



# **Participatory Adaptive Integrated Urban Water Management – the Tensions**

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under the supervision of Professor Pierre Mukheibir (Principal)  
and Associate Professor Simon Fane (Co-Supervisor)

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## Certificate of original authorship

I, Bao Anh Nong declare that this thesis, is submitted in fulfilment of the requirements for the award of Doctor of Philosophy in the Institute for Sustainable Futures at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise referenced or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

This document has not been submitted for qualifications at any other academic institution.

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# Abbreviations

**AM:** Adaptive Management

**AP:** Adaptive Planning

**APP:** Adaptive Pathway Planning

**CF:** Cynefin Framework

**DAPP:** Dynamic Adaptive Policy Pathways

**DELWP:** Department of Environment, Land, Water and Planning (Victoria)

**GWP:** Global Water Partnership

**IAP2:** International Association for Public Participation

**IPART:** NSW Independent Pricing and Regulatory Tribunal

**IUWM:** Integrated Urban Water Management

**IWCM:** Integrated Water Cycle Management

**IWM:** Integrated Water Management

**IWRM:** Integrated Water Resources Management

**LHWSP:** Lower Hunter Water Security Plan

**MCDA:** Multi-Criteria Decision Analysis

**MWP:** Metropolitan Water Plan

**NSW DPIE:** New South Wales Department Planning, Industry and Environment

**PP:** Public Participatory

**ROA:** Real Option Analysis

**SSM:** Soft Systems Methodology

**ST:** System Thinking

**SUWM:** Sustainable Urban Water Management

**SWITCH:** Sustainable Water Management Improves Tomorrow's Cities' Health

**TWCM:** Total Water Cycle Management

**UNCED:** United Nations Conference on Environment and Development

**WPP:** Water Partnership Program

**WSC:** Water Sensitive Cities

**WSUD:** water sensitive urban design

**YVW:** Yarra Valley Water

## Abstract

Urban water management is now experiencing significant growth in complexity and uncertainty. This trend is expected to continue as emerging pressures will likely be exacerbated in the future. Furthermore, the way we currently manage our water in the city is no longer appropriate to respond to this ever-growing uncertainty and complexity of the human-urban water system. A shift to an *Adaptive, integrated and participatory approach* is advocated.

In this thesis I seek to inform the transition to a more sustainable paradigm for urban water planning and management, which exhibits characteristics and qualities from public participatory (PP), integrated urban water management (IUWM), and adaptive management (AM) approaches. To that end, the research explores the challenges and issues of complexity and uncertainty in current water planning processes. The potential tools and methods to deal with such problems are discussed from different perspectives.

A nested exploratory case study methodology with multiple cases was utilised to conduct the research in South Eastern Australia seaboard metropolitan areas. The methods include semi-structured interviews, literature review and document analyses.

The literature reviewing process identified the lack of documented cases that exhibit principles of the three approaches and the lack of analysis on how they should be adopted in conjunction. The interviews confirmed that the three approaches are perceived as highly interconnected and have the potential to complement others. Further, the findings indicated critical features of the three approaches in practice and identified four major challenges. Furthermore, uncertainty and complexity emerged as critical concerns that were further explored.

The Cynefin framework was adopted to investigate the roots causes of the emerging complexity and uncertainty and the potential methods and tools for future planning and management. The study revealed that there is a lack of methods or tools that can operate within the complex domain.

The key recommendations from this research are 1) that the methods and associated tools should be applied and coordinated together in a framework guided by a combined approach to better address complex problems; 2) more attention should be paid to develop the techniques and practices for designing and implementing pilots and learning experiments; and 3) it is necessary to provide capacity-building assistance on integrating IUWM and AP.

This research demonstrated that to adequately plan for sustainable and resilient urban water servicing, the water sector needs to find a consistent and coherent way to simultaneously incorporate adaptive, integrated, and participatory approaches, especially when dealing with complexity.