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Sustainable Ecological Systems and Urban Development in New Zealand: a Wetlands Case Study

A thesis presented in partial fulfilment of the requirements for the degree of

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Abstract

The destiny of urban wetlands lies largely in the hands of the urban planners. The results of this study suggest that planners are underestimating the importance of the urban wetland with irreversible consequences. The ecological integrity of natural systems like wetlands is inevitably compromised when they occur in urban environments. The Resource Management Act 1991 altered the approach to urban development from being entirely anthropocentric to one of consideration of the environment in which such developments were planned. Supposedly, adherence to the Act has resulted in a more focused approach to environmental outcomes in district and regional plans. However, this research into the effects of urban development on urban wetland riparian areas identifies a lack of appreciation of their structure and function.

Eight palustrine wetlands were assessed for health and riparian function. They comprised two non-urban wetlands that provided the best-available ecological data on wetland health and six urban wetlands. Ecological indicators and urbanisation data were incorporated into a multi-metric model (named the Urban Wetland Health Index) to evaluate the biological health of urban wetlands.

A key finding of this research is that the urban wetlands have poor ecological health and functioning indicated by excessive nutrients and algal blooms. Other key findings included the inadequate structure and function of the wetland riparian areas; the loss of riparian habitat associated with a lack of indigenous vegetation; the minimal cultural values given to the urban wetlands; and the negative impacts of urban imperviousness and inadequate stormwater infrastructure on wetland health. Notably, older residential areas that had poor stormwater connections to appropriate drainage also had the least healthy urban wetlands. The role of stormwater runoff in compromising the health of the urban wetlands was not addressed in the 2010 Kapiti Coast District Plan Review documents regarding Landscape and Biodiversity. These documents guide the development of the ‘second generation’ district plan.

The Urban Wetland Health Index was found to be robust and reliable with this research. It was designed to address a gap in the tools available to planners, ecologists and other professionals seeking to assess the impacts of urban development on urban wetland ecosystem health. This Index is an important tool for use by councils in reviewing their district plans and undertaking plan changes. The incorporation of ecosystem services science into their policies and plans, and the understanding of the value of urban wetland ecosystem services, is needed to foster urban sustainability.
Acknowledgements

My thanks go to my supervisors, Dr Michael Joy, Associate Professor John Holland and Associate Professor Christine Cheyne. They have been forever patient and encouraging with their ‘second career’ student. Also to the Massey Ecology Group technical staff, Paul Barrett and Tracy Harris, who made sure that I had appropriate laboratory materials and equipment.

Special thanks go to the people who allowed me access to their wetlands – Lorraine and Ian Jensen at Te Hapua; Bruce Benseman and staff at Nga Manu Nature Sanctuary; David Blair and Wendy Huston of the Sevenoaks Midlands Gardens Retirement Village Trust and the Ferndale Trust administrator and staff. Emily Thomson, Kapiti Coast District Council (KCDC) helped me with maps and documents and Brian Phillips, a neighbour of Tower Lake No 1, Chris Horne, Wellington Botanical Society, Rob Cross, Biodiversity Officer KCDC and Jonathan Smith, Owner of Ngarara Farm, Waikanae, were generous with their time and information.

Many others have contributed to the work-in-progress, not the least my family Penny and Mark, John and Jenny, and Mark and Megan, who have been required to listen and read my efforts, and even accompany me on sampling trips. My Wednesday tramping group have withstood my highs and lows as we walked the Wellington hills. My close friends have lent an ear to my frustrations and shared my excitement. My thanks to them all.
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<td>BP</td>
<td>Before present time</td>
</tr>
<tr>
<td>CIA</td>
<td>Connected Impervious Areas</td>
</tr>
<tr>
<td>CMS</td>
<td>Conservation Management Strategy</td>
</tr>
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<td>CRC</td>
<td>Canterbury Regional Council</td>
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<td>EPA</td>
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<td>EPT</td>
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<td>ha</td>
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<td>HERCULES</td>
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<td>MA</td>
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