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Abrupt transitions between drought and pluvial events becoming more widespread and intense

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Droughts and floods, as individual hazards, pose significant challenges, but their consecutive occurrence can trigger catastrophic cascades of disasters. Therefore, it is crucial to understand these extreme events, known as drought-pluvial (DPAT) and pluvial-drought abrupt transitions (PDAT), to mitigate their risks and potential impacts effectively. Our study utilizes historical records spanning from 1940 to 2022 to identify DPAT and PDAT events, investigating their frequencies, durations, intensities, and underlying causes. Additionally, we analyzed the frequency, duration, and intensity of these events under projected future scenarios. Globally, there has been an increasing trend in the frequency of DPAT and PDAT events, with significant upticks observed in Eastern North America, South Asia, East Asia, the Middle East, Africa, and Australia. In the 2010s, these disasters impacted over 100 million people, predominantly in less economically developed countries. Our findings enhance the current understanding of DPAT and PDAT, thereby contributing to the development of more effective mitigation and adaptation strategies against their impacts.