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Incorporation of practice-oriented decision contexts into a flood early warning early action system

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Forecast-based actions are increasingly receiving attention in flood risk management. However, despite the advances in hydrological flood forecasting over the last decades that have led to more informative forecasts with better skills and longer lead times, different types of uncertainty still remain. Most forecast systems exhibit a decrease in skill with an increase in lead time, revealing an inherent trade-off between timely decisions and accurate information. In this research, we incorporate some important practice-oriented decisions aspects into a forecast-based flood early action system. More specifically, we demonstrate how flood forecast uncertainties, limited budgets, action implementation constraints, time-varying costs, damages and benefits are linked to each other and determine the decision between acting upon limited-quality forecast information and taking less effective actions. We used hindcasts from a global flood forecast model (GloFAS) in Akokoro, Uganda to demonstrate how the forecast quality and the different triggering action thresholds affect the relative economic value of the early warning early action system. Finally, we identify the potential benefits of taking actions that are complementary to each other but are triggered by forecasts with different lead times, exploring cases in which such a two-stage system can be more beneficial than a single-stage system.