

SEMINAR ANNOUNCEMENT

Digital twins can empower decision makers for improved management of flood risk

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Abstract

Flood inundation is a frequent, widespread, and impactful hazard, which regularly causes damage to housing and infrastructure, along with disruption to communities and businesses. Further, flood risk is expected to increase in future, due to increased storminess caused by climate change, and rapid urbanisation. To manage this risk, it is essential that we become more efficient at flood risk management. For example, we need to improve land use planning to take account of multiple scenarios for potential flood impact or mitigation. However, the computational modelling and scenario assessment required for such flood risk management is challenging and expensive. This is a particular problem for smaller regions or communities where the costs of detailed risk assessments may be prohibitive. Furthermore, analyses require substantial amounts of spatial data related to infrastructure and the environment, and the appropriate processing of these data is complex. Environmental digital twins can solve these challenges by enabling automated data capture and rapid processing of large volumes of disparate geospatial data, combined with automated data analytics and computational modelling. This can break down the barriers which exist for decision making due to the significant expertise and resources required to process and analyse data. In this seminar, I will share our progress towards creating a digital twin for flood resilience and its implementation for assessing catchment-based natural flood solutions. This open-source system automates the ingestion and processing of the varied data needed for flood risk assessment, runs hydrological and hydraulic models to assess scenarios, then ingests and analyses the results enabling potential flood impacts to be assessed. This is integrated with a web-based interface and 3D visualisation tool, which provides a powerful front-end to access the digital twin. In addition, I will share how we are utilising virtual reality to aid with communication of flood risk to communities, using outputs from the digital twin. I will end by exploring how we are using the system as part of community engagement with rūnanga (indigenous Māori communities of New Zealand), to enable community members to engage in integrated river basin management. The digital twin is being developed to enable the assessment of environmental restoration initiatives such as native reforestation, accounting for both flood mitigation and the co-benefits that the initiatives bring.

Note biografiche

Dr. Matthew Wilson

Matt is the Director of the Geospatial Research Institute Toi Hangarau, and a professor in the School of Earth and Environment, University of Canterbury, New Zealand. He has a background in hydrology and spatial data science, with a PhD from the University of Southampton, UK.

Il seminario è rivolto principalmente ai dottorandi, e aperto a tutti gli interessati