

Preface

Wastewater and stormwater flows are inherently variable, responding to rainfall events and fluctuations in loading. This variability has significant effects on treatment systems performance, largely related to changes in hydraulic residence times and fluctuations in pollutant loadings. How much this variability influences treatment performance has rarely been specifically addressed in design manuals or performance assessments and modelling. This volume aims to start the process of filling this gap by focusing on ecotechnologies, in particular various types of wetlands and ponds, which are generally considered to be relatively resilient to such variations in inflow.

The initial impetus for this book was a 2½ day workshop on *Ecotechnologies for treatment of variable wastewater and stormwater flows* held at RWTH Aachen University in Germany in October 2014. The workshop was a joint collaboration between the RWTH Aachen University's Institute of Environmental Engineering and The National Institute of Water and Atmospheric Research (NIWA) in New Zealand, funded through the New Zealand-Germany Scientific and Technological Co-operation Agreement. The workshop attracted approximately 30 researchers and practitioners from Germany, France, England, Belgium, Denmark and New Zealand, including research organisations and a range of private sector and other supporting organisations working on treatment wetlands and related ecotechnologies.

A core group from the workshop showed interest in developing and further extending the ideas discussed at the workshop. Despite our initial enthusiasm for the task, other commitments inevitably intervened and threatened to derail the endeavour. However, with perseverance (and including some supplementary assistance along the way to extend and bolster coverage), it has finally come together.

At the beginning, we introduce the range of treatment ecotechnologies considered. Then, we discuss the general impact of flow variability on treatment processes in these systems. Subsequent chapters cover the main contaminant categories of interest: nutrients, faecal microbes, metals and emerging contaminants, spanning urban and agricultural applications. Finally, we review modelling tools that have

the potential to improve our understanding and ability to simulate and predict responses to flow variability.

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