

Uncertainty and Multifunctionality as Bridging Concepts from Socio-Ecological Resilience to Infrastructure Finance in Water Resource Decision Making

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Abstract : Uncertain climate projections, multiple possible development futures, and a financing gap create challenges for water infrastructure decision making. In contrast to conventional predict-plan-act methods, an emerging decision paradigm that enables social-ecological resilience supports decisions that are appropriate for uncertainty and leverage social, ecological, and economic multifunctionality. Concurrently, water infrastructure project finance plays a powerful role in sustainable infrastructure development but remains disconnected from discourse in socio-ecological resilience. At the time of research, a project to transfer water from Lesotho to Botswana through South Africa in the Orange-Senqu River Basin was at the pre-feasibility stage. This case was analysed through documents and interviews to investigate how uncertainty and multifunctionality are conceptualised and considered in decisions for the resilience of water infrastructure and to explore bridging concepts that might allow project finance to better enable socio-ecological resilience. Interviewees conceptualised uncertainty as risk, ambiguity and ignorance, and multifunctionality as politically-motivated shared benefits. Numerous efforts to adopt emerging decision methods that consider these terms were in use but required compromises to accommodate the persistent, conventional decision paradigm, though a range of future opportunities was identified. Bridging these findings to finance revealed opportunities to consider a more comprehensive scope of risk, to leverage risk mitigation measures, to diffuse risks and benefits over space, time and to diverse actor groups, and to clarify roles to achieve multiple objectives for resilience. In addition to insights into how multiple decision paradigms interact in real-world decision contexts, the research highlights untapped potential at the juncture between socio-ecological resilience and project finance.

Keywords : socio-ecological resilience, finance, multifunctionality, uncertainty

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