CLIMATE CHANGE AND ITS EFFECTS ON AGRICULTURE

Climate change is a long-term shift in global or regional climate patterns. Often climate change refers specifically to the rise in global temperatures from the mid-20th century to present. Climate change can affect agriculture in a variety of ways. Beyond a certain range of temperatures, warming tends to reduce yields because crops speed through their development, producing less grain in the process. Here we look into how climate change effects the agricultural industry, specifically the rice industry.

The state of Telangana mainly depends on agriculture and rice is their most cultivated crop. The district of Nizamabad is one of the top cultivators of rice in Telangana. Our objective is to forecast the annual production of rice and to see if it is affected by the unseasonal rainfall

Data:

We decided on taking the data that was given to us by TSIC on the annual production of rice in the Nizamabad district. Since the data was divided into seasonally and was limited, we have taken into consideration the data for the years 2015-2019.

For the data on annual rainfall, we searched online and found the data from 'World Weather Online'. The data given in this site was the average rainfall per day for each month and the number of days it rained. From this we manually calculated the monthly rainfall data and added them up to get the annual rainfall data.

Correlation & Regression:

The Correlation Coefficient is 0.9589. This shows that they have a very strong positive correlation.

Y=15.2634*X+2371024.7202 , This is the Regression Equation

Time Series Analysis:

The data was converted into a Time series and plotted in R. Using the decompose function in R, the time series data was decomposed into multiplicative components- Trend, Seasonality, and Random error. These components were plotted as shown in the given chart. It is observed that the 'Trend' component signifies the variation in the total amount of rainfall received by Nizamabad over the past years. There has been a sudden increase during the year 2016, and it can be seen that as compared to 2014, there has been about 180% increase in rainfall in 2019. The seasonal component present is indicating seasonality of rainfall in the months June to September every year. It is seen that, there is an irregular component present every year in the data. This is an indicator

of irregular patterns of rainfall in Nizamabad. The reasons for this could be climate change.

Conclusion:

The seasonality observed, was an expected outcome considering the rainy season months in India. However, the irregularities observed in rain pattern was not expected, and is indicating drastic climate changes. Changes in climate can cause abrupt rainfall patterns and may lead to even more challenging issues. According to the regression model fitted, about 90% of the Rice Production data in explained by the rainfall data for the Nizamabad district. Proper actions need to be taken to against climate change otherwise over the years, the rice production will be affected. Unexpected Rainfall pattern also causes threats of floods, dilution of soil minerals, threats to cattle life, infrastructure,etc.

Future Scope: Increase in Rainfall can be a boon and also a threat. It was observed that heavy rains turned out to be fruitful for paddy and sugarcane crops as they require efficient water for cultivation. On the other hand, the unexpected changes in the rain pattern has increased water levels in canals and streams, causing problems for cotton agriculture. In Adilabad, Peddapalli, Manchrial and Warangal districts problems of cropping pattern changes have started to take root. Future scope of rain pattern analysis would be to Forecast possible future rain patterns and identifying factors that could be improved to tackle these problems.

Years	Annual production of rice(kg/hect)	Annual Rainfall (mm)
2015	2631383	22043.32
2016	3345068	71397.91
2017	3048971	38989.4
2018	3267518	56324.55
2019	3423776	64240.4