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Analysis of Rice Field Drought Level in Pemalang Regency 2019 – 2021

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Abstract

Pemalang is a district that has rice fields up to 36 thousand hectares and becomes a buffer area for rice commodity in Central Java and becomes a focus in maintaining availability and food reserves. However, Pemalang Regency is vulnerable to the threat of drought that often hits the Central Java region. Therefore, information is needed about rice field drought as a form of mitigation and supporting food security by the sustainable development goals (SDGs). The purpose of this research is to determine the level of rice fields' drought in the rainy and dry seasons from 2019 to 2021 and displays in the form of web gis that all circles can access. The data needed in this study include normalized difference vegetation index (NDVI) map, normalized difference water index (NDWI) map, land surface temperature (LST) map, hydrogeology map, land type map, and rice field map. The result of this study is the formation of a map of the drought level of rice fields in the Pemalang Regency divided into five classes, namely very low, low, medium, high, and very high. Ulujami and Belik are the sub-districts with the broadest moderate drought rate from the data processing. Then Ulujami, Watukumpul, and Belik are districts with the broadest area of high drought, and Randudongkal is a subdistrict with the broadest very high drought area.

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INTRODUCTION

Drought is one of the disasters that often occurs in parts of Indonesia. That is because Indonesia only has two seasons. The dry season causes drought disasters to often happen in the territory of Indonesia due to reduced rainfall intensity and where rainfall is an input of water in an area. A drought has several impacts, especially on daily water needs, affecting the agricultural sector. Drought causes many losses for farmers who experience drought in their agricultural land. Pemalang Regency is the food buffer area, especially rice commodities in Central Java, and is the foundation for maintaining food availability and reserves. Pemalang Regency contributes to supporting food security in Central Java because it has up to 36 thousand hectares of raw land for rice fields (Kontributor Pemalang, 2020). That matter is threatened by a drought that will hit the Central Java region. Central Java itself is one of the provinces with a high drought threat based on BNPB (2015); this will affect the resilience and yield of rice farming.

Food security includes in the Sustainable Development Goals (SDGs) goals. The Sustainable Development Goals (SDGs) are a global action plan agreed by world leaders, including Indonesia, to end poverty, reduce inequality and protect the environment. The SDGs contain 17 Goals and 169 Targets that are expected to achieve by 2030 (Bappenas, 2020b). Food security is related to the SDGs goal, namely goal 2, ending hunger, achieving food security and better nutrition, and supporting sustainable agriculture. Food security will be related to consumption in line with the goal of SDGs number 12, namely ensuring sustainable consumption and production patterns (Bappenas, 2020a). Therefore, it is necessary to have real-time information related to the level of dryness of rice fields to give information for farmers to minimize the impact of drought.

Currently, technological advances that have penetrated the field of knowledge in geography and remote sensing can produce images as accurate as aerial photographs with good quality to describe the earth's surface. It does not require time and expansive costs to conduct direct research. The use of satellites and aerial photography, coupled with developments in geographic information systems, has been widely used in all areas of life, such as regional planning, economics, and business, to mitigate natural disasters. These technological advances can help in presenting drought information to farmers. The results of this research are spatial information about the level of the drought of rice fields and their distribution in the Pemalang Regency. The results also show the public in hub sites, dashboards, and web applications.

METHODS

Research Location

Astronomically, Pemalang Regency locate between 6° 52' 30" - 7° 20' 11" South Latitude (LS) and between 109° 17' 30" 109° 40' 30" East Longitude (BT).

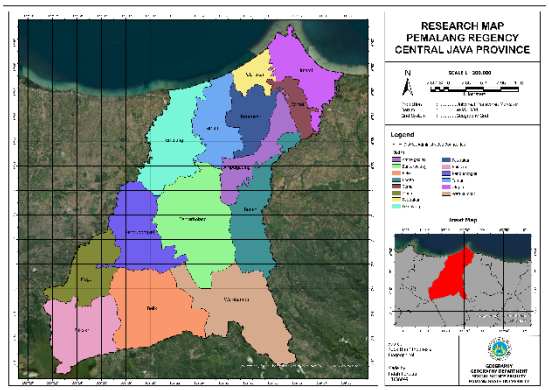

Figure 1. Research Location Map

Data

The type of data in this research is secondary data. The data is Landsat Oli 8 Image data (USGS earth explorer) which use to obtain data on Vegetation Index, Humidity Index, and Soil Surface Temperature. The Hydrogeological Map (RTRW), Soil Type Map (RTRW), Land Use Map, and Rice fields (KLHK).

Type of soil

The type of soil used in this study was obtained from Bappeda and then digitized, then scored based on the level of soil that absorbs water. This score will be used in the overlay arithmetic method to determine the degree of dryness. The type of soil used in this study is because the type of soil is an indicator that affects the ability of the land to absorb water (Soewandita, 2019)**.** Then the soil types are classified into five can be observed in **Table 1**.

Hydrogeology

Hydrogeology is used in research to interpret the condition of underground water, the less water the area will be more prone to drought (Dzulfikar Habibi Jamil, Tjahjono, & Parman, 2013). The hydrogeological classification is based on the productivity of the aquifer can be seen in

Table 2.

Table 1. Classification of Soil Types Against Drought

Type of Soil	Score
Litosol, Mediteran	5
Regosol	4
Andosol	3
Latosol	2
Aluvial	1

Source : Darmawan, 2008 in Arum & Adly (2018)

Table 2. Classification of Hydrogeology against Drought

Hidrogeology	Score
Rare Groundwater	4
Small-Medium Productivity	3
Medium-High Productivity	2
High Productivity	1

Source : Tjahjono (2008) in Prayoga (2017)

Vegetation Index

In analyzing the vegetation index used the image transformation—the transformation of the vegetation index rates into four. The primary vegetation index is the vegetation index, which minimizes the soil background, the vegetation index, which minimizes the influence of the atmosphere, and other vegetation indices (Danoedoro, 2012).

NDVI combines substitution techniques with image reduction techniques, a simple index, and dynamic and sensitive range value results that are very suitable to be applied to see changes in vegetation cover. The formula results have values ranging from -1 to 1, with the smaller the value lower the vegetation level in the area. NDVI values are grouped into five classes according to the Regulation of the Minister of Forestry of the Republic of Indonesia number P.12/Menhut-II/2012.

Table 3. Classification of NDVI Values Against Drought

NDVI Value	Defenition	Score
-0,8 – 0,03	Non-vegetated land	5
0,03 – 0,15	Very Low greenness	4
0,15 – 0,25	Low greenness	3
0,25 – 0,35	Medium greenness	2
0,35 - 1	Very High greenness	1

Source: Peraturan Menteri Kehutanan RI nomor P.12/Menhut-II/2012 in Prayoga (2017)

Wetness Index

The surface soil wetness index is the index of water that fills the upper soil horizon. The wetness index used is based on the fact that soils with high humidity are assumed to be often flooded. The higher the level of wetness, the lower the vulnerability to drought, and vice versa. This wetness index analyzes using the NDWI (normalized difference water index) algorithm developed by Gao in 1996. NDWI values are classified into three classes according to the NDWI classification created by Xu (2006), as shown in the table below.

Table 4. Classification of NDWI Values against Drought

NDWI Value	Defenition	Skor
-0,7	Non-Body water	5
0 – 0,33	Medium Wetness	2
0,33 -1	Wetness is very high	1

Source : Xu (2006) in Prayoga (2017)

Land Surface Temperature

Land surface temperature is not the air temperature. The temperature is the temperature of the outermost part of an object. Like in vegetation is seen as the temperature of the plant canopy surface, and the body of water is the temperature of the water surface. The soil surface temperature was obtained using the Land Surface Temperature (LST) algorithm.

Data Processing Techniques

The data analysis technique used tools like ArcGIS Pro, ArcMap 10.4, Microsoft Excel, and Envi 5.3. In the process of data analysis using the arithmetic overlay technique by adding up all scores of each parameter. The process goes from data collection analysis to the presentation of information. In summary, the data processing in this research can see in the flow chart below.

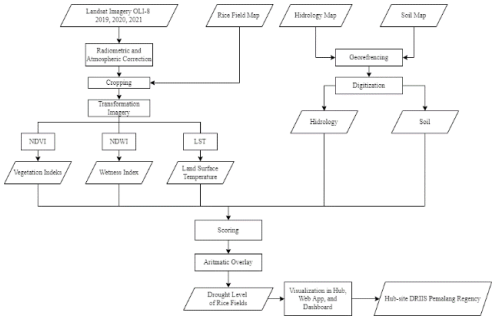

Figure 2. Research Flow Chart

RESULT AND DISCUSSION

Drought Potential in Rice Fields

The analysis was carried out in Pemalang Regency from 2019 to 2021, divided into the dry and rainy seasons. This matter does remain aware of the potential for drought in the rainy and dry seasons because rice planting does during the rainy season.

The Drought Level and Distribution in 2019

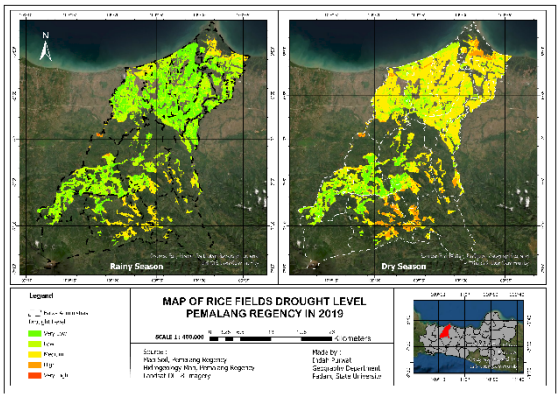

Figure 3. Map of Drought Level of Pemalang Regency Rice Fields in 2019

Dryness in the rainy season found that the most frequent droughts were at low, very low, medium, high, then very high drought levels. Because the image was taken in a rainy month, which affects the results, it should be noted that there are still rice fields that experience medium, high, and very high drought that will affect rice planting during the rainy season.

Table 5. Area and Percentage Based on Drought Level 2019 Rainy Season

Level of Drought	Area (Ha)	Percentage (%)
Very Low	15934,85	39,2
Low	18815,28	46,3
Medium	5547,13	13,6
High	318,92	0,78
Very High	8,20	0,02

Source : Data Analysis (2021)

As can be seen in the table above, the drought is very low level as much is 39.22%, and low level as much is 46.31%. Moreover, this condition is perfect for rice growth conditions because drought dominated at very low and low levels in the rainy season will not inhibit rice growth. However, there are still high and very high drought rates that are pretty wide, 318.92 ha and 8.20 ha, respectively. While the percentage is less than another drought level, the area of rice fields can be categorized as very wide even though the drought during the rainy season.

The spread of high drought levels in 2019 during the rainy season spread almost all districts

Table 6. Area (Ha) of Drought Level by District year 2019 rainy season

District	Very Low	Low	Medium	High	Very High
Ulujami	594,13	1643,9	981,82	74,39	0
Patarukan	1337,18	419,56	13,38	0,09	0
Taman	2649,8	2009,04	118,23	6,36	0
Comal	686,32	832,81	6,39	0	0
Pemalang	1988,31	2788,9	540,23	16,79	0
Petarukan	2612,92	1353,73	31,95	0	0
Ampelgading	1635,94	1527,93	63,69	3,28	0
Bodeh	946,22	1586,78	424,63	2,67	0
Bantarbolang	608,04	1768,53	747,85	42,19	0
Randudongkal	1253,59	2340,5	140,59	119,19	8,2
Moga	1087,09	1746,58	94,39	0	0
Watukumpul	10,79	189,55	827,5	25,67	0
Belik	433,89	446,87	1556,42	28,26	0
Pulosari	90,58	160,55	0	0	0
Jumlah	15934,85	18815,28	5547,13	318,92	8,2

Source : Data Analysis (2021)

in Pemalang Regency. Only Comal, Bettors, Moga, and Polusari districts do not have high drought levels. The Ulujami district has the broadest high drought level. Besides that, Randudongkal is the only district with a very high drought in Pemalang Regency. The distribution of drought levels in every sub-district in the Pemalang Regency can see in the table 6.

Then during the dry season, the drought that occurs is dominated by low and moderate drought, then very high, and very high. These conditions are not too different, and it is just that the level of drought is high and very high wider than the rainy season.

Table 7. Area and Percentage Based on Drought Level 2019 Dry Season

Level of Drought	Area (Ha)	Percentage (%)
Very Low	2336,17	3,91
Low	38352,54	64,13
Medium	17550,21	29,35
High	1552,86	2,59
Very High	8,52	0,01

Source : Data Analysis (2021)

Not much different during the rainy season. The spread of drought in the dry season at high drought levels also occurs in almost all sub-districts except Comal, Petarukan, Moga, Ampelgading, and Pulosari districts, which does not have the potential for drought. The Ulujami sub-district still has the broadest high drought level. In comparison, Randudongkal is still the only district with a very high drought in Pemalang Regency in the dry season (**Table 8**). Information on the spread of rice field drought in 2019 can also see in the image below.

The Drought Level and Distribution in 2020

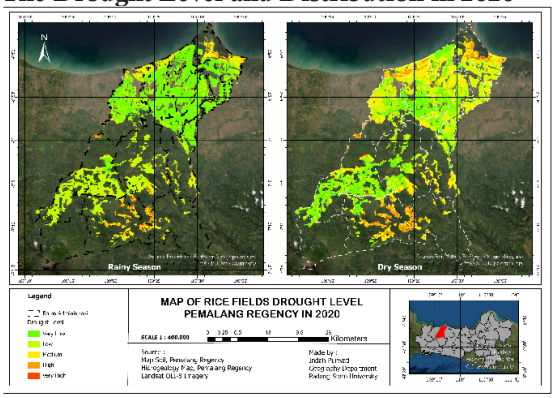

Figure 5. Map of Drought Level of Pemalang Regency Rice Fields in 2020

The result analysis of drought levels in the rainy season in 2020 found that the level of drought that dominates drought levels is very low and low, which is undoubtedly very good for rice growth but just like in 2019. A medium to very high drought rate can threaten rice fields even though the area is not as large as rice fields with

Table 8. Area (Ha) of Drought Level by District Year 2019 Dry Season

District	Very Low	Low	Medium	High	Very High
Ulujami	18,91	907,25	2031,73	335,86	0
Patarukan	11,52	899,59	858,93	0,16	0
Taman	79,98	2818,77	1857,71	26,95	0
Comal	3,09	398,7	1123,61	0	0
Pemalang	106,58	2773,59	2409,15	44,84	0
Petarukan	13,15	1515,74	2469,72	0	0
Ampelgading	1,39	1697,95	1531,5	0	0
Bodeh	10,93	1086,18	1771,48	92,08	0
Bantarbolang	443,34	1478,03	1127,58	117,65	0
Randudongkal	1087,87	2315,7	382,89	67,09	8,51
Moga	365,71	2260,76	301,54	0	0
Watukumpul	0,85	108,16	680,05	264,43	0
Belik	171,35	686,51	1003,84	603,74	0
Pulosari	21,43	229,29	0,4	0	0
Jumlah	2336,17	19176,27	17550,21	1552,85	8,51

Source : Data Analysis (2021)

very low and low drought levels.

Table 9. Area and Percentage Based on Drought Level 2020 Rainy Season

Level of Drought	Area (Ha)	Percentage (%)
Very Low	17342,7	42,69
Low	16728,91	41,18
Medium	5102,05	12,56
High	1430,12	3,52
Very High	17,65	0,04

Source : Data Analysis (2021)

The spread of high drought levels is spread evenly throughout the sub-district in Pemalang Regency, with the highest rice field area in Belik (543,48 Ha), Watukumpul (362.37 Ha), and Ulujami (208,23 Ha). In comparison, the drought rate is very high in Ulujami, Bodeh, Bantarbolang, Randudongkal, Watukumpul, and Belik districts, with Ulujami and Bantarbolang districts having the highest area of 10.49 ha and 4.44 ha.

While in the dry season, many drought levels occur at low (57.8%) and medium (21.36%) drought levels as they did in 2019. It is just that the drought rate became wide.

Table 11. Area and Percentage Based on Drought Level 2020 Dry Season

Level of Drought	Area (Ha)	Percentage (%)
Very Low	6866,1	16,90
Low	23482,44	57,80
Medium	8679,49	21,36
High	1562,31	3,84
Very High	34,73	0,085

Source : Data Analysis (2021)

While the spread of high drought in every sub-district in Pemalang Regency during the dry season is in all sub-districts except Comal and Pulosari districts with the highest subdistrict area in Belik district (576.66 Ha), Watukumpul (211.57 Ha), and Ulujami (267.89 Ha), for very high drought levels, there are in several sub-districts: Ulujami, Pemalang, Randudongkal, Watukumpul, and Belik with an area from 2 hectares to 13 hectares (Table 11). Information on the spread of rice field drought in 2020 can also see in the image below (Figure 3).

Table 10. Area (Ha) of Drought Level by District Year 2020 Rainy Season

District	Very Low	Low	Medium	High	Very High
Ulujami	1222,32	839,88	1012,04	208,23	10,49
Patarukan	1382,72	304,75	81,2	1,38	0
Taman	3112,61	1382,28	274,18	14,13	0
Comal	1264,42	253	7,1	0,31	0
Pemalang	2744,19	1896,04	653,83	40,01	0
Petarukan	3332,04	611,81	52,62	1,75	0
Ampelgading	2306,2	873,01	45,78	5,51	0
Bodeh	1409,28	1146,61	384,42	19,52	0,04
Bantarbolang	72,81	2347,53	622,85	122,29	1,05
Randudongkal	464,6	3015,8	275,59	101,82	4,43
Moga	27,66	2689,68	202,23	9	0
Watukumpul	0	183,68	506,74	362,37	0,67
Belik	3,76	934,27	983,07	543,47	0,94
Pulosari	0,05	250,52	0,34	0,27	0
Jumlah	17342,7	16728,91	5102,05	1430,12	17,65

Source : Data Analysis (2021)

Table 12. Area (Ha) of Drought Level by District year 2020 Dry season

District	Very Low	Low	Medium	High	Very High
Ulujami	53,46	1648,22	1310,88	267,89	13,62
Patarukan	490,33	1082,26	197,28	0,34	0
Taman	1302,81	2435,18	924,52	120,93	0
Comal	49,87	1302,07	173,62	0	0
Pemalang	612,2	3414,69	1114,13	189,29	3,96
Petarukan	541,55	2665,92	788,02	3,11	0
Ampelgading	465,29	2279,75	475,51	10,29	0
Bodeh	166,55	2076,33	712,91	5,24	0
Bantarbolang	682,03	1652,34	779,34	52,89	0
Randudongkal	1280,43	2211,44	244,71	121,02	4,47
Moga	852,8	1943,46	128,78	3,01	0
Watukumpul	9,08	85,54	744,67	211,57	2,6
Belik	297,46	497,3	1083,97	576,66	10,05
Pulosari	62,19	187,87	1,07	0	0
Jumlah	6866,1	23482,44	8679,49	1562,31	34,73

Source : Data Analysis (2021)

The Drought Level and Distribution in 2021

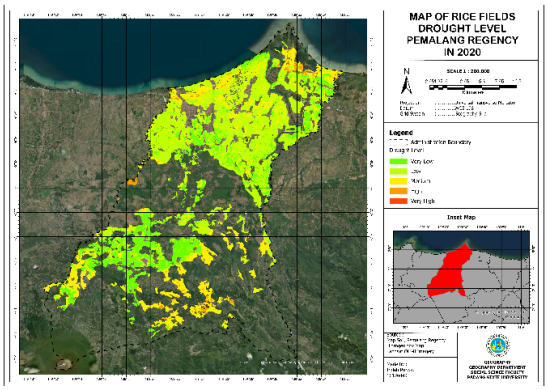

Figure 6. Map of Drought Level of Pemalang Regency Rice Fields in 2021

In 2021 the analysis conducted was an analysis of drought levels in the dry season with image taking in April when the region enters the beginning of the dry season. Just like the previous year's drought, the levels of drought that dominated were low (66.3%) and moderate (17.2%).

Table 13. Area and Percentage Based on Drought Level 2021 Dry Season

Level of Drought	Area (Ha)	Percentage (%)
Very Low	6227,95	15,33
Low	26917,76	66,28
Medium	6984,20	17,19
High	479,7	1,18
Very High	2,79	0,006

Source : Data Analysis (2021)

The distribution of drought levels in each sub-district is obtained. Almost all sub-districts are at high drought levels except Comal, Radudongkal, Ampelgading, Moga, and Pulosari districts. Ulujami and Watukumpul districts have the highest drought area of 149.83 Ha and 108.03 Ha. While at a very high drought level only found in Randudongkal subdistrict with a drought area of 2.8 ha. Information on the spread of rice field drought in 2021 can also see in the image below

Table 14. Area (Ha) of Drought Level by District year 2021 Dry season

District	Very Low	Low	Medium	High	Very High
Ulujami	512,58	1861,3	771,92	149,83	0
Patarukan	209,69	1407,89	149,22	2,38	0
Taman	416,88	3774,51	564,44	26,73	0
Comal	212,49	1211,92	100,82	0	0
Pemalang	303,01	4433,72	548,68	40,23	0
Petarukan	67,59	3528,27	402,74	0	0
Ampelgading	233,64	2851,59	145,6	0	0
Bodeh	336,05	2263,54	361,21	0,04	0
Bantarbolang	806,8	1716,76	642,24	0,81	0
Randudongkal	1781,21	1863,27	126,26	87,63	2,79
Moga	692,89	1315,05	917,76	0	0
Watukumpul	23,38	182,31	783,96	64,07	0
Belik	537,37	401,81	1418,23	108,03	0
Pulosari	94,29	105,77	51,07	0	0
Jumlah	6227,95	26917,76	6984,2	479,79	2,79

Source : Data Analysis (2021)

(Figure 4).

From the results of the analysis of drought for three years, both in the dry season and the rainy season, it was concluded that the level of drought that occurs during the rainy season is a meager drought rate while in the dry season is a low, moderate drought rate. The high drought rate has the highest area during the dry season in 2019 and 2020 and the rainy season in 2020. Some sub-districts that have always been sub-districts with medium drought conditions that have the highest area every year are Ulujami and Belik districts. **(Figure 6).**

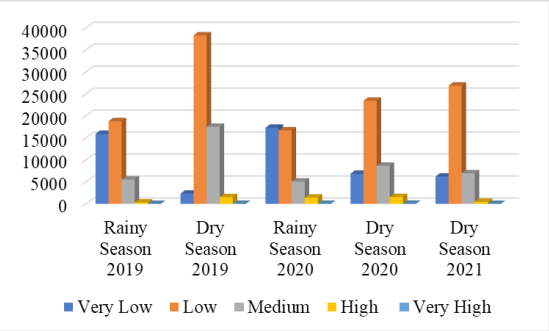

Figure 7. Drought Comparison Per Year in Pemalang Regency

While at a high drought level is Ulujami, Watukumpul, and Belik districts with the broadest high drought rate each year. However, sub-districts other than Watukumpul and Belik have priorities to be sub-districts that need to be considered when rice planting both during the rainy season and drought as sub-districts that given disaster mitigation assistance. At a very high level of drought, Randudongkal is a sub-district that must be prioritized to get help in preventing drought in rice fields that have the potential to experience drought.

In the analysis of droughts from 2019 to 2021, drought in addition to occurring due to a decrease in rainfall levels is also due to the hydrogeological side of Pemalang Regency consisting of rare groundwater and medium productivity. From the state of the soil in water absorption, Pemalang Regency also has Litosols, Regosols, and Podsolics which are difficult to store water. Meanwhile, humidity, vegetation index, and surface temperature depend on the season. For example, in the 2019 rainy season, the surface temperature is less than 37 degrees, then in the dry season, there are areas where the temperature is above 37 degrees.

Information Form

In presenting information about areas that have the potential for the drought of rice fields in Pemalang Regency is used Esri Indonesia Smart Community web application. Users can search for content that wants to know the information through the explore content tab by searching for keywords about the information to be examined. The presentation of information will be visible from application access and the website. Website applications can provide information that is easily accessible and reached by many people and is also more common and open to use. In addi-

tion, the web is a system related to the content of information providers to display text, images, multimedia, and others on the internet network (Sibero (2013) in Kuswandi, Ichsan, Ernawati, & Wahyuni, 2021). Websites also correlated with several web pages that usually contain interrelated topics and are sometimes accompanied by play with files in images, videos, and other file types Rahmadi (2013) in (Khairil & Syafutra, 2021).

In line with the nature of visualization of geographical information system results, where the website used also utilizes geographic information systems in displaying and describing the results of the data analysis presented. Visualizing data on the potential drought of rice fields in Pemalang Regency using web technology that is synchronized with geographic information systems also produces efficient information in the form of maps and graphs related to presenting data in the form of vegetation index, surface temperature, wetness index, to drought information related to the upcoming season period.

The website used to display rice fields potential drought in Pemalang Regency also utilizes Graphical User Interface technology. That provides a set of applications with menus, icons, and other pointer tools so that users and information seekers can become more accessible in accessing media used through electronic devices such as computers, laptops, and smartphones. The initial display of the website used in conveying information related to the potential drought of rice fields in Pemalang Regency using products issued by Esri is HUB that can access on the https://tinyurl.com/DRIISWebgis. The initial view of this hub site sees in the image below.

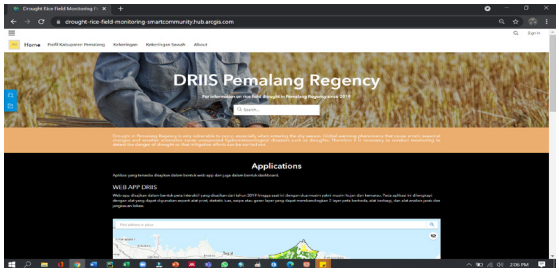

Figure 8. Early View of DRIIS Pemalang Regency Hub

The website used in the delivery of data also provides essential information in providing general delivery related to the information of the particular area and the theme of the problems discussed in this study. There is also a story map containing information related to the background of the problem, the methods used to analyze drought level information, applications, and conclusions of activities carried out. In addition, there is also a web app in playing information related to drought problems in Pemalang Regency through maps from 2019 to 2021 with analytical tools in the form of graphs, evidence analysis, print access and sharing, and others. The designed web-app view can see in figure 12 with some examples of panels related to legends and a list of layers that can view and compare how it shifts using swipe settings. In figure 13, there is also an example of a location analysis setting using a buffer to see the range of potentially drought-stricken levels in the surrounding environment with a specified location range.

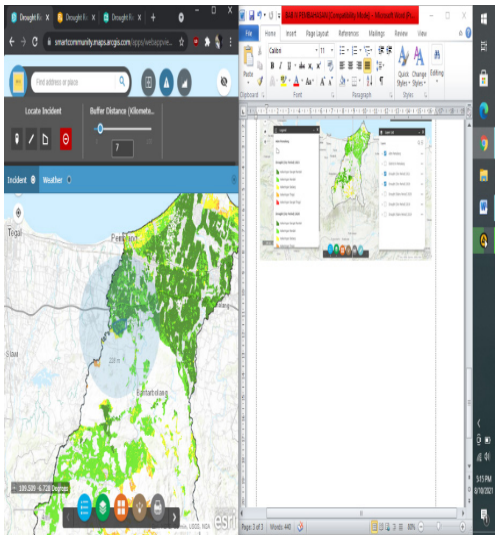

Figure 9. Application of Drought Distance Location Analysis

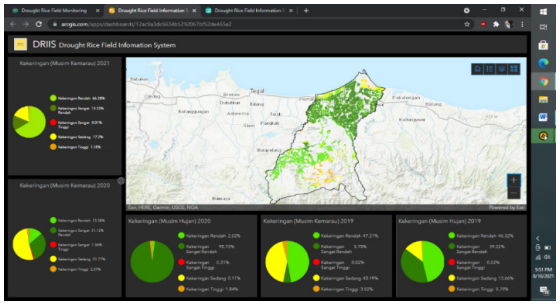

Figure 10. DRIIS Dashboard View

The presentation of drought rate graphs based on the seasons since 2019 is also presented in full and detailed in the dashboard page that displays the numbers and percentages of areas based on their potential to experience drought in the analysis at a given time.

In support of the validity of the data provided through the DRIIS web, it also provides data that builds drought level analysis in Pemalang Regency such as vegetation index, surface tempe-

rature, wetness index, rice field distribution, soil type, and hydrogeological data. The data is additional information in providing an understanding related to where the data was obtained by analyzing the variables used and providing specifications of the origin of the data.

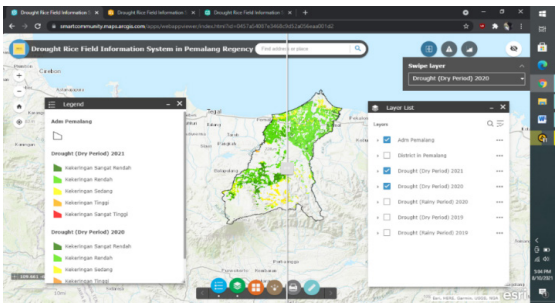

Figure 11. Swipe Layer Tools Display in Application of Drought Distance Location Analysis

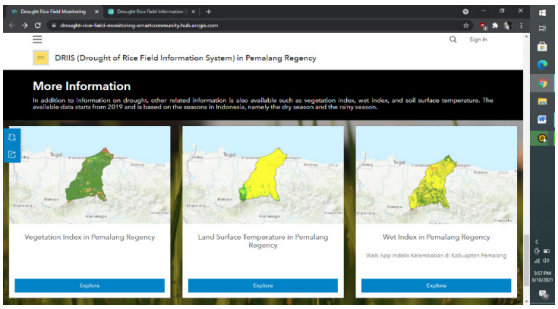

Figure 12. Access Variable Data Information

By displaying the data used in analyzing the level of drought, the wider community can understand how the dynamics of variables influence each other so that risks. Mainly related to economic activities such as crop failure, social problems such as health, scarcity of clean water, and unstable physical conditions can educate them in taking steps related to actual conditions in the area studied. By knowing the extent and distribution, intensity, frequency, and duration, effective handling measures can be determined in the future (Purnamawati, 2014). The use of websites in displaying this information is considered more effective because websites tend to be interactive with minimalist and complex concepts so that the time needed to access becomes faster (Aufa (2014) in Sasikirono, Rahayu, & Utami (2019)).

The process in the delivery of communication has three effects mainly seen from the process of communication that is mass, including (1) cognitive effects, where the role of communication shown in general can cause the audience to react to changes in science, perspective, and opinion on the information obtained; (2) practical effect, messages conveyed from mass communication can trigger certain feelings by the recipients; (3) Conative effect, causing the public to decide to do something or do nothing about the phenomenon known through this communication delivery process (Liliweri, (2001) in Halik (2013)). The way chosen by displaying information through GIS-based websites and GUI is considered to follow the debate of the times where the development of technology also causes massive changes in human habits in utilizing data and information and new knowledge. With the effectiveness of the information conveyed, it is expected that the community in Pemalang Regency can make maximum use of this presentation to be better prepared in facing drought risks. Mainly related to agriculture, planning the planting period, and implementing a better irrigation system. The availability of this information space also provides a form of temporal monitoring of conditions in a large area. It does not rule out the possibility that it can also be effective if applied to other regions, especially to state steps in the welfare of rice field farmers.

CONCLUSIONS

From the processing of data and results obtained, it can be concluded that from the results of drought analysis for three years both in the dry and rainy seasons. It is concluded that the level of drought that occurs during the rainy season is very low and low drought rate while in the dry season are low and medium drought levels. The high drought rate has the highest area during the dry season in 2019 and 2020 and the rainy season in 2020.

Some sub-districts that have always been sub-districts with moderate drought conditions that have the highest area every year are Ulujami and Belik districts. While at a high drought level is Ulujami, Watukumpul, and Belik districts with the broadest high drought rate each year. However, subdistricts other than Watkumpul and Belik have priorities to be sub-districts that need to be considered when rice planting both during the rainy season and drought as sub-districts that are given disaster mitigation assistance. Furthermore, at a very high level of drought, Randudongkal is a sub-district that should prioritize to get help in preventing drought on rice fields that have the potential to experience drought.

The website is used to convey information related to the potential drought of rice fields in Pemalang Regency using products issued by Esri, namely HUB, that can access at the https://tinyurl.com/DRIISWebgis. There is also a story

map containing information related to the background of the problem, the methods used to analyze drought level information, applications, and conclusions of activities carried out. In addition, there is also a web app in playing information related to drought problems in Pemalang Regency through maps from 2019 to 2021 with analytical tools in the form of graphs, evidence analysis, print access and sharing, and others. In support of the validity of the data provided through the DRIIS web, it also provides data that builds drought level analysis in Pemalang Regency such as vegetation index, surface temperature, wetness index, rice field distribution, soil type, and hydrogeological data.

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