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The expansion of forests and the practice of irrigated agriculture contribute to reduced river flows in southern Europe during dry years

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This research examines the changes in annual streamflow across Europe from 1962 to 2017, with a specific focus on the correlation between streamflow trends and climate dynamics, as well as physiographic and land cover characteristics. The spatial distribution of streamflow trends aligns closely with climate patterns, suggesting a climate-related influence. However, a detailed analysis at the basin scale reveals that the significant decline in streamflow in southern Europe cannot be solely attributed to climate dynamics. Instead, a discernible negative trend linked to non-climate factors becomes apparent. Specifically, our study indicates that the primary drivers of negative streamflow trends in southern Europe, especially during dry years, are forest growth and irrigated agriculture. This is attributed to the higher proportion of green water consumption compared to blue water generation. These findings hold substantial implications, particularly in the context of widely adopted nature-based solutions for addressing climate change. This includes concerns about carbon sequestration through forests and the planned expansion of irrigated agricultural lands in central and northern European countries to meet growing crop water demands. Such developments may potentially reduce the availability of water resources, leading to an increased frequency and severity of low flow periods.