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Climate Change Threats to UNESCO-Designated World Heritage Sites: Empirical Evidence from Konso Cultural Landscape, Ethiopia

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Abstract : Climate change poses severe threats to many cultural landscapes of UNESCO world heritage sites recently. The UNESCO State of Conservation (SOC) reports categorized flooding, temperature increment, and drought as threats to cultural landscapes. This study aimed to examine variations and trends of extreme rainfall and temperature events and their threats to the UNESCO-designated Konso Cultural Landscape in Southern Ethiopia. The study used dense merged satellite-gauge station rainfall data (1981-2020) with a spatial resolution of 4km by 4km and observed maximum and minimum temperature data (1987-2020) together with qualitative data gathered from cultural leaders, local administrators and religious leaders. The trend and variability of rainfall and extreme temperature events were examined using climate Data tool (CDT) software. The data gathered from key informant interviews and focus group discussions were analyzed qualitatively to identify the impacts of extreme events on the cultural landscape. The findings revealed that rainfall was highly variable and unpredictable, resulting in extreme drought and flood. There were significant ($P<0.05$) increasing trends of heavy rainfall (R10mm and R20mm) and total amount of rain on wet days (PRCPTOT), which might have resulted in flooding. The study also confirmed that absolute temperature extreme indices (TXx, TXn, and TNx) and the percentile-based temperature extreme indices (TX90p, TN90p, TX10p, and TN10P) showed significant ($P<0.05$) increasing trends which are signals for warming of the study area. The findings also showed that frequent drought has led to the loss of grasses, which are used for making traditional individual houses and multipurpose communal houses (pafta), food insecurity, migration, loss of biodiversity, and commodification of stones from the terrace. On the other hand, the increasing trends of extreme rainfall indices resulted in the destruction of terraces, soil erosion, loss of life, and damage of properties. The study shows that a persistent decline in farmland productivity due to erratic and extreme rainfall and frequent drought occurrences forced the local people to participate in non-farm activities and retreat from daily preservation and management of their landscape. Overall, the increasing rainfall and extreme temperatures are thought to have an impact on the sustainability of the cultural landscape by disrupting ecosystem services and the livelihood of the community. Therefore, more localized adaptation and mitigation strategies to the changing climate are needed to ensure the sustainability of Konso cultural landscapes as a global cultural treasure and to strengthen the resilience of smallholder farmers.

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