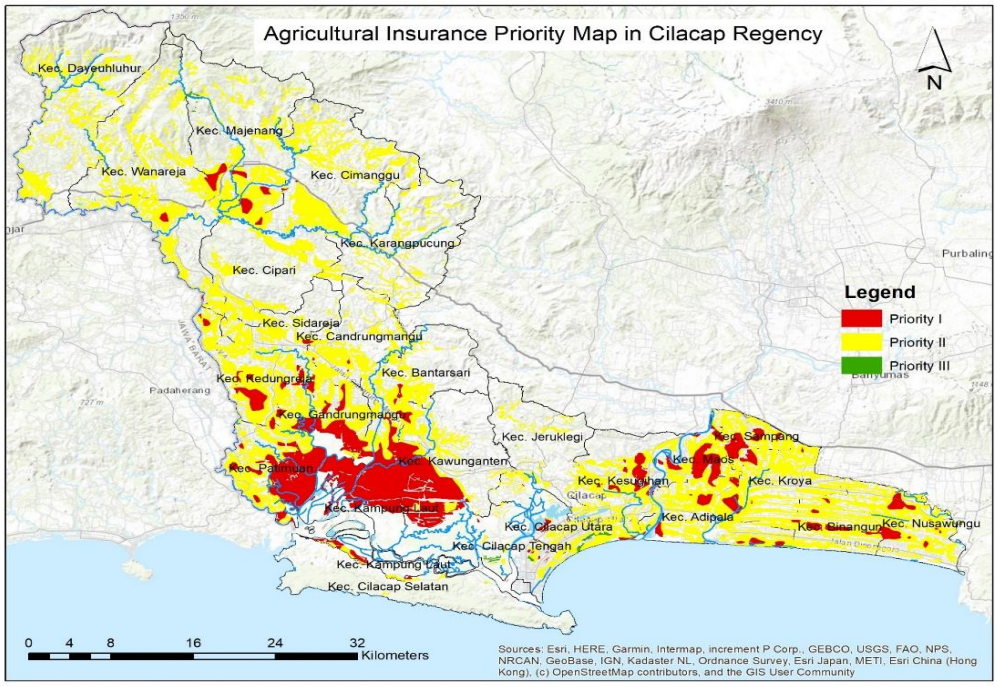

Figure 5. AUTP Priority Map for Cilacap Regency

Most of the first priority locations are in the upstream area, which has the threat of floods.

Vol. 5, No.06; 2021

ISSN: 2456-7760

4. Conclusion

The research concludes that it is very important to protect farmers by paying attention to disaster vulnerability. The area of rice fields categorized as priority I was 17,251 ha, priority II was 60,742 ha, and priority III, 223 ha. Furthermore, the Cilacap sub-district most affected by flood and drought was Kawunganten. Based on the results, disaster hazards should be a major consideration for the implementation of agricultural insurance policies. However further research is needed to prove this claim.

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