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## Evaluating the effects of drought mitigation measures during floods

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While nature-based drought mitigation measures (DMM), such as removing drainage and abstractions and raising stream bed levels, are a possible solution to combat droughts by targeting raised groundwater levels, they can also reduce the available storage capacity to buffer storm events, creating potential trade-offs with flood risk management objectives. However, the effects of floods and droughts are rarely assessed jointly. We demonstrate a coupled groundwater-surface water modeling approach in a shallow groundwater system of the Dutch sandy soils region that has shown vulnerability to droughts. We simulate the effects of DMM on both long-term averages of groundwater levels and short-term groundwater and surface water responses during heavy rainfall events. The DMM raise long-term summer groundwater levels, thereby compensating climate change induced summer groundwater storage deficits. However, during wetter winter months, groundwater levels are also raised significantly. As a result of reduced available flood storage capacity, peak streamflow increases following heavy winter rainfall events. We conclude that it is crucial to design and plan drought and flood mitigation strategies jointly. This also requires tailoring land management to prevalent environmental conditions. To this end, developing modeling approaches for a joint assessment of hydrological effects is key to inform the formulation of integrated strategies.

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## Supplementary materials

Supplementary material file

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