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

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Karen Thelma Palmer

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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.

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Abbreviations used in the text

BP	Before present time
CIA	Connected Impervious Areas
CMS	Conservation Management Strategy
CRC	Canterbury Regional Council
CSD	Commission for Sustainable Development
DOC	Department of Conservation
EDS	Environment Defence Society
EERNZ	Ecological Economics Research New Zealand
EMAP (US)	Environment Monitoring Assessment Program - Wetlands
EPA	Environment Protection Authority
EPT	Ephemoptera, Plecoptera, Tricoptera
ERE	Environment Result Expected
ERMA	Environment Risk Management Authority
GIS	Geographic Information System
GPS	Geographic Positioning System
GWRC	Greater Wellington Regional Council
ha	hectare
HERCULES	High Ecological Resolution Classification for Urban Landscapes and Environmental Systems
HGM	Hydrogeomorphic Classification Method
IPCC	Intergovernmental Panel on Climate Change
ISC	Impervious Surface Cover
IUCN	International Union for Conservation of Nature and Natural Resources
KCDC	Kapiti Coast District Council
LGA	Local Government Act
LINZ	Land Information New Zealand
LIUDD	Low Impact Urban Design and Development
LUC	Land Use Capability
MA	Millennium Ecosystem Assessment
MCI	Macroinvertebrate Community Index
MED	Ministry of Economic Development
MfE	Ministry for the Environment
MUL	Metropolitan Urban Limit
NES	National Environmental Standard
NGO	Non-Governmental Organisations
NIWA	National Institute for Water and Atmospheric Research
NPS	National Policy Statement
NPSFM	National Policy Statement for Freshwater Management

NWI (US)	US Fish and Wildlife Service's National Wetlands Inventory Program
NZBS	New Zealand Biodiversity Strategy
NZS	Standards New Zealand
PCE	Parliamentary Commissioner for the Environment
QP	Quality Planning
QV	Quotable Value (of property)
REC	River Environment Classification
RMA	Resource Management Act
RMC	Riparian Management Classification
RPS	Regional Policy Statement
SOE	State Owned Enterprise
TAG	Technical Advisory Group
TEV	Total economic Value
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
UWHI	Urban Wetland Health Index
USDA	U.S. Department of Agriculture
Vol	Volume
WCC	Wellington City Council
WCED	World Commission on Environment and Development
WET	Wetland Evaluation Technique
WMCI	Wetland Macroinvertebrate Community Index
WMO	World Meteorological Organisation
WWF	World Wildlife Fund