A STUDY ON RAINFALL AND TEMPERATURE OF SALEM DISTRICT, TAMILNADU, INDIA

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Abstract:

Rainfall and Temperature are two hands of any agriculture, industries and as well as growth of economic level of any country. In this, the precipitation plays a major role in improving the agriculture production and the ground water level which is the actual source we leave to the next generation. This paper studies the rainfall from 2009 to 2019 of Salem district, Tamilnadu, India. This Southern state Tamilnadu with 32 districts had 998 mm average annual rainfall. This study reveals that average rainfall in the month October has highest rainfall and for the past eleven years, the last year 2019 has the highest average rainfall. The Seasonal Variation of time series analysis is applied to analyze to study the Rainfall of the Salem district.

Keywords: Rainfall, Seasonal variation, Time series analysis.

Introduction:

Tamilnadu is one of the most important southern states in India. Other countries are in panic, because Our India has the supreme power which is more powerful than a nuclear weapon are the youngsters. These youngsters are getting strengthened due to the consumption of agriculturally more nutritional products. The agricultural land and the farmer's most important source is the rain. A country's wealth is in the level of precipitation and its temperature level. If a country gets rain properly, then the environment maintains its purity, level of ground water which increases the yield of any crop. If the yield increases the economic level of an individual and the country will also increased and there is a lack of famine, poverty. An ant has few senses less than a human. But it teaches how to store food for future to meet the needs and fulfill the demands.

Tamil Nadu:

Tamil Nadu state has a geographical area of 1,30,058 sq.km and is situated between North Latitudes 08º 00’ and 13º30’ and East Longitudes 76º15’ and 80º 18’. The State is bounded by the Bay of Bengal in the east, the Indian Ocean in the south, the Western Ghats in the west and the States of Karnataka and Andhra Pradesh in the north.

For administrative purpose, the State is divided into 32 Districts, 209 Taluks, and 1139 Firkas. The State has 10Corporations, 150 Municipalities, 559 Town Panchayats, 12,620 Panchayat Villages and 93,699 Habitations

Study Area:

Salem is the fifth largest city in Tamil Nadu by population and covers 124 km^2. The district lies between 11° 14' and 12° 53' North of latitude and between 77°44' and 78° 50' East of longitude, covering an area of 5245 sq. km. Salem is a Geologist’s paradise, surrounded by hills and the landscape dotted with hillocks. It is located about 160 km northeast of Coimbatore, 186 km southeast of Karnataka state capital Bangalore and about 340 km southwest of the state capital, Chennai.

Rainfall Data:

The monthly rainfall data is used for this study and they are the secondary source and are collected from the online web source of World Weather Online for the period of 2009 to 2019 of Salem districts, Tamilnadu, India, which has complete weather details of all countries and its states as well as districts wise. The monthly, annually rainfall of Salem district was analyzed. Simple average and Seasonal Variation of Time series analysis are applied for the study

Climate of Salem:

The season of India influenced by the two types of winds – one blow from the Arabic Sea and second is from the Bay of Bengal. The Indian meteorological department has divided the climate of India into four seasons.

The Winter Season

The winter season begins from mid- November in northern India and stays till February. The temperature decreases from south to the north. The average temperature on the eastern coast is between 24° - 25° Celsius, while in the northern plains, it ranges between 10° - 15° Celsius.

Days are warm and nights are cold. Frost is common in the north and the higher slopes of the Himalayas experience snowfall.

During this season, the North-East trade winds prevail over the country. They blow from land to sea and hence, for most part of the country, it is a dry season. Some amount of rainfall occurs on the Tamil Nadu coast from these winds as; here they blow from sea to land. A feeble high-pressure region develops in the northern part of the country, with light winds moving outwards from this area. Influenced by the relief, these winds blow through the Ganga valley from the west and the northwest. The weather is normally marked by clear sky, low temperatures and low humidity and feeble, variable winds.

The Summer Season

It begins from March to the middle of June. The whole India experiences increase in temperature because of the summer solstice. During this season, hot violent winds blow during daytime in the north and north-west India which is called ‘loo’. Since the Sun goes gradually towards north (Summer Solstice), the Inter-Tropical Convergence Zone (ITCZ) begins moving towards the north and passes the 250 latitude in July.

When the hot and dry land breeze meets the humid sea breezes during this season, violent cyclone originates in that area. This cyclone is known as the pre-monsoon cyclone. This is very violent winds that brought heavy rainfall and hailstorms.

The Rainy Season

Rainy season or southwest monsoon begins from the middle of June to September. During this season, the low-pressure condition over the northern plains intensifies which attracts the trade winds of the southern hemisphere. These south-east trade winds originate over the warm sub-tropical areas of the southern oceans. They cross the equator and blow in a south-westerly direction entering the Indian peninsula as the south-west monsoon. The inflow of the south-west monsoon into India brings about a total change in the weather which is related to the easterly jet stream that approaches the land masses in two branches- The Arabian Sea Branch; The Bay of Bengal.

The Autumn Season

Autumn season or northeast monsoon begins after rainy season from October to the middle of December. It is often called as the retreating season of monsoon which happened due to the

gradual retreat of south-west monsoon. There is no rainfall in the northern India but several cyclonic storms arises in the Bay of Bengal that move from the north-east to the south-east along the eastern coast causing rainfall in the Tamil Nadu Coast and Sri Lanka.

1. Annual Average Rainfall

Tamil Nadu is a state with limited water resources and the rainfall in the state is seasonal. The annual average rainfall in the state is 998 mm. approximately 33 % of this is from the southwest monsoon and 48 % from the northeast monsoon and the rest are from the other climatic conditions.

The Salem district gets rainfall in all the periods. The only thing is some period's gets more rainfall and some are less. This variation is because of the earth's movement. The earth is moving around the sun on a elliptical orbit. On its movement it is closer (approximately 147 million km) to the sun in the month of January and February. So that the temperature is high and the rainfall is low. And on the same movement it is little far from the sun (approximately 152 million km). When earth is near to the sun, it gets the less precipitation and more temperature and when it is far to the sun, it gets more precipitation and low temperature.

Table 1.1 Range of Rainfall

Year	Rainfall (in mm)		
	Average	Max	Min
2009	57.67	163.36	0.05
2010	66.01	157.17	0.06
2011	49.82	129.30	3.27
2012	48.67	135.51	0.15
2013	37.69	92.28	0.32
2014	41.99	143.61	1.50
2015	35.14	117.83	3.83
2016	19.58	44.97	0.42
2017	52.85	270.86	0.41
2018	73.72	413.70	0.78
2019	215.07	454.20	21.00

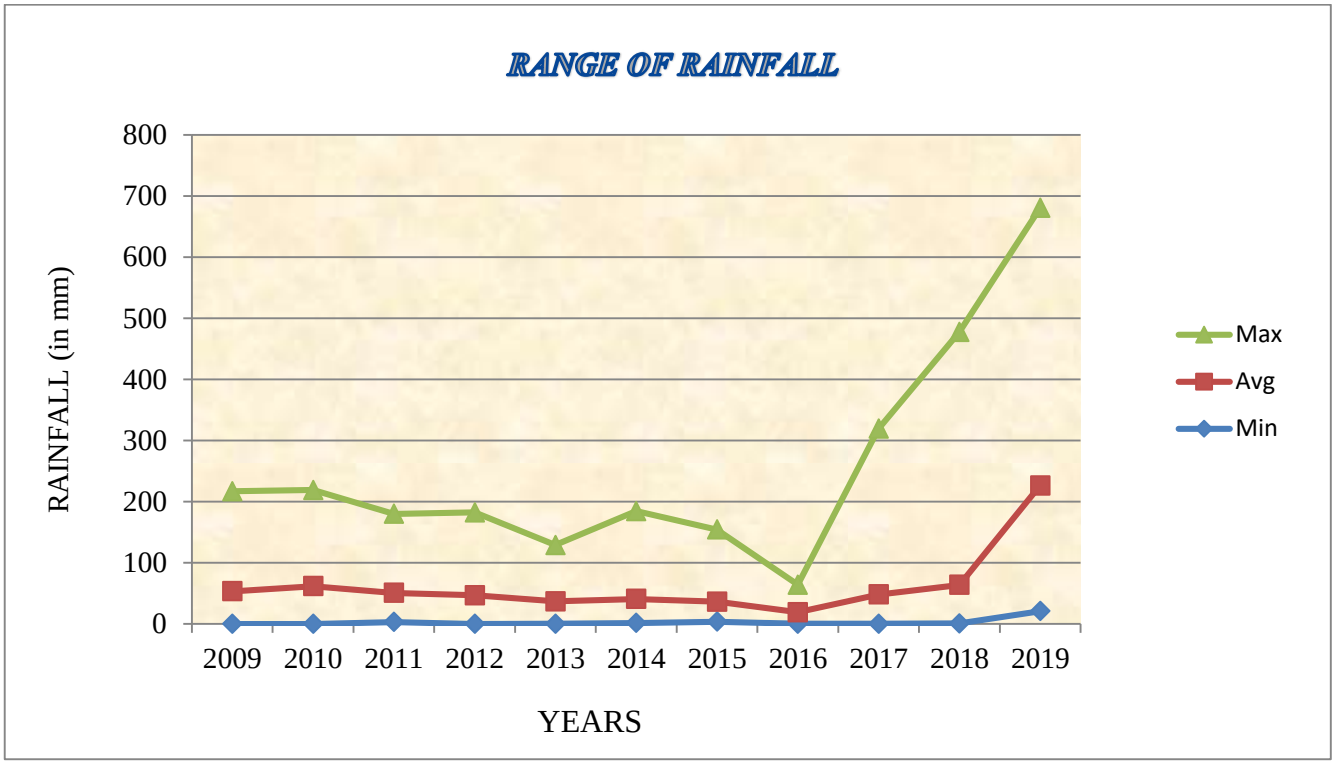


Diagram 1: Range of Rainfall

Table 1.1 shows that the minimum, maximum and the average rainfall in year wise from 2009 to 2019. From the table the highest maximum rainfall received by the Salem District in the year 2019 and in 2009, the district received the least rainfall. **Diagram 1,** is the simple line graph to understand the minimum, maximum and the average rainfall occurred during the years 2009 to 2019. Overall Average Annual Rainfall is 59.39 mm. The average annual rainfall during the years 2011 to 2017, is below to the overage average level and for the years, 2009, 2010 and 2018 is nearest to the overall average rainfall and for the year 2019 received 25% above the average rainfall

Table 1.2 Average Rainfalls

Month	Average Rainfall (in mm)	Month	Average Rainfall (in mm)
January	6.09	July	19.29
February	8.18	August	68.70
March	17.83	September	70.42
April	35.42	October	152.58
May	57.45	November	81.78
June	34.71	December	27.32

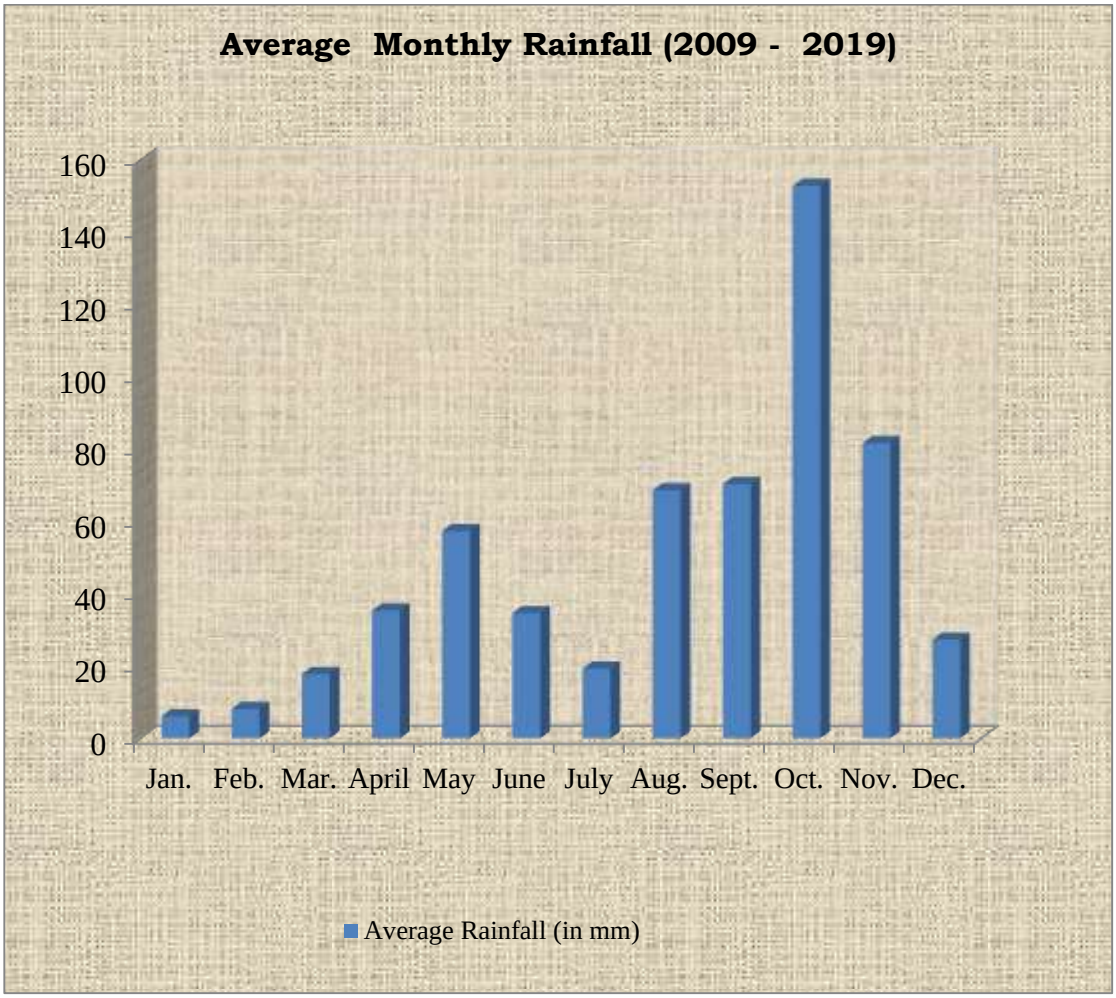


Diagram 2: Average Rainfalls

Table 1.2 Maximum average rainfall of Salem District is received in the month of October i.e.152.6 mm and the sum of rainfall is 1980mm. The minimum average rainfall of Salem District is received in the month January i.e. 6.09 mm and the sum of rainfall is 81.93 mm. **Diagram 1,** is the simple bar chart to clarify the month October has the highest average of rainfall and the January month received the least average of rainfall.

Percentages of Annual Rainfall

The annual rainfall data of Salem district was computed and it is found that the rainfall ranges from 802 mm to 3080 mm. The average aggregate of rainfall during the period of 2009 to 2019 is 752 mm . Percentage of annual rainfall was also computed and shown in the ***Table 1.3.*** A simple pie chart is carried out to understand the overall distribution of percentage of annual rainfall and is shown in the ***Diagram 3.***

Year	Annual Rainfall (in mm)	Percentage of Rainfall (%)
2009	802.10	9.70
2010	927.15	11.22
2011	712.84	8.62
2012	702.98	8.50
2013	548.29	6.63
2014	592.11	7.16
2015	490.26	5.93
2016	280.63	3.39
2017	718.72	8.69
2018	945.82	11.44
2019	3079.26	37.25
Total	**8266.25**	**100.00**

Table 1.3 Percentages of Annual Rainfall

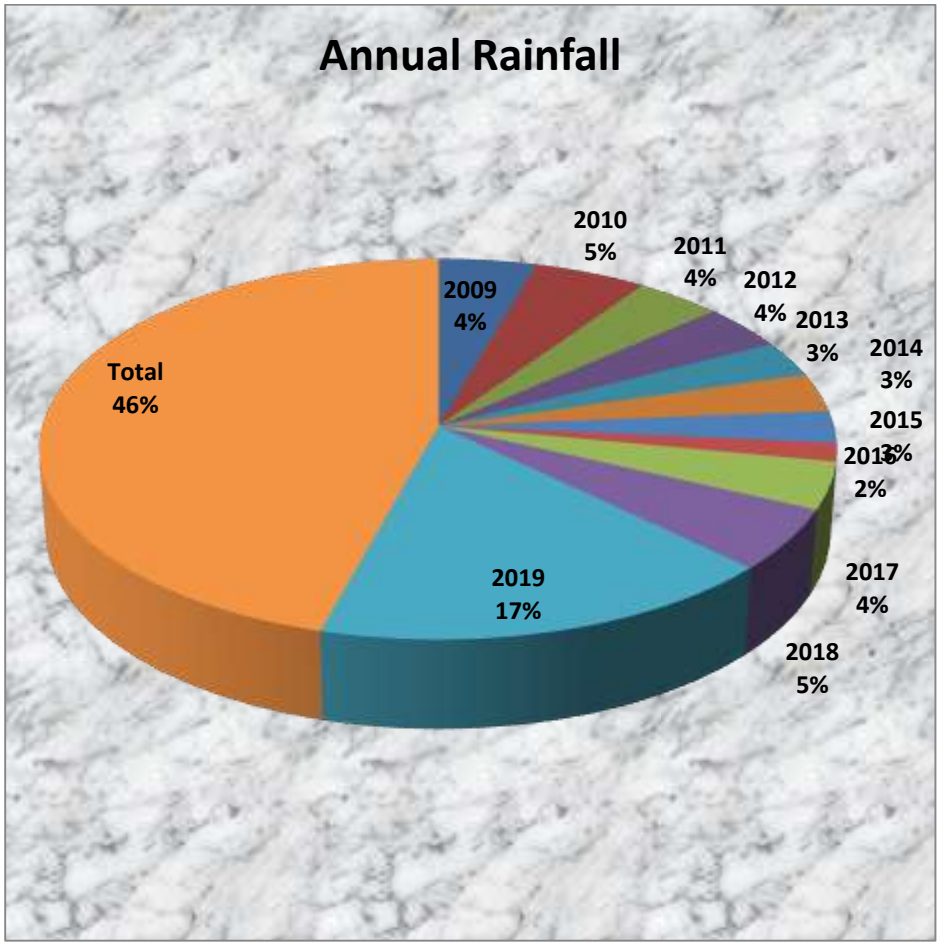


Diagram 3: Percentages of Annual Rainfall

2. Seasonal Rainfall

The Seasonal Rainfalls of winter (January to February), summer (March to May), Southwest Monsoon (June to September) and Northeast monsoon (October to December) was analyzed and shown below ***Table 2.1.*** From that it shows table during the year of 2016, the study area was received the least rainfall in all the seasons and seasonal rainfall is high during the year 2019.

Diagram .4 is given for better understanding of the average rainfall of various seasons, like winter, summer southwest monsoon and the northeast monsoon based on the record of rainfall from 2009 to 2019.

Table 2.1 Seasonal Rainfalls

Season	Winter Rains (Jan – Feb)	Summer rains (Mar - May)	Southwest monsoon (Jun – Sept)	Northeast monsoon (Oct - Dec)	Average Annual Rainfall
2009	3.73	42.32	64.02	100.51	52.64
2010	10.98	30.03	94.02	101.33	59.09
2011	14.54	47.03	53.45	71.29	46.58
2012	2.49	58.65	57.76	57.37	44.07
2013	16.47	40.83	38.76	47.26	35.83
2014	4.62	24.19	59.39	61.51	37.43
2015	4.01	35.55	28.99	63.70	33.06
2016	0.64	18.77	26.21	24.19	17.45
2017	8.16	42.45	33.89	118.32	50.71
2018	5.75	29.18	26.31	226.77	72.00
2019	27.30	191.03	280.13	277.53	194.00

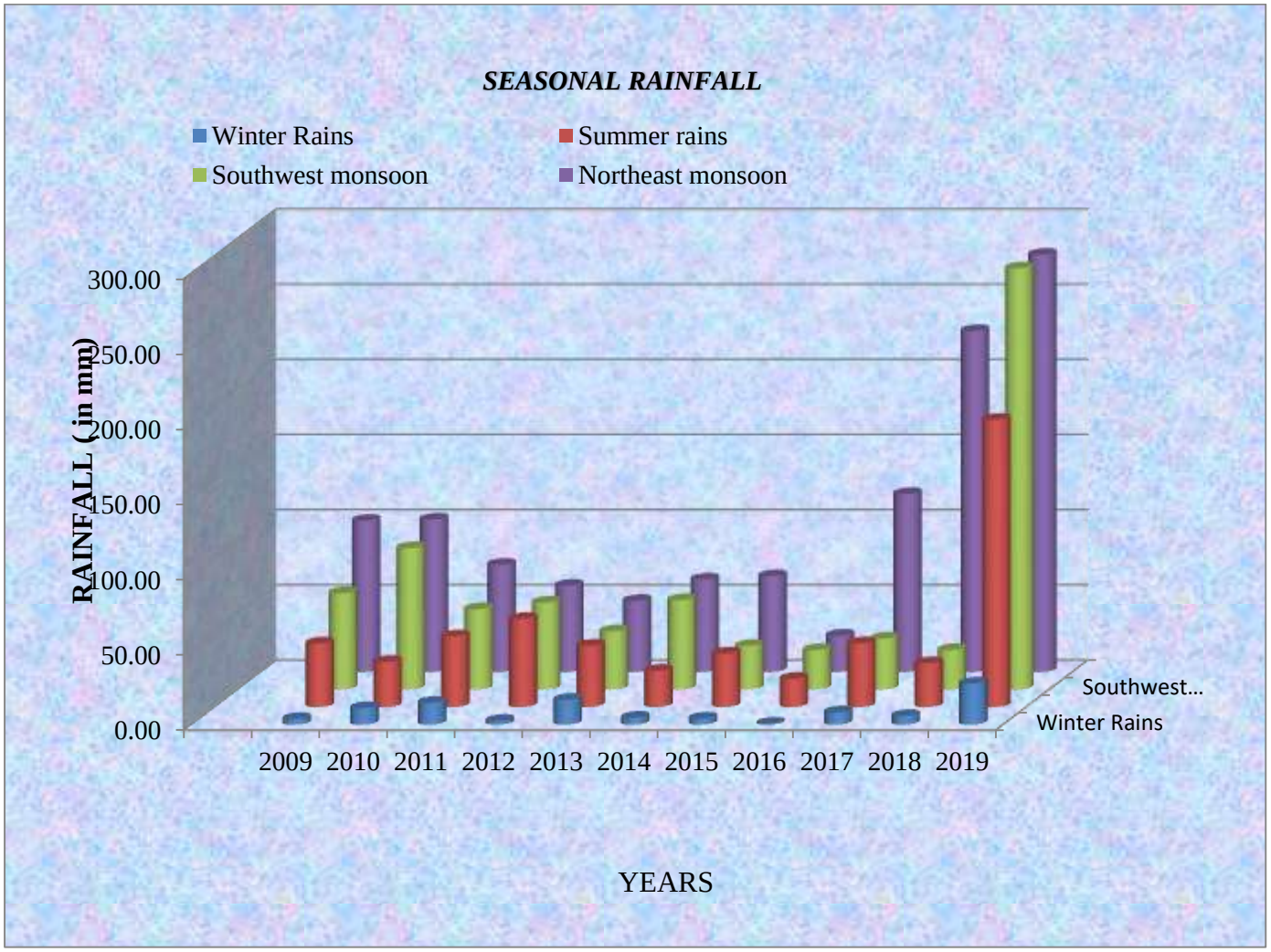


Diagram 4: Seasonal Rainfall

Table 2.2 Seasonal Index

Season	Aggregate of Seasonal Rainfall (mm)	Average Rainfall (mm)	Seasonal Index
Winter Rains	98.67	8.97	**15.35**
Summer rains	560.04	50.91	**87.12**
Southwest monsoon	762.93	69.36	**118.68**
Northeast monsoon	1149.78	104.53	**178.86**
	Grand Average	58.44	

Table 2.2 shows that the seasonal indices of rainfall of the seasons (winter, summer, southwest and the northeast monsoon) from 2009 to 2019. It reveals that the highest seasonal indices occurred during the northeast monsoon and the lowest in the winter season.

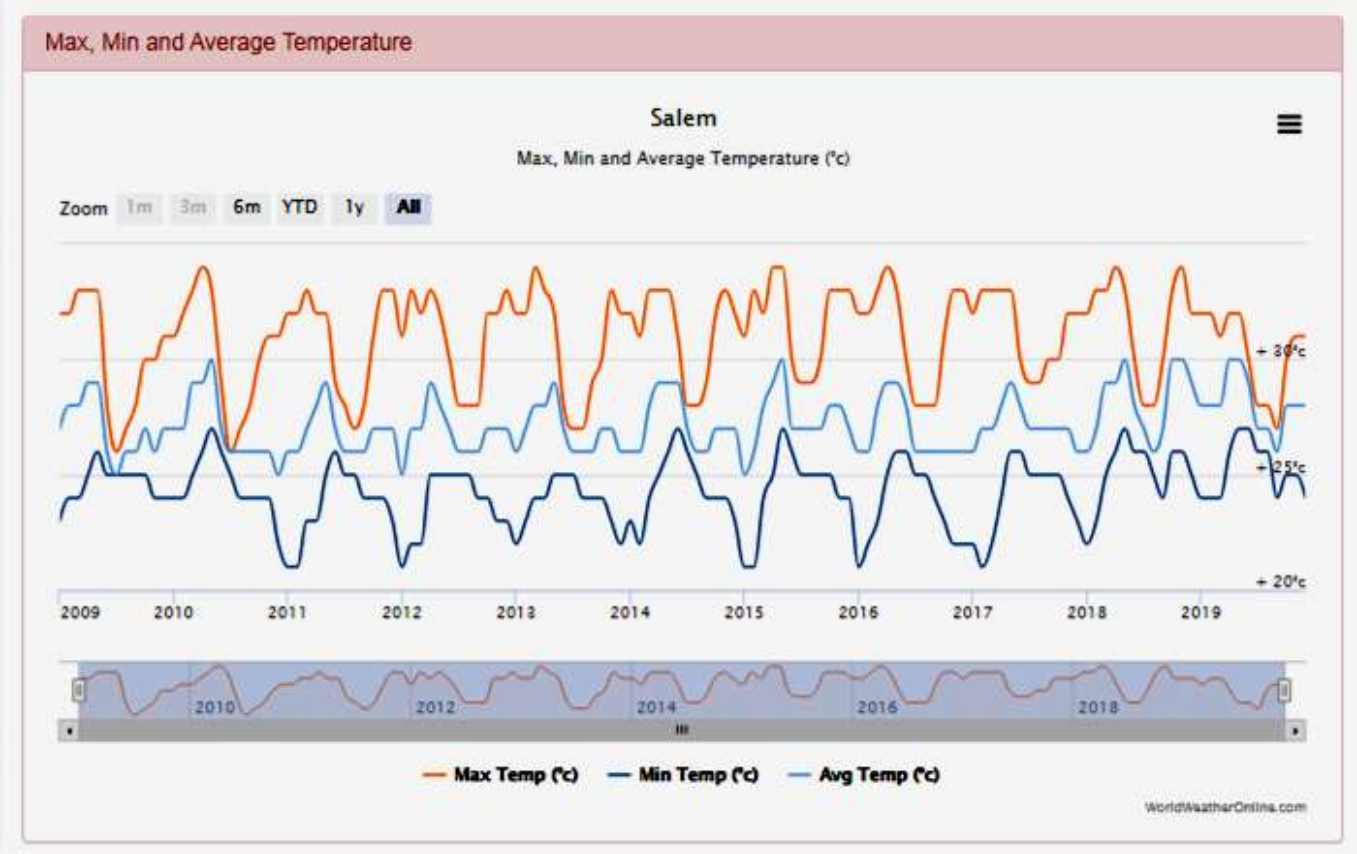
Table 2.3 Percentage of Average Seasonal Rainfall

Season	Month	Average Rainfall (mm)	Percentage
Winter Rains	Jan – Feb	8.97	3.84 %
Summer rains	Mar - May	50.91	21.78 %
Southwest monsoon	Jun – Sept	69.36	29.67 %
Northeast monsoon	Oct - Dec	104.53	44.71 %

Table 2.3 shows that the percentage seasonal indices of rainfall of the seasons (winter, summer, southwest and the northeast monsoon) from 2009 to 2019.. It reveals that the majority of rainfall received only during the northeast monsoon i.e. 45 % and the least percentage of this seasonal rainfall is getting in the winter seasons.

3. Temperature

Temperature is the most important factor of knowing a climatic situation. If a country receives the normal temperature, its growth and the economic level and it lead to improving the status of any country comparing to other. This study analyzed the temperature condition of the district Salem, Tamilnadu during the period of 2009 to 2019 and it is shown the ***Diagram 5.*** From the diagram it indicates that the study area maintains the normal temperature level.



Conclusion

The study of Salem district analyzed the rainfall data from 2009 to 2019. The important factors of the earth's environment are the rainfall and temperature. They are the key parameters to change anything. We cannot face the reflections of their changes. The nature has many wonders which are hidden or not understandable by humans. So we fail to protect the nature. Even though the nature will not fails to protect us. This study tells the deep knowledge receiving the rainfall of the study area during the northeast monsoon and next to southwest monsoon. Because of the State Tamilnadu Receives the Rain under the sway of both southwest and northeast monsoons. The Northeast monsoon primarily contributes to the rainfall in the district. The normal annual rainfall over the Salem district varies from about 800 mm to 3050 mm during the study period. Save the rainwater and preserve it for our next generations.

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