FACULTY OF MATHEMATICS AND NATURAL SCIENCES
UNIVERSITAS NEGERI MAKASSAR
INDONESIA

PROCEEDING

"The Role of Mathematics, Sciences, Technology, Education towards ASEAN Economic Community and Global Challenges"

ICMSTEA 2016

ISBN: 978-602-99837-4-6

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2nd ICMSTEA

INTERNATIONAL CONFERENCE ON MATHEMATICS, SCIENCE, TECHNOLOGY, EDUCATION AND THEIR APPLICATIONS

"The Role of Mathematics, Sciences, Technology, Education towards ASEAN Economic Community and Global Challenges"

October 3rd - 4th, 2016
Makassar, South Sulawesi, Indonesia

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Fakultas Matematika dan Ilmu Pengetahuan Alam Universitas Negeri Makassar 2016

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WELCOME SPEECH

Forewords from the Chairman of Committee

Assalamu'alaykum wa Rahmatullahi wa Barakatuh

First of all, I wish to extend a warm welcome to fellow delegates from the various countries and regions. I realize that you are fully dedicated to the sessions that will follow but I do hope you will also take time to enjoy sparkling Makassar with its tropical setting, friendly people, and wonderful cuisine.

This 2nd International Conference on Mathematics, Science, Technology, Education, and Their Application 2016 is organized by the Faculty of Mathematics and Natural Sciences, Universitas Negeri Makassar to bring all experts and researches in these field sharing their important thoughts and findings. The conference will be held in two days from 3rd – 4th of October 2016 with two keynote speakers, seven invited speakers, and more than 80 parallel speakers from different backgrounds.

Let me take this opportunity, on behalf of the committee members, to express my gratitude and sincere thanks to the keynote, invited and all parallel speakers for spending their valuable time with us in this conference. I do hope that your time in Makassar will be valuable and memorable.

Finally, I would like to thank all steering and organizing committee for their hard work and dedication to the success of this conference. I would like also to apologize to all of you should you find any inconvenience during this event.

Thank you very much,

Wassalamu'alaykum Warahmatullahi Wa barakatuh

Chairman of Committee,

Dr. Drs. A. Mushawwir Tayeb, M.Kes.

The 2nd ICMSTEA Speech
By The Dean of Mathematics and Natural Sciences Faculty
Universitas Negeri Makassar

Your excellency Rector of Universitas Negeri Makassar
Honorable Vice Rectors and Dean of All Faculties
Honorable Keynote Speakers
Distinguished all invited speakers from outstanding universities
Distinguished all speakers and guests
All participants,
Ladies & Gentlement,

Assalamu'alaykum Warahmatullahi Wabarakatuh. My greetings for all of you. May peace and God's blessing be upon us all. *Alhamdulillah*, all praises be to the Almighty God, Allah *subhanahu wata'ala*.

It is my pleasure to welcome you all to the opening of The 2nd International Conference on Mathematics, Science, Technology, Education & their Applications (2nd ICMSTEA). I am delighted to see that the Mathematics and Natural Science Faculty has again organized the second conference that capitalize on our strength and built on our commitment to promoting Mathematics, Science, Technology and Education.

I do hope that this conference would bring a great opportunity for all of us to strengthen our contribution to the advancement of our nation.

I would like to take this opportunity to thank the conference organizing committee for their diligent work. I would also like to thank participants, especially those of you coming from abroad, for joining us and sharing your valuable experiences. Should you find any inconveniences and shortcomings, please accept our sincere apologies.

Finally, let me wish you fruitful discussion and a very pleasant stay in Makassar.

Thank you,
Wassalamu'alaykum Warahmatullahi Wabarakatuh

Dean of Faculty of Mathematics and Natural
Sciences Universitas Negeri Makassar

Prof. Dr. Abdul Rahman, M.Pd.

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Oldeman Climate Zoning for the Agricultural Area

Rosmini Maru*, M. Nur Zakariah Leo, Syamsiah Rahim,
Nur Fatimah Basram

Department of Geography, Faculty of Mathematics and Natural Sciences, Universitas Negeri Makassar, Parangtambung, Makassar, Indonesia

Email*:* rosminimaru@unm.ac.id

Abstract : Knowledge of the climate of a region is needed. One way to get to know the further climate is classified by calculating rainfall. One method to do that is Oldeman method by determining the average number of wet months and dry months later on interpolation and processed automatically in ArcGIS. This classification aims to determine the type of climate conditions based on Oldeman classification and regions spreading on each type of climate types in Soppeng. The results of this study are to map climate types using Oldeman classification system in Soppeng. In order to know the type of climate and Agro-climate zones in the study sites. The attribute value of the determination of the type of climate in the interpolation using kriging method. Data collection techniques are secondary data collection, observation, and documentation. The data obtained were processed and counted then displayed in the form of maps and described systematically. The results showed there are three types of climate B2, C3 and E. Distribution B2 climate includes DonriDonri District and Marioriawa District with an area of distribution of 13%. C3 Climate contained in Citta, Donri-Donri, Lalabata, Lilirilau, Marioriawa and Marioriwawo District with an area of distribution of 43%. E Climate contained in the District Citta, Donri-donri, Ganra, Lalabata, Liliriaja, Lilirilau, and Marioriwawo with an area of distribution of 44% and there is 24,6 % areas wich conformity between agroclimatic zone and planting frequency.

Keywords*: Climate Type, Oldeman, Soppeng Regency, Interpolation*

INTRODUCTION

The climate is an air temperature average condition, precipitation, air pressure, wind direction, humidity, and the other climate parameters in the long term (Tjasyono, 2004). In general, Indonesia has become the high-risk area for the climate change included around South Sulawesi. The climate change is an important issue and always keep going on in these past few years. Climate change is already and is going to happen as long as the rising of human activity.

Climate information of an area is needing. In the tropical area, air temperature rarely becomes the limit factor in the agriculture production, but the water supply is the most deciding factor in the agriculture cultivation. The long and extreme dry season brings wide consequences for the environment and human living.

Climate also affects the plant type in Soppeng Regency for cultivating in an area, scheduling and cultivation techniques that will be carried out by farmers. However, Utilization of climate information in this area is very little for the agricultural sector, whereas the climate will affect the distribution of plants. This happens because of the lack of resources that can be utilized by people to know the type of climate somewhere and types of plants suitable for the location of the right

climate. Climate classification used for agriculture is climate classification according to Oldeman climatic. Oldeman climatic classification uses the element of rainfall as a basis for determining the classification its climate. The main type Oldeman classification is based on the number of consecutive wet months, namely: Zone A, Zone B, Zone C, Zone D, and E. The zone subtypes based on the number of consecutive dry months, namely: Zone 1, Zone 2, Zone 3 and zone 4 (Lakitan, 1994).

Based on the description of the background, it is necessary to do a research on the climatic conditions currently affecting various aspects of human life and other living organisms and is presented in the form of a research report entitled "Oldeman Climatic Zoning in Soppeng". The purpose of this study was to determine the distribution of climate types with Oldeman method.

METHODS

The research stage

This research stage includes data collection phase in the form of Soppeng rainfall data for the last 30 years. Then check the field, observing and plotting of each rainfall station. Data processing by calculating the amount of rainfall based formula Oldeman, and GIS analysis in making Oldeman climate distribution map in Soppeng.

Determination of climate types according to Oldeman

According to Oldeman climate to determine the climate types is the month of consecutive wet and dry consecutive month as well. To determining the Oldeman' wet months and dry months, there are:

- Wet month is a month of rainfall over 200 mm
- Dry month is the month of rainfall less than 100 mm (Kartasapoetra, 2008)

Based on the classification that focuses on the wet months, Oldeman offers five main zones of wet months in a row as follows:

1) Zone A, wet months are more than 9 times in a row
2) Zone B, wet months are 7 to 9 times in a row
3) Zone C, wet months are 5 to 6 times in a row
4) Zone D, wet months are up 3 to 4 times
5) Zone E, wet months are less than 3 times (Kartasapoetra, 2008)

Table 1 Climate Criteria according to Oldeman

Month	Rainfall
Wet	>200 mm
Dry	<100 mm

Source: Kadarsah, 2007

Table 2 Climate Zone by wet Month According to Oldeman

Climate	The number of wet month in a row
A	>9
B	7-9
C	5-6
D	3-4
E	<3

Source: Kadarsah, 2007

Table 3 Oldeman Climate Classification based on the wet month and dry month

Climate	Classification	The number of wet month in a row	The number of dry month in a row
A	A1	10-12 Months	0-1 Month
	A2	10-12 Months	2 Months
B	B1	7-9 Months	0-1 Month
	B2	7-9 Months	2-3 Months
	B3	7-8 Months	4-5 Months
C	C1	5-6 Months	0-1 Month
	C2	5-6 Months	2-3 Months
	C3	5-6 Months	4-6 Months
	C4	5-6 Months	7 Months
D	D1	3-4 Months	0-1 Month
	D2	3-4 Months	2-3 Months
	D3	3-4 Months	4-6 Months
	D4	3-4 Months	7-9 Months
E	E1	0-2 Months	0-1 Month
	E2	0-2 Months	2-3 Months
	E3	0-2 Months	4-6 Months
	E4	0-2 Months	7-9 Months
	E5	0-2 Months	10-12 Months

GIS Analysis with Kriging Interpolation

Spatial data processing is performed to determine the classification of the type of climate based on Oldeman classification in the form of the area. The data in this spatial processing is rainfall for over the past 30 years has been known in the wet and the dry months, climate type, and data latitude and longitude coordinates post a graduated rainfall. The method is the Interpolation. The interpolation method is a method of filling the data gaps with certain methods of a dataset to generate a continuous distribution in the form of the area.

The methods in Geographic Information System that is used in the processing of these is by interpolation of Kriging. Kriging interpolation is a method of estimating a value of a point on each grid focus to the value of a point that has real value.

Steps for Kriging interpolation:

1. Input Oldeman climate types into excel.
2. In Excel contained Oldeman climate classification mode, then input the point coordinates in the decimal degree of each rainfall measuring station.
3. In ArcGIS, export the excel data in a shapefile format.
4. Analyze the type of climate in order to interpolate by selecting ArcToolbox.
5. Because kriging interpolation is used in Arc Toolbox, select raster and select kriging interpolation.
6. Click reclassify to reclassify raster re-class and select.
7. Due to the resulting interpolated still has no specific boundaries so the next step is clipping Area. Where the move was made to cut the interpolation of the administrative map of the region, in this case, is Soppeng area.
8. Once the results of the clip area appearing on the layer, then the next step is to export the polygon as a result clip is still in the shape of raster area, by choosing conversion tools.
9. Showing interpolated in the form of a map layout, the distribution map of Oldeman climate classification in Soppeng Regency area.

RESULTS AND DISCUSSION

This research used rainfall data in rainfall measuring posts in Soppeng for 30 years from 1985 to 2014. Calculation of rainfall as the basis for determining the classification of Oldeman climate

done by calculating the average rainfall from 1985 to 2014 in each rainfall measuring posts in Soppeng.

Table 4 Rainfall Data Monthly Average of 30 Years (1985-2014)

No	Nama Stasiun	JAN	FEB	MAR	APR	MEI	JUN	JUL	AGS	SEP	OKT	NOP	DES	BB	BK
1	Latappareng	107.8	88.83	89.8	185.5	163.9	113	115.7	71.7	53.8	89	109.8	142.7	0	5
2	Leworeng	163.5	166	156.8	206.2	240.4	168.8	163	60	55.9	125	167.4	100.8	2	2
3	Lapajung	181.8	140.8	148.1	167	206.3	144.2	134.2	43.9	34.3	95	133.2	184.7	1	3
4	Lalange	130.2	108.6	132.6	150.8	202.6	167.9	129.8	56.4	46.1	86	121	118.1	1	3
5	Umpungeng	323.8	313.9	213.5	209.4	183	131.9	88.97	52	39.1	86	137.4	241.2	5	3
6	Sero	173.3	140.3	124.3	143.3	182.6	126.1	119.8	36.6	37.8	92	138.6	186.8	0	3
7	Salobunne	276.8	224.1	273.1	279.6	396.5	282.6	191.9	98.6	92.6	178	224.5	321.7	8	2
8	Congko	169.9	118.3	134.7	163.3	193.4	148.1	118	52.5	28.6	74	122.8	154.2	0	3

(Source: The results of the processing data, 2016)

Information:
BB= Month Wet,
BK = Month Dry.

In determining the wet months and dry months, according to Oldeman, is when an area has a rainfall average monthly greater than 200 mm, the monthly rainfall in the area belonging to the wet month. If an area has an average monthly rainfall is less than 100 mm then the monthly rainfall in the area is classified as dry months.

According to the table 7 Latappareng has 0 wet months and 5 months of dry, Leworeng have 2 months of wet and two dry months, Lapajung have one wet month and 3-month dry, Lalange have one wet month and 3-month dry, Umpungeng has 5 wet months and 4 dry months, Sero has 0 wet months and 3 months of dry, wet Salobunne have 8 months and 2 months of dry, wet and Congko 0 months 3 months to dry.

After wet months and dry months are known, the rainfall station data are classified based on Table of the main type of Oldeman Classification Climate and Table of The sub-type of Oldeman Classification Climate. The following data is:

Table 5 The Climate type Based on the main Oldeman climate type and Oldeman climate sub-type of Soppeng

Number	Name of Statiun	Wet Month	Dry Month	Climate Type
1	Latappareng	0	5	E3
2	Leworeng	2	2	E2
3	Lapajung	1	3	E2
4	Lalange	1	3	E2
5	Umpungeng	5	3	C3
6	Sero	0	3	E2
7	Salobunne	8	2	B2
8	Congko	0	3	E2

Source: The results of the analysis of climate type, 2016

Based on Table 4.5 the regions with an E climate type (E2, E3) are the regions of Latappareng station, Leworeng station, Lapajung station, Lalange station, Sero station, and Congko station and the region of C3 climate type is the region of Umpungeng station, and the climate of B2 type is the region of Salobunne station. After knowing the type of Oldeman climate classification, next is

an interpolation of Oldeman climate type classification with the shaped element must be first converted into a form of numbers.

The changes of attribute data are based on agro-climatic zones of each type of climate. Climate types that have the most growing season will rate of at least a small number, whereas the type of climate that has a growing season of at least will become the greatest score, and if the climate type there is the same agro-climate zones, the greatest scoring will be given to the climate type that has a number behind capital letter, and the following results are:

Table 6 Classification Notation Climate Data Attribute PosOldeman by a graduated Rainfall in Soppeng

No	Name of station	Climate type	Agro-climate zone	Attribute data
1	Latappareng	E	This area is too dry may only be one time depending on their crops and even then rain	80
2	Leworeng	E	area is too dry may only be 1 time palawiaja even then depending on their rain	80
3	Lapajung	E	E area is too dry may only be 1 time palawiaja even then depending on their rain	80
4	Lalange	E	area is too dry may only be 1 time palawiaja even then depending on their rain	80
5	Umpungeng	C3	crops Rice once and 2 times but crops that both must be carefully	50
6	Sero	E	area is too dry may only be 1 time palawiaja even then depending on their rain	80
7	Salobunne	B2	Rice Twice a year with crops	30
8	Congko	E	area is too dry may only be one time depending on their crops and even then rain	80

Source: data processing, 2016

E-climate Type with agro-climate zones with the more dry areas can only be used one time to plant the crops planted as the 2d crop in the dry season are given 80 attribute data that is located in the region of Latappareng station, Leworeng station, Lapajung station, Lalange station, Sero station and Congko station. C3 climate type with Agro-climate zone that have 1 times planting of rice and 2 times planting the crops given the 50 attribute data in Umpungeng station area, and B2 climate type with agro-climatic zones that have Rice planting for 2 times a year and crops in 1 time are given the 30 attribute data in Salobunne station area.

The distribution of Oldeman Climate types can be viewed on an Oldeman climate classification map. The Interpolation used was Kriging, which were interpolated is the attribute values have been determined based on the type of climate and the point coordinates at each observation station in the area of research. The climate dissemination is basically aimed shows the limits of the coverage area of climate types have been counted on each observation station. On the map of the distribution of Oldeman climate types that have been generated can show zoning criteria and type of climate as well as the breadth of each region at each observation station. Based on the results in the reclassification of distribution map of Oldeman climate types can be seen that the climate type spread in Soppeng is climate B2, C3, and E. Each type of climate is spreading in various sub-districts in Soppeng. This climate types in its range of each region. For more details can be seen in the following table:

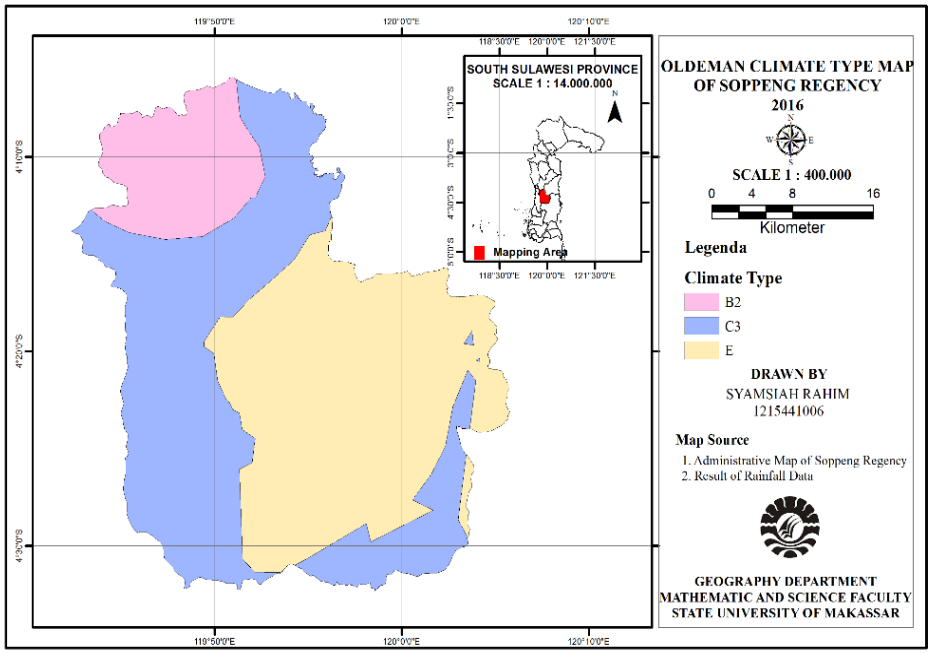
Table 7 Distribution Type Size Region Climate Research Areas

No	**Climate Type**	**Area (Ha)**	**Percentage (%)**
1	B2	17590.05	13%
2	C3	58923.29	43%
3	E	59901.33	44%
Total		**136414.67**	**100%**

Source: data processing, 2016

From the rainfall monthly data, the average during 30 years (1985-2014) used and by using GIS, it was found that Soppeng has climate type mode based on the Oldeman' classifications are type B2, C3, and E.

a. B2 Type
   Oldeman Climate classification type of B2 spread in Soppeng total of 13% of the entire region of Soppeng or an area of 17590.05 hectares which include: partial region of Marioriawa District, the Bulue village, Laringgi village, ManorangSalo village, Tellulimpoe village, and Patampanua village as well as a relatively small area of Donri-donriSubdistrict in the northern part of the LalabataRiaja village. This climate types according to agroclimatic zones can be planting two crops in one year with a variety of short lifespan and the dry season is short enough for planting crops.
b. C3 Type
   Oldeman Climate classification type of C3 spread in Soppeng as much as 43% of the total area in Soppeng or an area of 58923.29 hectares which include: partial region District of Marioriawa, the AttangSalo village, Desa stones village, Bulue village on the west side, eastern Laringgi village, ManorangSalo eastern in the Eastern side, Limpomajang village, Kaca village, TelluLimpoe village on the eastern side, Panincong Village, Patampanua village on the eastern side, most of Donri-donri District, there are Tottong village, the small part of Labokong village on the north side, Sering village, Kessing Village on the eastern side, Donri-Donri village, Pesse village in thw Western side, RiajaLalabata village, Pising village on the Eastern side, Leworeng village on the northern side, a half part of Lalabata village, there are Bila village on the northern side, the Mattabulu village on the eastern side, the Botto village, and most of Lebbae village. Lilirilau district there are Tetewatu village and Palangisang village on the eastern side. And the most of Mariorawa district, there are Barae village, goarie village, Marioriaja village, Gattareng Toa village, and Gattareng village. Agro-climatic zone of this type is just one time of planting rice and the second crops planting have to be careful not to fall in the dry months.
c. E Type
   E-climate type classification based on Oldeman in Soppeng spread over as much as 44% of the entire area in Soppeng or broad of 59901.33 hectares that include: Most of Citta district, the Kampir village, Citta village, and Tinro village. Most of Donri-Donri district there are Labokong village, Pisisng Village, Pesse village, kissing village danLeworeng village. Ganra district, there are Ganra village, Belo village, enrekeng village, danLompulle village. Lalabata district, there are LalabataRilau village, Ompo village, Bila village, SaloKaraja village, Lemba village, Maccile village, Mattabulu village, Lapajung village, Umpungeng village, Liliriaja district there are Galung village, jennae village, Rompegading village, Appanang village, Pattojo village, Jampu village, Lilirilau district there are Paroto village, Ujung village, Tetewatu village, Macanre village, Pajalesang village, Masing village, Parenring village, Abbanuangnge village, Palangiseng village, Baringeng village, danKebo village, MarioriwawoLabessi district, Congko village, Mario Rilau village, Tettikenrarae village, Watutoa village, Soga village, Goarie village, Watu village, Marioritengnga village, danMarioriaja village This type of regional agro-climatic zone is too dry may only be 1 times the crops and it depends on the rain.



Pic 4.4 Oldeman Climate Type of Soppeng Regency

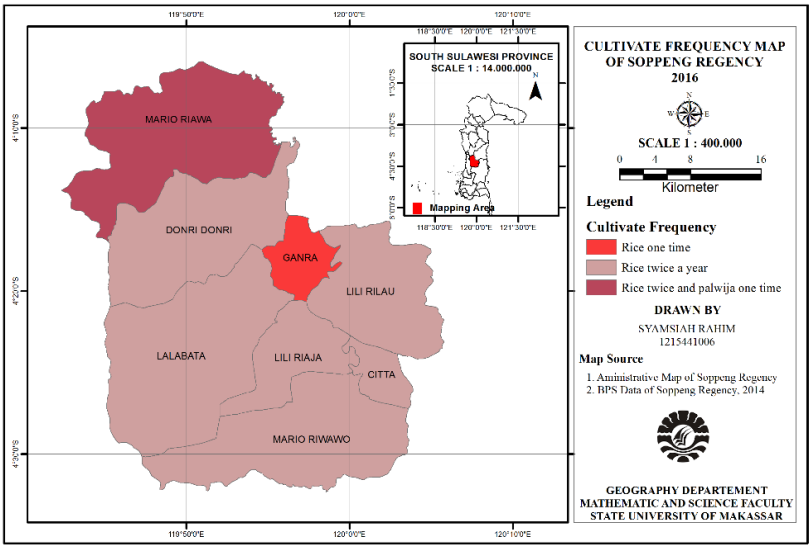
Frequency of Planting in Soppeng

Based on the data of BPS in Soppeng Regency, the Frequency results of Planting Rice and Crops in Soppeng, there are:

Table 8 Frequency of Investment Soppeng

No	Name of Sub-district	Frequency Annual Investment	
		Paddy	**Corps**
1	Marioriwawo	2 Times	-
2	Lalabata	2 Times	-
3	Liliriaja	2 Times	-
4	Ganra	1 Time	-
5	Citta	2 Times	-
6	Lilirilau	2 Times	-
7	Donri-donri	2 Times	-
8	Marioriawa	2 Times	1

Source: BPS, 2014

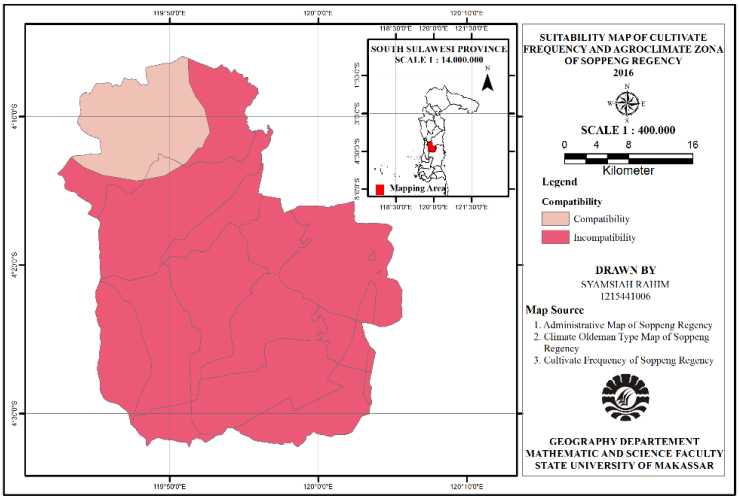


Pic 4.6 Cultivate Frequency Map Of Soppeng Regency

Based on the results of questioners and surveys of the frequency of rice and corps planting, there are:

a. 2 times rice planting period
   2 times rice planting in some district region in Soppeng regency, there are Mariorawa district, Lalabata district, Liliriaja district, citta district, Lilirilau district, and Donri-donri district.
b. 1 time Rice Planting Period
   Rice planting season is only found in one of the districts in the region Soppeng, it is Ganra district.
c. 2 times for rice planting and 1-time Crops-planting period
   Rice planting Periods are 2 times and the crops planting period is 1 time in Mariorawa, one of the districts in the northern Soppeng Regency.

Based on the results of interpolation using GIS with Kriging method is found that the agro-climate zone and climate types in Soppeng divided into three zones of Agro-climatic based on Oldeman climate classification, there are rice planting is twice within one year with a variety of short lifespan and the dry season short enough for planting crops (type B2), only one rice planting and the second planting crops must be careful not to fall in the dry (type C3), this area is generally too dry, it may only be one of the crops, and even then subject to the rain (type E). While BPS on 2014 and the results of field survey Frequency annual planting in Soppeng can be divided into three, that is 2 times for rice planting per year, 1-time rice planting per year and 2 times for rice planting and 1 times for crops. Based on the data generated map compatibility between agro-climatic zones according to the frequency Oldeman rice cultivation in Soppeng.



Pic 4.7 Suitability Map Of Cultivate Frequency and Agroclimate Zone Of Soppeng Regency

The frequency of the most dominanOldeman Climate classification type of B2 spread in Soppeng total of 13% of the entire region of Soppeng or an area of 17590.05 hectares which include: partial region of Marioriawa District, the Bulue village, Laringgi village, ManorangSalo village, Tellulimpoe village, and Patampanua village as well as a relatively small area of Donri-donriSubdistrict in the northern part of the LalabataRiaja village. This climate types according to agro-climate zones can be planting two crops in one year with a variety of short lifespan and the dry season is short enough for planting crops.

The type of climate and agro-climatic zones in Citta Sub-district divided by 2 is E-Type with too dry areas that only allows 1-time crops and C3 type with agro-climatic zones with 1 times for rice planting and 2 times for corps planting. However, based on the frequency of planting Soppeng in District Citta occur 2 times the cultivation of rice in a year, it indicates a mismatch between the frequency Agroclimatic Zone planting in Citta sub-district. Citta sub-district which has Size 3493.14 Ha. Sub-district Citta with agro-climatic zone 1 time for crops are not in accordance with the frequency of 2 times rice cultivation in a year has an area of 2210.68 hectares or 63% of the total area in Citta sub-districts. Then, the Citta sub-district with agro-climatic zones for the rice planting in 1 times and for the crops planting in 2 times are inappropriate for the frequency of rice cultivation in a year has an area of 1282.46 hectares or 37%. Overall, the Citta sub-district between agro-climatic zones and planting occurs inexpediency. These frequency caused by the irrigation technology that provides the water supply so Crop Water Requirement (CWR) or so-called water the plant needs are met and to do rice cultivation as much as 2 times a year.

Donri-donri sub-district which has an area of 21902.81 hectares based on the type of climate and agro-climatic zone is divided into three, there are E-Type with areas too dry that only allows 1 time for corps planting, C3 type with agro-climatic zones with 1 time for rice planting and 2 times for crops planting, and B2 type with agro-climatic zones are 1 times for rice planting and 2 times for crops planting. Based on Table 4.9 Donri-Donri sub-district has corresponding regions and is not suitable for agro-climatic zones with a frequency between plantings. Donri-donri Sub-district with the agro-climatic zone is 1 time for crops planting are not in accordance with the frequency of 2 times rice cultivation in a year has an area of 4337.36 hectares or 20% of the total area of Donri-donri sub-district. And the Donri-donri sub-district with agro-climatic zones have 1 time for corps planting and 2 times for crops planting, also do not correspond to the twice paddy planting frequency in a year that has broad 16831.25 or 77% of the total area of Donri-donri districts. So, the Donri-donri sub-district amounted to 97% of its territory between agro-climatic zones and planting occurs inexpediency. It happened because of irrigation technology that provides water supply and helps the farmers to apply the CWR way for paddy cultivation and the paddy planting time can become twice in a year. And there are 3% of Donri-Donri sub-district with agro-climate zone have 2 times for corps planting in a year and the crops are the same as paddy planting in Donri-Donri, twice in a year.

The GanraSubdistrict have E climate type with the agro-climate zone. This area is too dry that only allows 1 time for crops planting. However, based on the frequency of the planting of the Ganra area planted with 1-time paddy planting in a year. So, the Ganra district have an inexpediency between agroclimatic zone and planting frequency. It is because the irrigation technology that provides the water supply so that CWR and fulfill the once a year of paddy planting, and in this district, the irrigation water supply is only able to help for once a year of paddy planting because it is the last area for the flow of water irrigation so that the water supply is less.

SubdistrictLalabata, based on the type of climate and agro-climatic zones divided by 2 is Type E with areas too dry that only allows 1-time crops and C3 climate type with agro-climatic zones have 1 time for rice planting and 2 times for crops planting. However, based on the frequency of planting in Soppeng exactly in Lalabata, have rice cultivation occurs two times in a year, it indicates a mismatch between the frequency Agro-climate Zone planting in Lalabata Sub-district. Lalabata, that has 29899.28 hectares area with agro-climatic zone have 1-time crops planting is not in accordance with the frequency of 2 times paddy cultivation in a year with 11624.66 hectares or 39% of the total area in Lalabata sub-districts. Then, the Lalabata District with agro-climatic zones have 1 time for rice planting and 2 times for crops planting is a mismatch to the frequency of rice cultivation in a year have an area of 18274.62 hectares or 61% of the total area of Lalabata district. So, the Lalabata District occurs an inexpediency between agro-climatic zones and planting frequency. It is because the irrigation technology that provides the water supply so that CWR and fulfill twice a year of paddy planting.

District of Liliriaja has one type of climate and agro-climatic zone E-type with areas too dry that only allows 1 time for corps planting. The whole District of Liliriaja occurs an inexpediency between agro-climatic zones and planting frequency. It is caused by the irrigation technology that provides the water supply so that CWR rice plant are met and to do rice cultivation as much as 2 times in a year, so the lack of rainfall affecting agro-climatic zones did not significantly affect rice cultivation in of this area.

LilirilauSubdistrict based on the type of climate and agro-climatic zones divided by 2, there is E-Type with areas too dry that only allows 1-time crops and C3 type with agro-climatic zone have 1 time for rice planting and 2 times for crops planting. However, based on the frequency of planting in Soppeng, exactly in Lilirilau District rice cultivation occurs two times in a year, it indicates a mismatch between the planting frequency and Agro-climatic Zone. SubdistrictLilirilau that has 15874.12 hectares area. LilirilauSubdistrict with agro-climatic zone has 1-time crops are not in accordance with the frequency of 2 times paddy cultivation in a year that has an area of 899.08 hectares or 6% of the total area of Lilirilau districts. Then the District Lilirilau with agro-climatic zones and crops Rice 1 times 2 times do not correspond to the frequency of rice cultivation in a year has an area of 14975.04 hectares or 94% of the total area of the District Lilirilau. So overall the District Lilirilau between agro-climatic zones and planting occurs inexpediency. it is caused by the irrigation technology that provides the water supply that causes CWR can fulfill rice cultivation and can be done 2 times a year so the lack of rainfall affecting agro-climatic zone is not too affecting rice cultivation in this area.

SubdistrictMarioriawa which has an area of 27054.32 hectares based on the type of climate and agro-climatic zones divided by 2 is the C3 mode with agro-climatic zones with crops of rice 1 times 2 times and Type B2 with two rice agro-climatic zones with crops. According to Table 4.9, Sub-District Marioriawa has corresponding regions and is not suitable agro-climatic zones with a frequency between plantings. SubdistrictMarioriawa zone agroclimatic rice 1 time and pulses 2 times do not correspond to the frequency of planting two times the rice and 1 times crops a year has broad 10295.63 or 38% of the total area districts Donri-donri, between zones agroclimatic and frequency planting, occurs nonconformity. It is caused by the irrigation technology that provides the water supply so that CWR f dan rice plant rice cultivation can be done 2 times a year. As 62% of the District of Marioriawa with agro-climatic zones Rice 2 times a year to crops in accordance with the frequency of planting in the District Marioriawa this is caused by the high rainfall in the region.

SubdistrictMarioriwawo based on the type of climate and agro-climatic zones divided by 2 is Type E with areas too dry that only allows 1-time crops and C3 mode with agro-climatic zones

have 1 time for rice planting and 2 times for crops planting. However, based on the frequency of planting in Soppeng exactly Marioriwawo District rice cultivation occurs two times in a year, it indicates a mismatch between the frequencyAgroclimatic Zone Investment in Sub Marioriwawo. SubdistrictMarioriwawo who has 23458.12 hectares area. SubdistrictMarioriwawo with agro-climatic zone has 1-time crops planting are not in accordance with the frequency of 2 times paddy cultivation in a year that has an area of 12499.40 hectares or 53% of the total area of Marioriwawo districts. Then the District of Marioriwawo with agro-climatic zones have 1 time for rice planting and 2 times for crops planting do not correspond to the frequency of rice cultivation in a year has an area of 10958.72 hectares or 47% of the total area of the District Marioriwawo. So overall the District Lilirilau between agro-climatic zones and planting occurs inexpediency. It is caused by the irrigation technology that provides the water supply so that CWR rice plant are met and to do rice cultivation as much as 2 times a year so the lack of rainfall affecting agro-climatic zone is not too affecting rice cultivation in this area.

CONCLUSION

Based on Geographic Information System analysis, shows that Soppeng has three types of climate and the Classification of Oldeman Agro-climate zone are B2 climate type with agro-climate zone have twice for paddy planting with the short life span varieties and once for the crops planting, C2 climate type with agro-climate zone have one time for paddy planting and one time for crops planting and the E climate type with Agro-climate zones have once for crops planting and there are 24.6% of the area in Soppeng have compatibility between agro-climatic zones and planting frequency.

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