

### Impact of past climate change and socio-economic drivers on different crops in agroforestry systems of Wayanad, India

George A. (angelgeo93@gmail.com), Joseph S., Sebastian A., Sajeev T.V

*GIS and Remote Sensing Department, Kerala Forest Research Institute, Thrissur, Kerala, India*

Agroforestry systems are conventionally treated as a mitigation tool to reduce the impact of climate change. However, climate change is threatening the very existence of every ecosystem, and there is no reason to believe that agroforestry systems will be spared. Hence we have addressed whether climate change has an impact on agri and agroforestry systems of Western Ghats biodiversity hotspot. The objective of the study was to identify and measure the impact of climate change on patterns, productions and processes in agroforestry systems of Western Ghats region of Kerala, India in particular Wayanad. The shift in area and production of major crops were analyzed using the data available from Agricultural Statistics records of the Government of Kerala. The daily temperature and rainfall data were collected from different agencies and ordinary least square regression equations were fitted in order to analyze the changes in trends. A house-hold survey was conducted to understand how agricultural practices have changed over the period, and what drove the changes in practices. Factor analysis based on principal components was conducted to identify the most important factors that drove the shift in agroforestry practices. The result showed that Wayanad has undergone major changes in agroforestry practices over the last couple of decades. The area and production of crops such as arecanut, coconut, rubber and banana increased considerably whereas that of rice, ginger and pepper has declined. Climate variables showed that monsoon rainfall is found to be decreasing over the years, while there is an increase in temperature during the same period. Also, there is a delay in the onset of monsoon and an advance in the offset of monsoon. Factor analysis indicated that 71% of the changes in cropping pattern of the area is driven by four principal components which were found to be, market driven shift in agricultural practices (25%), adaptive agriculture management strategy adopted by the stakeholders (18%), impact of climate change (15%) and booming expansion of tourism industry (13%). The study concludes that there are changes in pattern, production and processes of agroforestry systems in Wayanad, and climate change contributes 15% of the shift in agricultural practices. The present study contributes to our existing knowledge on the effect of climate change on crop production and agricultural dynamics, and sheds light into the programs related to the agroforestry based climate change mitigation where climate variability and other factors need to be accounted before making policy decisions that aimed to mitigate the impact of climate change by means of agroforestry systems.

**Keywords:** Agroforestry systems, Climate change, Wayanad, Kerala, India.