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A questionnaire-based review on the role of hydrological models in operational drought management: Insights from the Netherlands

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The recent report from the Joint Research Centre (JRC) of the European Commission emphasizes a growing impact of drought on the whole of Europe, worsened by climate change. Even in temperate climates such as the Netherlands, the impact of droughts is on the rise. Drought can be divided into three stages: meteorological drought, soil moisture drought, and hydrological drought. These stages often coincide with specific policy phases that require different approaches. In the Netherlands, these policy phases are Phase 0 (focused on drought adaptation), Phase 1 (addressing impending water scarcity), Phase 2 (managing actual water shortages), and Phase 3 (dealing with an area-wide crisis). Each phase involves a shift in organizational management. Phase 0 and, to some extent, Phase 1 focus on strategic development for drought, while operational management is important from Phase 1 through Phase 3 as the drought progresses. Decision-making in these phases is often supported by specialized tools, with hydrological numerical models often playing a key role, either embedded in monitoring dashboards or directly used by water managers. This research aims to uncover the role of hydrological models as decision-support tools across different drought phases. In this way, this study wants to contribute to the development of effective decision-support tools for drought management as drought is expected to increase in frequency and intensity. The Netherlands is chosen as a case study because of the novelty of drought events, the prevalence of model-based water management systems, and regional variations in water management practices. The primary research methods include a survey and interviews.

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