

## ABSTRACT

This study aims to tackle the challenges presented by climate change concerning coffee production in India through the utilization of Maxent, GLM, and time-series analysis. The Maxent model was employed to forecast the climatic variables influencing the occurrence and potential distribution of coffee Arabica species in India from 2021 to 2040. The study revealed that various bioclimatic factors, such as temperature and precipitation, significantly impact the distribution of coffee Arabica species in the country. Considering that temperature-related bioclimatic variable exhibited the highest impact factor in the jackknife test, our focus shifted towards analyzing temperature changes in India using raster and spatial data processing in R Studio. This analysis aids in comprehending the scale and spatial patterns of temperature fluctuations in the region, which is crucial for assessing the implications of climate change on coffee production.

Furthermore, we sought to predict the future distribution of coffee species in the Karnataka region of India through GLM modeling. The outcomes revealed potential shifts in coffee species distribution under different climate scenarios, providing valuable insights for conservation and management strategies.

Additionally, this study emphasized on conducting a time series analysis and forecasting for coffee production. This analysis facilitates understanding historical production trends and enables informed predictions for future production levels, assisting farmers and policymakers in decision-making processes.

Ultimately, the findings of this study offer valuable insights into the impact of climate change on coffee production in India and propose methodologies to mitigate its effects. The results underscore the significance of considering climate factors, utilizing advanced modeling techniques, and adopting adaptive strategies to ensure the sustainability and resilience of coffee production in the face of evolving climatic conditions.