Aalto University
School of Engineering

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Solving water sustainability challenges starts from governance

Title of the dissertation	Keep it Complex: Critical perspectives on water governance for dynamic social–hydrological systems
Contents of the dissertation	Freshwater resources are experiencing mounting social and environmental pressures around the world, including growing demand and competition between water users and sectors. Solving these water sustainability challenges is largely an issue of governance, which denotes how we as humans use, manage, and develop water and related resources through both formal and informal arrangements. Many water challenges have high levels of complexity in that they involve open, dynamic hydrological and social systems interconnected across multiple scales, characterised by uncertainty and a lack of central control. Such challenges are thus often 'unsolvable' in that any proposed solution may reveal or create further problems and difficult trade-offs, or involve diverging, and often conflicting, perspectives amongst stakeholders. This dissertation explores what it means to "keep it complex" as we grapple with water governance challenges that defy traditional command-and-control solutions. Three key theoretical perspectives – social-ecological systems, resilience, and interactive governance – are examined and integrated through a critical political ecology lens to provide new insights for water governance literature, with two key conceptual contributions: a governance 'solutionscape' and a resilience–governance framework. Case studies from the Limpopo River Basin in South Africa and the Tonle Sap Lake in Cambodia provide empirical insights from two dynamic social–hydrological systems undergoing significant environmental and social change. In the Limpopo (South Africa), inadequate groundwater monitoring networks, infrequent recharge, and historical legacies of commercial farming dictate water governance processes and outcomes. Meanwhile, rigidity traps within Cambodia's governing system undermine the resilience of the dynamic Tonle Sap Lake, which is undergoing social-ecological transformation due to mounting pressures in the Mekong (including hydropower dams). The dissertation argues that navigating complexity requires us to 'get comfortable' with biophysical uncertainties, imperfect solutions, and value-laden questions related to governance. The dissertation thus supports a shift from focusing on institutional design and structure (governing complexity) towards capturing the dynamic processes and relations within governance itself (governing *in* complexity). By doing so, more transformative ways forward may be imagined, negotiated, and enacted.
Field of the dissertation	Water and Environmental Engineering
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The dissertation is publicly displayed online 10 days before the defence at
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