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A serious game on the role of forecast uncertainty and reliability in risk-based decision-making

Louise Crochemore, Carolina Cantone, Christiana Photiadou, and Ilias Pechlivanidis
SMHI, Hydrology Research Unit, Norrköping, Sweden (louise.crochemore@smhi.se)

Serious games have long been used in the hydrological forecasting community (e.g. in the HEPEX community: Arnal et al., 2016; Crochemore et al., 2016; Ramos et al., 2013; Zappa et al., 2013). The objective of these games is twofold: to train participants to specific forecasting concepts and to investigate how forecasts are used in decision-making contexts. With an increasing number of hydroclimate services being developed in the past years, it becomes crucial to understand how users apprehend and make use of the forecast quality information provided alongside these services. Forecast quality is indeed the base to build trust between service providers and users. In this experiment, we have developed a role-playing game that (1) trains participants to the concepts of uncertainty and reliability in seasonal forecasting, and (2) helps us investigate the levels of uncertainty and reliability participants are willing to base a risky decision on.

Participants endorse the role of a water manager of a theoretical reservoir that ensures water for the summer season. Each year, participants are consecutively presented with seasonal probabilistic forecasts of reservoir levels three months, two months and one month ahead of the beginning of the summer season. Based on these forecasts, participants decide if they should ask their neighbours to ensure the water supply, or if they can sell surplus water. In a first round, participants are provided with forecasts of varying reliability and uncertainty. In a second round, they have the additional possibility to pay for a gold service (sharp and reliable forecasts), or a silver service (reliable but less sharp).

Results based on a first set of 85 answers show that, after the first round, most participants were between a perfect decision-making (all right decisions taken three months in advance) and a safe one (importing water at the beginning of each round to ensure water). When asked for the minimum uncertainty and reliability levels they needed to make informed decisions, most participants asked for an equivalent level of reliability and confidence. Nevertheless, reliability was prioritized by a larger number of participants than sharpness was.

Arnal, L., Ramos, M.-H., Coughlan, E., Cloke, H. L., Stephens, E., Wetterhall, F., van Andel, S.-J. and Pappenberger, F.: Willingness-to-pay for a probabilistic flood forecast: a risk-based decision-making game, Hydrology and Earth System Sciences, 20, 3109–3128, 2016.

Crochemore, L., Ramos, M.-H., Pappenberger, F., van Andel, S.-J. and Wood, A. W.: An Experiment on Risk-Based Decision-Making in Water Management Using Monthly Probabilistic Forecasts, Bulletin of the American Meteorological Society, 97(4), 541–551, 2016.

Ramos, M. H., van Andel, S. J. and Pappenberger, F.: Do probabilistic forecasts lead to better decisions?, Hydrology and Earth System Sciences, 17(6), 2219–2232, 2013.

Zappa, M., Fundel, F. and Jaun, S.: A 'Peak-Box' approach for supporting interpretation and verification of operational ensemble peak-flow forecasts, Hydrological Processes, 27(1), 117–131, 2013.