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Decision- rather than scenario-centred downscaling: Towards smarter use of climate model outputs

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Climate model output has been used for hydrological impact assessments for at least 25 years. Scenario-led methods raise awareness about risks posed by climate variability and change to the security of supplies, performance of water infrastructure, and health of freshwater ecosystems. However, it is less clear how these analyses translate into actionable information for adaptation. One reason is that scenario-led methods typically yield very large uncertainty bounds in projected impacts at regional and river catchment scales. Consequently, there is growing interest in vulnerability-based frameworks and strategies for employing climate model output in decision-making contexts.

This talk begins by summarising contrasting perspectives on climate models and principles for testing their utility for water sector applications. Using selected examples it is then shown how water resource systems may be adapted with varying levels of reliance on climate model information. These approaches include the conventional scenario-led risk assessment, scenario-neutral strategies, safety margins and sensitivity testing, and adaptive management of water systems. The strengths and weaknesses of each approach are outlined and linked to selected water management activities.

These cases show that much progress can be made in managing water systems without dependence on climate models. Low-regret measures such as improved forecasting, better inter-agency co-operation, and contingency planning, yield benefits regardless of the climate outlook. Nonetheless, climate model scenarios are useful for evaluating adaptation portfolios, identifying system thresholds and fixing weak links, exploring the timing of investments, improving operating rules, or developing smarter licensing regimes. The most problematic application remains the climate change safety margin because of the very low confidence in extreme precipitation and river flows generated by climate models. In such cases, it is necessary to understand the trade-offs that exist between the additional costs of a scheme and the level of risk that is accommodated.