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Changes in Rainfall and Climate Classification in South Sulawesi

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Abstract

The study discuss about Changes in Rainfall and Climate Classification in South Sulawesi. The climate of the Earth is determined by the location of the sun in relation to the earth's surface. Geographical location influences the categorization of climate on our planet. The results of the study (1) Rainfall in Bone Regency has been classified as high rainfall intensity for the last 10 years; (2) Determination of climate classification can be done by processing rainfall data obtained from data before weighting, after weighting, ranking, and opportunity; (3) The climate classification according to Schmidt-Ferguson for Bone Regency has a B climate type, which is a humid subtropical climate; and (4) The climate classification according This is based on a comparison of the number of dry months (BK) and wet months (BB), from which the Q value is obtained, which is then used to determine the type of climate according to Schmidt-Ferguson; (4) Oldeman's climate classification for Bone Regency has a C1 climate type, which has the characteristics of planting lowland rice once a year and secondary crops twice a year; (5) Oldeman's climate classification for Bone Regency has a This is based on the number of Wet Months (BB) and Dry Months (BK) in a given year.

Introduction

Climatology is primarily concerned with the distribution of weather and climatic factors on a global, regional, and local scale, as well as their interaction with one another (Jakob Themeßl et al., 2011). In the area of climatology, geographical elements like as latitude, altitude, the location of the earth's surface, and other factors are strongly associated with one another. South Sulawesi Province is situated between the latitudes of 0°12' and 8° South and the longitudes of 116°48' and 122°36' East. Located in Southeast Asia, the province has a total land area of 45,764.53 km2, is split into 21 regencies and three municipalities, and comprises of 304 sub-districts and 2,953 villages/kelurahan. It is crossed by 67 rivers, and there are also seven mountains and four lakes. The province is bounded on the north by Central Sulawesi and West Sulawesi, on the east by Bone Bay and Southeast Sulawesi, on the west by the Makassar Strait, and on the south by the Flores Sea. Central Sulawesi and West Sulawesi are the two largest islands in the province. The island of South Sulawesi is comprised of a range of terrain ranging from the lowlands to the mountains. Conditions Slopes range from zero to three percent, with zero to three percent being comparatively level ground, three to eight percent being generally wavy soil, and eight to forty-five percent being land with a high slope, with around forty-five percent being steep and mountainous.

The average weather conditions over a lengthy period of time are referred to as the climate. In large part, the climate of the Earth is determined by the location of the sun in relation to the earth's surface. Geographical location influences the categorization of climate on our planet. There are various climate categories to choose from. Because of the interaction of these processes with climatic components and climate-controlling variables, we may conclude that weather and climate conditions fluctuate in terms of quantity and intensity, as well as

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distribution to agriculture. When it comes to physical elements of the environment, rain is the most diversified, both in terms of time and location. Rain is also a deciding factor, as well as a limiting one, for agricultural operations in general, and it is also the most unpredictable. As a result of the above description, it is required to conduct a rainfall and climate classification practicum in order to have a better understanding of the optimal planting time and weather conditions for plants to be planted in the Tana Toraja Region.

Rainfall in Last 10 Years

In the presence of climate anomalies, rainfall, which is a critical climatic factor that affects the water balance of plants, has a highly obvious influence on the water balance of plants. Meanwhile, it has been shown that the occurrence of climatic anomalies in Indonesia has a significant impact on agricultural productivity and food security in the country.

Tana Toraja has a tropical climate, similar to that of Hawaii. When it comes to weather, the rainy season runs from October to March, while the dry season runs from April to September. Nonetheless, while world climate change and the consequences of global warming have had a little impact on the climatic pattern in Tana Toraja over the past decade; however, the pattern and season of rice planting, which is dependent almost exclusively on rainfall, has not altered at all. The wettest months of the year are typically December through January. On the boundary with the Bone Bay region, there is also an area that is virtually constantly blanketed in fog throughout the day, and this is especially true in the morning. With an average temperature ranging between 15°C and 28°C and an average relative humidity of 82–86 percent, the Tana Toraja region is pleasant year-round. The average rainfall ranges from 1500 mm/year to more than 3500 mm/year, with two seasons, one of which is the rainy season, and two of which are the dry season. This region is characterized by its wet tropical climate, with typical temperatures ranging from 15°C to 28°C and air humidity ranging from 82-86 percent. The average annual rainfall is around 1,500 mm, with temperatures averaging between 15°C and 28°C. Tana Toraja Regency is classified as Type C2 in the Oldeman classification system, which means that it has rainy months (200 mm) for 2 – 3 months in a succession and dry months (100 mm) for 2 – 3 months in a row. This has a significant positive impact on community activities in the agriculture sector. The following table provides further information on the meteorological conditions that have prevailed in Tana Toraja district during the last 12 years:

Table 1. Climatological data for Tana Toraja Regency in 2000 – 2010

Moon	Rainfall	Temperature	Irradiation
January	235.47	22.43	56.72
February	236.77	21.99	55.90
March	302.06	22.72	59.90
April	366.75	22.58	60.63
May	218.13	22.28	64.54
June	146.46	22.77	56.90
July	118.12	22.00	59.00
August	102.59	21.98	67.36
September	95.10	22.34	79.54
October	190.38	22.96	78.27
November	306.10	23.27	72.90
December	276.10	22.76	60.54

Source: Meteorology and Geophysics Agency Tana Toraja

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The quantity of rain falling indicated in height or volume of rain per unit time is known as rainfall intensity. The quantity of rain intensity varies based on the length of time that it rains and the frequency with which it rains occurs. In order to determine rain intensity, both statistical and empirical analyses of rainfall data are performed. The intensity of rainfall is symbolized by the letter I and is measured in millimeters per hour. When using the Rational technique to calculate the anticipated flood discharge, the amount of rainfall intensity is very important to take into consideration.

The length of rain occurrences (in minutes, hours, and days) is determined mostly by the findings of automated rain gauges that record the time of day it rains (Dunkerley, 2020). When it comes to drainage design, rainfall length is often connected with concentration time. This is especially true in urban drainage, where a relatively short duration is necessary due to the tolerance for inundation duration and the fact that the drainage area is not very large (Molina-Sanchis et al., 2016). Rain that falls over a large region and is seldom intense, but may linger for an extended period of time that can be considered fairly lengthy is referred to as widespread rain.

The average time gap between rainfall events of a specific intensity and subsequent rainfall events of the same or greater intensity is referred to as the rainfall intensity frequency. There are various features of rain that are crucial to consider throughout the conversion process from rain to flow, including rainfall intensity (I), rainfall duration (t), rainfall depth (d), rainfall frequency (f), and the region of effect of rain. (A). In order to study the rain component with these characteristics, it is necessary to divide it into two categories: point rain and average rain covering a small to big catchment area. When it comes to physical elements of the environment, rain is the most diversified, both in terms of time and location. Rain is also a deciding factor, as well as a limiting one, for agricultural operations in general, and it is also the most unpredictable.

If rainfall falls on a flat surface and does not evaporate, seep, or flow, the height of the rainwater is measured in millimeters (mm). One millimeter of rainfall is rainwater with a drop size of one millimeter or more that falls (accommodates) on a flat surface of one square meter, with the premise that nothing evaporates, flows, or percolates. It is described as the height of precipitation that gathers in a flat area and does not evaporate, seep, or flow; this is also referred to as rainfall. Cumulative rainfall is the total quantity of rain that has accumulated over a period of time that is measured in years. Depending on the measurement system used, the quantity of rainfall is expressed in inches or millimeters (1 inch = 25.4 mm). A single millimeter of rainfall indicates that the height of precipitation that covers the surface of one millimeter of record does not allow any water to percolate into the ground.

Climate

Climate is a collection of weather variables that occur day by day and over a long period of time across a vast region (Dell et al., 2014). It was in 1950 that the categorization of Indonesia's climate started, which was prompted by the formation of a working group for climate research, which was tasked with creating climate maps for agricultural, forestry, and soil science research and development purposes. In light of the fact that climatic circumstances vary greatly, climate mapping is very important in order to be able to deliver advantages in the growth of numerous areas, particularly agriculture in its broadest meaning. In addition to discussing the link between climate and plant or climate and soil, climate classification also examines the relationship between climate and people. Climate categorization not only provides effective information that tackles the complexity of the climate, but it also helps to reduce the risk of natural disasters (George et al., 2021).

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Climate may be described as the state of the average air temperature, rainfall, air pressure, wind direction, humidity, and other climatic factors over a long period of time, including the presence or absence of precipitation (Deisenhammer, 2003). When there is a deviation from the average state of the climatic parameters, this is referred to as a change in climate. Climate change does not occur overnight or in a short amount of time, but rather occurs gradually over a long period of time (Maddison, 2007).

The categorization of climates is an effort to identify and classify the climates of different places on Earth (Peel et al., 2007). One of the aspects of climate, as well as physical location, is the most important factor in determining climatic categorization (Philipp et al., 2010). Through climate classification, it is possible to see the distribution of areas on the earth's surface ranging from cold, hot, and desert areas, each of which has its own geographic data characteristics; therefore, in principle, the use of climate classification is to obtain efficient information in a general and straightforward manner.

Results and Discussion

As a consequence of the calculations performed in this practical rainfall and climate categorization, the following conclusions were obtained:

Raw Data Table Per Decade

The following are the findings of raw data collected every decade in the Nanggala sub-district of Tana Toraja Regency:

Table 2. Table before weighting

Month	Decade	Year									
		2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Jan	**1**	74	-	3	69	97	128	129	124	97	9
	2	46	203	16	85	53	32	179	177	0	4
	3	34	160	72	145	145	193	61	302	9	158
	Total	**154**	**363**	**91**	**299**	**295**	**353**	**369**	**603**	**106**	**171**
Feb	**1**	159	138	35	9	101	123	87	419	63	141
	2	134	53	2	101	99	215	75	311	55	41
	3	89	57	84	172	172	169	36	0	51	119
	Total	**382**	**248**	**121**	**282**	**372**	**507**	**198**	**730**	**169**	**301**
Mar	**1**	7	8	144	109	87	81	20	94	69	165
	2	171	240	109	245	56	189	1	73	70	140
	3	102	151	241	69	69	100	163	176	113	156
	Total	**280**	**399**	**494**	**423**	**212**	**370**	**184**	**343**	**252**	**461**
Apr	**1**	35	256	172	70	78	158	82	134	70	166
	2	168	142	282	89	187	149	70	123	156	94
	3	58	152	132	255	255	149	119	132	125	71
	Total	**261**	**550**	**586**	**414**	**520**	**456**	**271**	**389**	**351**	**331**
May	**1**	24	136	140	27	132	210	92	56	73	265
	2	124	110	-	19	19	31	111	125	65	231
	3	249	29	82	25	25	93	124	82	29	15
	Total	**397**	**275**	**222**	**71**	**176**	**334**	**327**	**263**	**167**	**511**
Jun	**1**	100	24	72	24	137	9	73	78	69	128
	2	154	38	131	25	25	75	75	49	116	165
	3	38	64	-	19	19	18	51	169	105	14

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	Total	**292**	**126**	**203**	**68**	**181**	**102**	**199**	**296**	**290**	**307**
Jul	**1**	46	108	50	17	173	6	69	142	226	-
	2	39	111	77	18	18	27	95	210	157	5
	3	21	5	84	95	95	62	61	8	-	-
	Total	**106**	**224**	**211**	**130**	**286**	**95**	**225**	**360**	**383**	**5**
Aug	**1**	24	9	13	7	87	22	26	101	-	-
	2	2	20	71	14	14	12	5	68	5	-
	3	26	5	15	3	3	28	13	11	2	-
	Total	**52**	**34**	**99**	**24**	**104**	**62**	**44**	**180**	**7**	**0**
Sep	**1**	6	82	149	3	139	20	-	11	-	-
	2	10	9	20	5	5	35	177	1	-	-
	3	-	43	-	2	2	84	47	5	-	-
	Total	**16**	**134**	**169**	**10**	**146**	**139**	**224**	**17**	**0**	**0**
Oct	**1**	-	31	76	-	342	51	-	0	-	-
	2	-	54	102	-	-	108	-	27	-	-
	3	-	60	330	51	51	74	32	40	-	1
	Total	**0**	**145**	**508**	**51**	**393**	**233**	**32**	**67**	**0**	**1**
Nov	**1**	-	94	180	200	388	158	41	216	2	-
	2	24	74	100	147	147	120	51	68	1	-
	3	143	105	135	356	356	160	17	112	4	8
	Total	**167**	**273**	**415**	**703**	**891**	**438**	**109**	**396**	**7**	**8**
Dec	**1**	60	94	202	170	158	219	91	118	-	12
	2	79	74	204	334	334	193	107	223	63	84
	3	139	105	147	208	208	76	212	173	109	276
	Total	**278**	**273**	**553**	**712**	**700**	**488**	**410**	**514**	**172**	**372**

Source: Primary data after processing

Weighted Data Table

The following are the findings of the data that have been weighted by decade in the Nanggala sub-district of Tana Toraja Regency:

Table 3. Table After Weighted

Month	**Decades**	**Year**									
		2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Jan	**1**	74	-	3	69	97	128	129	124	97	9
	2	46	203	16	85	53	32	179	177	0	4
	3	31	145	65	132	132	175	55	275	8	144
	Total	**149**	**351**	**88**	**289**	**285**	**342**	**357**	**584**	**103**	**165**
Feb	**1**	159	138	35	9	101	123	87	419	63	141
	2	134	53	2	101	99	215	75	311	55	41
	3	111	71	105	215	215	211	45	0	64	149
	Total	**409**	**266**	**130**	**302**	**399**	**543**	**212**	**782**	**181**	**323**
Mar	**1**	7	8	144	109	87	81	20	94	69	165
	2	171	240	109	245	56	189	1	73	70	140
	3	93	137	219	63	63	91	148	160	103	142
	Total	**271**	**386**	**478**	**409**	**205**	**358**	**178**	**332**	**244**	**446**
Apr	**1**	35	256	172	70	78	158	82	134	70	166

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	2	168	142	282	89	187	149	70	123	156	94
	3	58	152	132	255	255	149	119	132	125	71
	Total	**261**	**550**	**586**	**414**	**520**	**456**	**271**	**389**	**351**	**331**
May	**1**	24	136	140	27	132	210	92	56	73	265
	2	124	110	-	19	19	31	111	125	65	231
	3	226	26	75	23	23	85	113	75	26	14
	Total	**384**	**266**	**215**	**69**	**170**	**323**	**316**	**255**	**162**	**495**
Jun	**1**	100	24	72	24	137	9	73	78	69	128
	2	154	38	131	25	25	75	75	49	116	165
	3	38	64	-	19	19	18	51	169	105	14
	Total	**292**	**126**	**203**	**68**	**181**	**102**	**199**	**296**	**290**	**-**
Jul	**1**	46	108	50	17	173	6	69	142	226	-
	2	39	111	77	18	18	27	95	210	157	5
	3	19	5	76	86	86	56	55	7	-	-
	Total	**103**	**217**	**204**	**126**	**277**	**92**	**218**	**348**	**371**	**5**
Aug	**1**	24	9	13	7	87	22	26	101	-	-
	2	2	20	71	14	14	12	5	68	5	-
	3	24	5	14	3	3	25	12	10	2	-
	Total	**50**	**33**	**96**	**23**	**101**	**60**	**43**	**174**	**7**	**0**
Sep	**1**	6	82	149	3	139	20	-	11	-	-
	2	10	9	20	5	5	35	177	1	-	-
	3	-	43	-	2	2	84	47	5	-	-
	Total	**16**	**134**	**169**	**10**	**146**	**139**	**224**	**17**	**0**	**0**
Oct	**1**	-	31	76	-	342	51	-	0	-	-
	2	-	54	102	-	-	108	-	27	-	-
	3	-	55	300	46	46	67	29	36	-	1
	Total	**0**	**140**	**492**	**49**	**380**	**225**	**31**	**65**	**0**	**1**
Nov	**1**	-	94	180	200	388	158	41	216	2	-
	2	24	74	100	147	147	120	51	68	1	-
	3	143	105	135	356	356	160	17	112	4	8
	Total	**167**	**273**	**415**	**703**	**891**	**438**	**109**	**396**	**7**	**8**
Dec	**1**	60	94	202	170	158	219	91	118	-	12
	2	79	74	204	334	334	193	107	223	63	84
	3	126	95	134	189	189	69	193	157	99	251
	Total	**269**	**264**	**535**	**689**	**677**	**472**	**397**	**497**	**166**	**360**

Source: Primary data after processing

Ranking table by decade

The following are the findings of the ranking data collected in the Nanggala sub-district of Tana Toraja Regency over the course of a decade:

Table 4. Ranking

Month	**Decades**	**Year**										**Average**
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	
Jan	**1**	129	128	124	97	97	74	69	9	3	0	66
	2	203	179	177	85	53	46	32	16	4	0	72
	3	275	175	145	144	132	132	65	55	31	8	106

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	Total	**584**	**357**	**351**	**342**	**289**	**285**	**165**	**149**	**103**	**88**	**271**
Feb	**1**	419	159	141	138	123	101	87	63	35	9	116
	2	311	215	134	101	99	75	55	53	41	2	99
	3	215	215	211	149	111	105	71	64	45	0	108
	Total	**782**	**543**	**409**	**399**	**323**	**302**	**266**	**212**	**181**	**130**	**355**
Mar	**1**	165	144	109	94	87	81	69	20	8	7	71
	2	245	240	189	171	140	109	73	70	56	1	118
	3	219	160	148	142	137	103	93	91	63	63	111
	Total	**478**	**446**	**409**	**386**	**358**	**332**	**271**	**244**	**205**	**178**	**331**
Apr	**1**	256	172	166	158	134	82	78	70	70	35	111
	2	282	187	168	156	149	142	123	94	89	70	133
	3	255	255	152	149	132	132	125	119	71	58	132
	Total	**586**	**550**	**520**	**456**	**414**	**389**	**351**	**331**	**271**	**261**	**413**
May	**1**	265	210	140	136	132	92	73	56	27	24	105
	2	231	125	124	111	110	65	31	19	19	0	76
	3	226	113	85	75	75	26	26	23	23	14	63
	Total	**495**	**384**	**323**	**316**	**266**	**255**	**215**	**170**	**162**	**69**	**266**
Jun	**1**	137	128	100	78	73	72	69	24	24	9	65
	2	165	154	131	116	75	75	49	38	25	25	78
	3	169	105	64	51	38	19	19	18	14	0	45
	Total	**307**	**296**	**292**	**290**	**203**	**199**	**181**	**126**	**102**	**68**	**206**
Jul	**1**	226	173	142	108	69	50	46	17	6	0	76
	2	210	157	111	95	77	39	27	18	18	5	69
	3	86	86	76	56	55	19	7	5	0	0	36
	Total	**371**	**348**	**277**	**218**	**217**	**204**	**126**	**103**	**92**	**5**	**196**
Aug	**1**	101	87	26	24	22	13	9	7	0	0	26
	2	71	68	20	14	14	12	5	5	2	0	19
	3	25	24	14	12	10	5	3	3	2	0	9
	Total	**174**	**101**	**96**	**60**	**50**	**43**	**33**	**23**	**7**	**0**	**59**
Sep	**1**	149	139	82	20	11	6	3	0	0	0	37
	2	177	35	20	10	9	5	5	1	0	0	24
	3	84	47	43	5	2	2	0	0	0	0	17
	Total	**224**	**169**	**146**	**139**	**134**	**17**	**16**	**10**	**0**	**0**	**86**
Oct	**1**	342	76	51	31	0	0	0	0	0	0	46
	2	108	102	54	27	0	0	0	0	0	0	27
	3	300	67	55	46	46	36	29	1	0	0	53
	Total	**492**	**380**	**225**	**140**	**65**	**49**	**31**	**1**	**0**	**0**	**138**
Nov	**1**	0	216	200	180	158	94	41	2	0	0	81
	2	147	147	120	100	74	68	51	24	1	0	67
	3	356	356	160	143	135	112	105	17	8	4	127
	Total	**891**	**703**	**438**	**415**	**396**	**273**	**167**	**109**	**8**	**7**	**341**
Dec	**1**	219	202	170	158	118	94	91	60	12	0	102
	2	334	334	223	204	193	107	84	79	74	63	154
	3	251	193	189	189	157	134	126	99	95	69	137
	Total	**689**	**677**	**535**	**497**	**472**	**397**	**360**	**269**	**264**	**166**	**433**

Source: Primary data after processing

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Average Table

The following are the findings of the table showing the chances of rain in the Nanggala sub-district of Tana Toraja Regency at 40 percent, 50 percent, and 60 percent:

Table 5. Average

Month	Decades	Opportunity				Opportunity
		40%	50%	60%	Average	
Jan	**1**	97	86	71	5	47%
	2	72	50	38	4	38%
	3	139	132	92	42	383%
	Total	**321**	**287**	**213**	**12**	**108%**
Feb	**1**	132	112	93	11	103%
	2	100	87	63	4	37%
	3	134	108	85	5	42%
	Total	**369**	**313**	**280**	**8**	**77%**
Mar	**1**	91	84	74	6	50%
	2	159	125	87	7	63%
	3	140	120	97	9	83%
	Total	**375**	**345**	**295**	**6**	**58%**
Apr	**1**	148	108	80	10	90%
	2	153	146	131	6	54%
	3	142	132	128	10	88%
	Total	**439**	**402**	**366**	**5**	**42%**
May	**1**	134	112	81	12	107%
	2	111	88	45	7	61%
	3	75	51	26	5	48%
	Total	**296**	**261**	**231**	**11**	**102%**
Jun	**1**	76	73	70	5	42%
	2	100	75	59	7	60%
	3	46	29	19	4	40%
	Total	**255**	**201**	**188**	**46**	**416%**
Jul	**1**	92	60	48	5	45%
	2	88	58	32	6	51%
	3	56	37	12	5	46%
	Total	**218**	**211**	**157**	**4**	**40%**
Aug	**1**	23	18	11	3	26%
	2	14	13	8	3	28%
	3	11	8	4	5	49%
	Total	**56**	**47**	**37**	**4**	**37%**
Sep	**1**	16	9	4	4	34%
	2	10	7	5	3	24%
	3	4	2	1	4	34%
	Total	**137**	**76**	**16**	**12**	**106%**
Oct	**1**	19	0	0	3	30%

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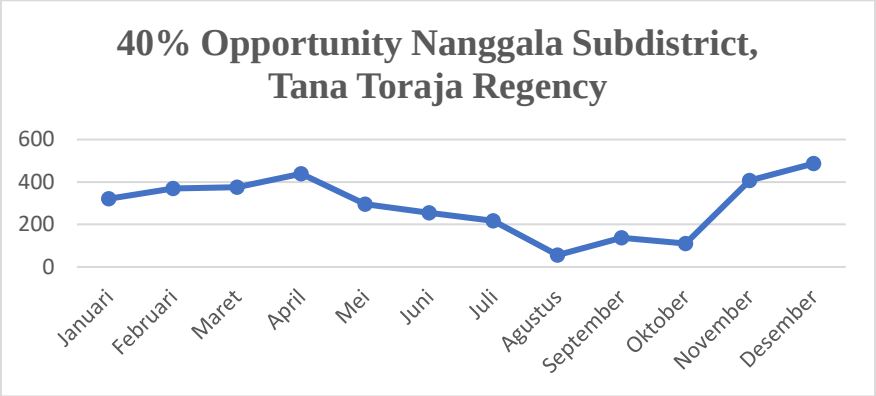
	2	16	0	0	4	36%
	3	46	41	32	3	29%
	Total	**110**	**57**	**38**	**4**	**37%**
Nov	**1**	171	126	62	9	81%
	2	90	71	58	6	51%
	3	140	124	108	5	45%
	Total	**407**	**335**	**209**	**7**	**66%**
Dec	**1**	142	106	92	9	79%
	2	200	150	93	7	60%
	3	176	146	129	0	0%
	Total	**487**	**435**	**375**	**6**	**52%**

Source: Primary data after processing

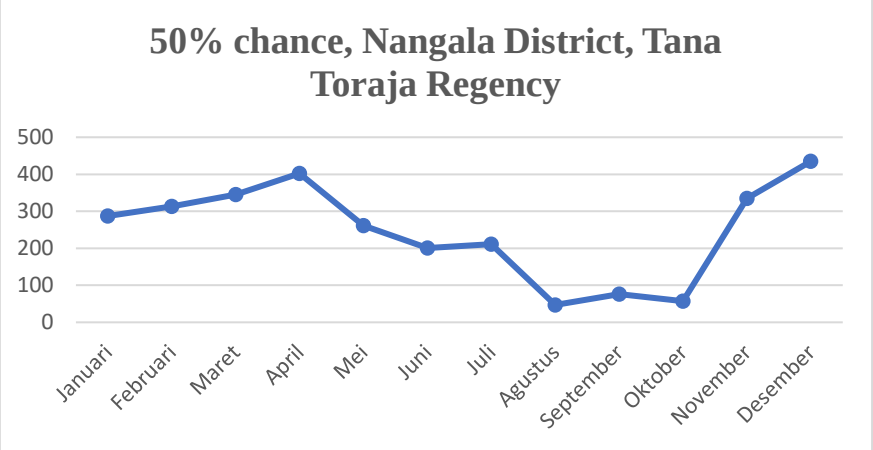
40%, 50% and 60% Odds Charts and Combined Odds Charts

The following are the findings of the table showing the chances of rain in the Nanggala sub-district of Tana Toraja Regency at 40 percent, 50 percent, and 60 percent:



Source: Primary data after processing

Figure1. 40% Odds Graph



Source: Primary data after processing

Figure 2. 50% Odds Chart

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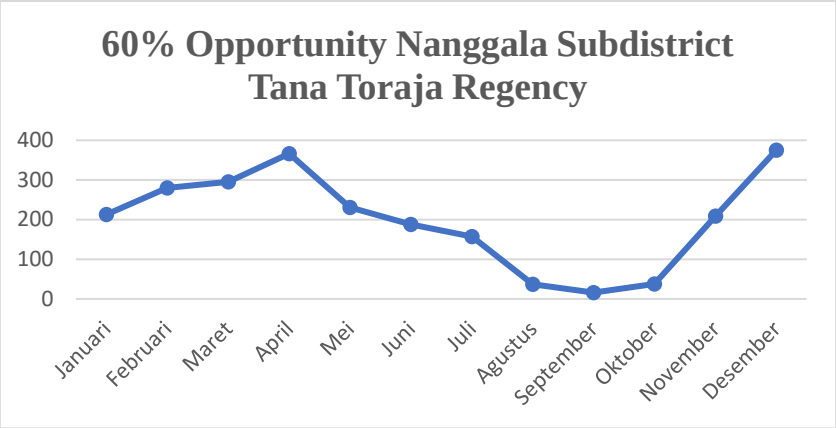
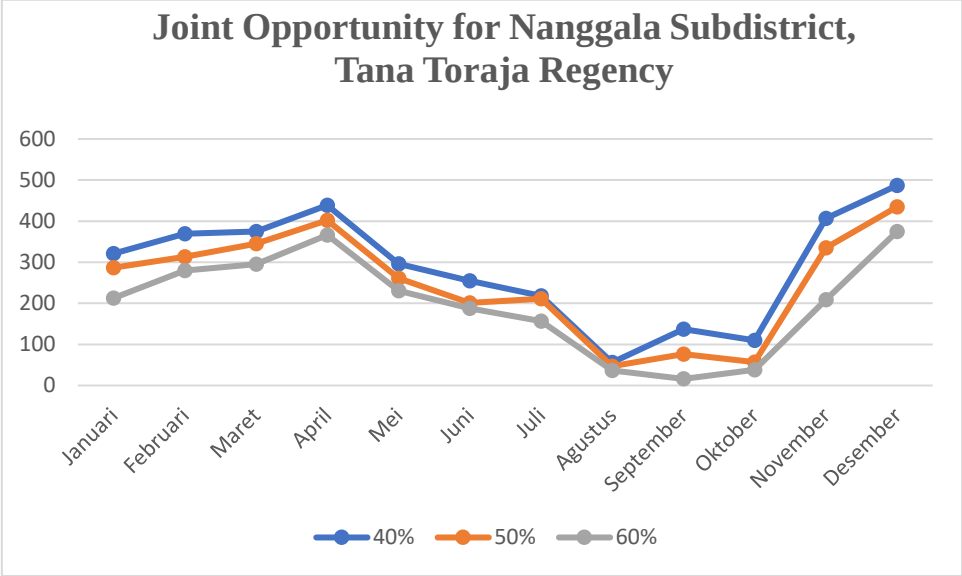


Source: Primary Data after processing

Figure 3. 60% Odds Graph



Source: Primary data after processing

Figure 4. Combined Odds Graph 40%, 50%, and 60%

Climate Classification According to Schmidt-Ferguson

The findings of the Schmidt-Ferguson categorization of climatic types in Nanggala District, Tana Toraja Regency, were published in the journal Climate Dynamics.

Table 6. Climate Classification According to Schmidt-Ferguson

Climate Classification by Smith Ferguson										
Month	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
January	BB	BB	BL	BB	BB	BB	BB	BB	BB	BB
February	BB	BB	BB	BB	BB	BB	BB	BB	BB	BB
March	BB	BB	BB	BB	BB	BB	BB	BB	BB	BB
April	BB	BB	BB	BB	BB	BB	BB	BB	BB	BB
May	BB	BB	BB	BL	BB	BB	BB	BB	BB	BB
June	BB	BB	BB	BL	BB	BB	BB	BB	BB	BB
July	BB	BB	BB	BB	BB	BL	BB	BB	BB	BK

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August	BK	BK	BL	BK	BB	BL	BK	BB	BK	BK
September	BK	BB	BB	BK	BB	BB	BB	BK	BK	BK
October	BK	BB	BB	BK	BB	BB	BK	BL	BK	BK
November	BB	BB	BB	BB	BB	BB	BB	BB	BK	BK
December	BB	BB	BB	BB	BB	BB	BB	BB	BB	BB

Source: Primary data after processing

Table 7. Number of months according to Schmidt-Ferguson

Month	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**Average**
BB	9	11	10	7	12	10	10	10	8	7	9.4
BK	3	1	2	3	0	0	2	1	4	5	2.1
BL	0	1	0	2	0	2	0	1	0	0	0.6

BK	2.1
BB	9.4

Source: Data After processing

Based on the information in the climate categorization table above, it is possible to calculate the value or price comparison of Q, which is as follows:

$$Q = \frac{\text{Average Dry Month (BK)}}{\text{Average Wet Month (BB)}} \times 100\%$$

$$Q = \frac{2,1}{9,4} \times 100\%$$

$$Q = 22,34\ \%$$

Because the Q value for Nanggala District, Tana Toraja Regency was calculated to be 22.34, the district falls within the classification of climatic type B, which is distinguished by being a moist region with tropical rain forests.

Classification of Climate according to Oldeman

The findings of the Schmidt-Ferguson climate classification in Nanggala District, Tana Toraja Regency, were published in the journal Climate Dynamics.

Table 8. Classification of Climate according to Oldeman

Classification of Climate according to Oldeman										
Month	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
January	BL	BB	BK	BB	BB	BB	BB	BB	BL	BL
February	BB	BB	BL	BB	BB	BB	BB	BB	BL	BB
March	BB	BB	BB	BB	BB	BB	BL	BB	BB	BB
April	BB	BB	BB	BB	BB	BB	BB	BB	BB	BB
May	BB	BB	BB	BK	BL	BB	BB	BB	BL	BB
June	BB	BL	BB	BK	BL	BL	BL	BB	BB	BB
July	BL	BB	BB	BL	BB	BK	BB	BB	BB	BK
August	BK	BK	BK	BK	BL	BK	BK	BL	BK	BK

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September	BK	BL	BL	BK	BL	BL	BB	BK	BK	BK
October	BK	BL	BB	BK	BB	BB	BK	BK	BK	BK
November	BL	BB	BB	BB	BB	BB	BL	BB	BK	BK
December	BB	BB	BB	BB	BB	BB	BB	BB	BL	BB

Source: Primary data after processing

Table 9. Number of Months According to Oldeman

Month	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average
BB	5	7	5	6	7	8	3	9	2	5	5.7
BK	3	0	0	3	0	2	0	2	4	5	1.9
BL	0	2	0	0	2	0	0	0	3	0	0.7

BK	1,9
BB	5,7

Source: Primary data after processing

According to Oldeman's climate classification chart, Nanggala Subdistrict, Tana Toraja Regency has a C1 climatic type, which means that lowland rice and secondary crops may be planted twice a year.

This practicum on rainfall and climate categorization was carried out by processing rainfall data in Nanggala District, Tana Toraja Regency, over the previous ten years, from 2006 to 2015. The data was collected from the Nanggala District, Tana Toraja Regency, for the last ten years, from 2006 to 2015. After conducting a data analysis, researchers discovered that the rainfall data in Nanggala District, Kabupaten Tana Torajo, is variable in intensity. This is demonstrated by examining the raw data table per decade, which shows that in every decade or 10 days in one year, there is a different intensity of rainfall. There are various elements that contribute to this variation in rainfall intensity, including temperature, temperature, humidity, and wind direction. Following the perspective of Sabaruddin (2012), it is believed that the variables that create rain include temperature fluctuations, low humidity levels and wind direction variations, all of which lead clouds to develop and ultimately result in rain.

Tana Toraja has a tropical climate with a lot of rain. When it comes to weather, the rainy season runs from October to March, while the dry season runs from April to September. Nonetheless, while world climate change and the consequences of global warming have had a little impact on the climatic pattern in Tana Toraja over the past decade; however, the pattern and season of rice planting, which is dependent almost exclusively on rainfall, has not altered at all. The wettest months of the year are typically December through January. On the boundary with the Bone Bay region, there is also an area that is virtually constantly blanketed in fog throughout the day, and this is especially true in the morning. With an average temperature ranging between 15°C and 28°C and an average relative humidity of 82–86 percent, the Tana Toraja region is pleasant year-round. The average rainfall ranges from 1500 mm/year to more than 3500 mm/year, with two seasons, including the rainy season and the dry season, with two seasons, including the rainy season and the dry season.

40 percent, 50 percent, and 60 percent odds of precipitation are represented graphically in the following ways: the highest probability of 40 percent rainfall occurs in December, with an estimated probability of 487, while the lowest probability of 40 percent rainfall occurs in August, with an estimated probability of 47. 50 percent, the highest rainfall occurs in December, with an estimated probability of 435, and the lowest rainfall occurs in August, with

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an estimated probability of 47. Afterwards, with a 60 percent probability of occurring, the heaviest rainfall occurs in December with an intensity of 375, while the lightest rainfall occurs in September with an intensity of 16. Knowing this information, we can decide the most optimal planting and harvesting times, since the opportunity data can help us predict which months will have minimal rainfall and which months will have excessive rainfall. As a result, it may be readily changed to the plants that will subsequently be planted, ensuring that there is no crop failure as a result of erroneously estimating the planting and harvest times.

According to the Schmidt-Ferguson climate classification table, Nanggala Subdistrict, Tana Toraja Regency has a B climate type, which is a climate type with features that include wet regions, as can be seen in the image below. When comparing the dry month (BK) to the rainy month (BB), the Q value is 22.34 percent, which means that it falls into the category of climatic type B. This is in agreement with the view of Sabaruddin (2012), who believes that if the value of Q is between 14.5 and 33.3, the climatic type is class B, and the region is classified as having a wet climate with tropical rain forest flora features. A climate classification system based on Schmidt-classification Ferguson's system is used to assist the plantation and forestry industries in determining which plantation and forestry crops may be grown in regions designated as wet areas. Similarly, according to Oldeman's climate classification table, Nanggala Subdistrict in the Tana Toraja Regency has a C1 climate type, which is a climate type that is characterized by the ability to sow lowland rice and secondary crops twice each year. A classification system based on the number of Wet Months (BB) in a row as the primary classification type and the number of Dry Months (BK) in a row as a subcategory. In general, rice fields can only be planted once, and even then, they are subject to the availability of rain or irrigation. The amount of rainfall received is a critical determinant in the success of agricultural production. As Lakitan (2002) points out, rain is the most diverse physical element of the environment in terms of time and place, as well as a determining factor for agricultural activities in general. Rain is also a limiting factor for agricultural activities in general as well as a determining factor for agricultural activities in particular.

Conclusion

On the basis of the results obtained from this practical rainfall and climate classification, it can be concluded that: (1) Rainfall in Bone Regency has been classified as high rainfall intensity for the last 10 years; (2) Determination of climate classification can be done by processing rainfall data obtained from data before weighting, after weighting, ranking, and opportunity; (3) The climate classification according to Schmidt-Ferguson for Bone Regency has a B climate type, which is a humid subtropical climate; and (4) The climate classification according This is based on a comparison of the number of dry months (BK) and wet months (BB), from which the Q value is obtained, which is then used to determine the type of climate according to Schmidt-Ferguson; (4) Oldeman's climate classification for Bone Regency has a C1 climate type, which has the characteristics of planting lowland rice once a year and secondary crops twice a year; (5) Oldeman's climate classification for Bone Regency has a This is based on the number of Wet Months (BB) and Dry Months (BK) in a given year.

References

Deisenhammer, E. A. (2003). Weather and suicide: the present state of knowledge on the association of meteorological factors with suicidal behaviour. *Acta Psychiatrica Scandinavica, 108*(6), 402-409.

Dell, M., Jones, B. F., & Olken, B. A. (2014). What do we learn from the weather? The new climate-economy literature. *Journal of Economic Literature, 52*(3), 740-98.

ISSN 2721-1304 (Print), ISSN 2721-1207 (online)

Dunkerley, D. (2020). Acquiring unbiased rainfall duration and intensity data from tipping-bucket rain gauges: A new approach using synchronised acoustic recordings. *Atmospheric Research*, *244*, 105055.

George, G., Merrill, R. K., & Schillebeeckx, S. J. (2021). Digital sustainability and entrepreneurship: How digital innovations are helping tackle climate change and sustainable development. *Entrepreneurship Theory and Practice*, *45*(5), 999-1027.

Jakob Themeßl, M., Gobiet, A., & Leuprecht, A. (2011). Empirical-statistical downscaling and error correction of daily precipitation from regional climate models. *International Journal of Climatology*, *31*(10), 1530-1544.

Maddison, D. (2007). *The perception of and adaptation to climate change in Africa* (Vol. 4308). World Bank Publications.

Molina-Sanchis, I., Lázaro, R., Arnau Rosalén, E., & Calvo Cases, A. (2016). Rainfall timing and runoff: The influence of the criterion for rain event separation. *Journal Of Hydrology And Hydromechanics, 2016, vol. 64, num. 3, p. 226-236*.

Peel, M. C., Finlayson, B. L., & McMahon, T. A. (2007). Updated world map of the Köppen-Geiger climate classification. *Hydrology and earth system sciences*, *11*(5), 1633-1644.

Philipp, A., Bartholy, J., Beck, C., Erpicum, M., Esteban, P., Fettweis, X., ... & Tymvios, F. S. (2010). Cost733cat–A database of weather and circulation type classifications. *Physics and Chemistry of the Earth, Parts A/B/C*, *35*(9-12), 360-373

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