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Historical droughts in the Qing dynasty (1644-1911) of China and the role of human interventions

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This study presents a new epistemology to analyze drought chronology through a clear-cut methodology for reconstructing past drought series as well as series for other associated ecological and societal variables. Instead of building grading system based on mixed criteria, this method can facilitate transparency in the reconstruction process and can enable statistical examinations of all variables when building the series. The data used is from the REACHES database, however other archival documentary and index data from independent sources are also applied to understand drought narratives and to cross check and validate the analysis derived from the REACHES. From time series analysis, six severe drought periods are identified in the Qing dynasty, and then spatial analysis is performed to demonstrate spatial distribution of drought and other variables in the six periods as well as social network analysis to reveal connections between drought and other ecological and societal variables. Research results clearly illustrate the role of human intervention to influence the impacts of drought on societal consequences. Particularly, the correlation between drought and socioeconomic is not strong; crop failure and famine are important intermediate factors, meanwhile ecological factor such as locust and disaster relief measures are all imperative to intervene between crop production and famine. Implications of the study on drought impact are provided as well as the significance of historical climate reconstruction studies.