ABSTRACT

This fluctuating climate poses significant challenges to forest communities, impacting their biodiversity and biomass production, and consequently placing stress on human socio-economic conditions. This study addresses the impact of climate change on forest communities, focusing on temperature and precipitation. Tree ring samples from Kalam Forest Subdivision, KP, Pakistan, revealed the growth patterns of key tree species: *A. pindrow* (max age 262 years, DBH 233cm, growth rates 0.98-2.77mm), *C. deodara* (max age 245 years, DBH 248cm, growth rates 1.03-2.53mm), *P. wallichiana* (max age 213 years, DBH 175cm, growth rates 0.89-2.60mm), and *T. baccata* (max age 240 years, DBH 226cm, growth rates 1.10-2.88mm). *A. pindrow* and *C. deodara* exhibited slow growth, *P. wallichiana* showed relatively faster growth, and *T. baccata* had the fastest growth. Dendrochronological analysis of samples indicated a mean growth of 1.59-1.91mm, sensitivity of 0.233-0.244, autocorrelation of 0.748-0.861, and correlation with master dating series from 0.192 to 0.310. Standard tree ring chronologies covered the years 1761-2022A.D. for *A. pindrow*, 1778-2022A.D. for *C. deodara*, 1810-2022A.D. for *P. wallichiana*, and 1783-2022A.D. for *T. baccata*. *A. pindrow* exhibited varying temperature correlations in November, July, June, and recent January, while precipitation showed mixed correlations in March, April, and May. *C. deodara* displayed negative temperature correlations during March to August and negative precipitation correlations in previous December and December but strong positive correlations in October and November. *P. wallichiana* had strong temperature correlations from April to December but a strong negative correlation in current March. Precipitation generally had positive correlations, especially in July. *T. baccata* showed positive temperature correlations in August, September, November, and December, with strong positive correlations in February, while October, April, and previous December had strong negative correlations. Precipitation exhibited positive correlations in all months, with strong positive correlations in July and October and negative correlations in March.