
Editorial – New Zealand as a hotbed of innovative thinking in the sustainability space

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Biographical notes: Nigel Jollands' career spans 15 years in energy, resource management and economic analysis fields. In November 2006 he took up a post with the International Energy Agency where he is the Principal Administrator in the Energy Efficiency and Environment Division. This role includes leading the IEA's energy efficiency policy research, coordinating the IEA's energy efficiency advice to the G8 under the Gleneagles Plan of Action, and providing Secretariat assistance to the Agency's Energy Efficiency Working Party. He was previously Principal Ecological Economist in the New Zealand Centre for Ecological Economics (NZCEE) at Manaaki Whenua-Landcare Research. He has also held posts as Senior Lecturer at Massey University, and worked as a policy analyst in Wellington at the Ministry of Commerce, Energy Efficiency and Conservation Authority and Ministry for the Environment.

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The contents of this Special Issue on Research Innovation in New Zealand in the Sustainability Space reflect New Zealand's unique policy context, as well as some of the core environmental issues affecting the country. These issues include climate change/global warming, water and air quality, indigenous habitat protection, and the risks to biodiversity associated with genetically modified organisms and invasive pests. New Zealand continues to enjoy a privileged image as 'clean and green'. However, the

reality is that environmental issues may be relatively less severe than those in other industrialised countries due only to a low density population and limited industrial base, rather than 'environmentally enlightened' lifestyle and consumption patterns.

Making sustainability a central concern for New Zealand requires community awareness of environmental issues and community participation in environmental policy decision-making processes and applications. New Zealand's key environmental legislation, the Resource Management Act 1991 (RMA), places an emphasis on understanding the links between environmental pressures and the human dimension of environmental challenges.

The themes covered in this Special Issue reflect the RMA's approach to linking environmental pressures and human dimensions. The papers deal with the diverse range of issues facing New Zealand and include a specific focus on integrating the human dimensions of environmental challenges into a post-normal science framework, quantitative modelling and the relatively new exploration of participatory modelling, and empirical ethics.

New Zealand policy makers and researchers are increasingly confronted with messy meta problems; none more so than the issue of climate change. However, climate change issues also challenge policy makers and researchers to take new approaches. It is not surprising to see that the paper by Carswell et al. reviews their research on reducing terrestrial greenhouse gas emissions using a post-normal science framework (Funtowicz and Ravetz, 1992). The term 'post-normal' suggests a qualitative change in the way science and policy making is approached, and draws attention to aspects of uncertainty and values that tend to be neglected in traditional research.

Carswell et al.'s paper focuses on climate change mitigation at a regional level in New Zealand. Through case studies, the authors identify how government agencies and communities are approaching climate change as both a threat and an opportunity. Where networks of people form an 'extended peer community', positive changes can be created such as a focus on renewable energy sources. In this respect, the authors note that local government is becoming more participatory and more closely linked to the aspirations of the community. A further case study addresses indigenous Māori-owned land with respect to climate change issues. The implications of carbon sequestration and carbon trading are recognised as important land-use opportunities that may contribute to Māori values, aspirations and sustainable development outcomes.

New Zealand has a long history of applying quantitative modelling to environmental challenges. The paper by Andrew and Forgie reflects a relatively new revival in the application of the Leontief input-output model. The paper explores the environmental impact of New Zealand's food and fibre industries from two perspectives: the direct impacts of the producer; and how purchasing decisions by consumers have indirect impacts on the environment. Their analysis makes an important contribution to addressing issues recognised by New Zealand farmers, industries and others interested both in developing tools that can measure the national environmental impact, and in gaining an understanding of international environmental impacts such as global warming potential.

A relatively new area for New Zealand researchers is the application of participatory modelling. This combines expertise in quantitative modelling with an increasing recognition of the important requirement to ensure that the human dimension is included in the equation. Three papers evaluate different participatory modelling approaches. The first paper by Cole uses different models in a diverse stakeholder

community in the Motueka catchment in New Zealand. Cole's research attempts to implement mediated modelling, which seeks to build consensus among stakeholders, based on a shared conceptual/mathematical modelling language. In taking a strong transdisciplinary theoretical perspective in evaluating the role of mediated modelling in a sustainability-oriented, action research context, a number of deficiencies in the model became apparent and are discussed in this paper.

Forgie and Richardson explore the scope for mediated modelling to be used as a tool by local authorities in New Zealand in helping facilitate and implement long-term community plans for working towards future sustainability solutions. They acknowledge that mediated modelling benefits from both computer modelling and public participation, to promote group learning, and build common understanding of complex systems issues and messy problems that often characterise sustainable development issues. A further example of a participatory model-building tool is Cole et al.'s use of an influence matrix, which they trialled in the Motueka catchment. The authors provide useful feedback on the strengths and limitations of this model in calculating sustainability values based on a system-wide influence.

In the final paper of the Special Issue, Small argues that social science based empirical ethics studies have a role to play in the socially sustainable development of powerful, contentious technologies. This paper highlights the importance of empirical ethics when developing public policy. Small's paper discusses qualitative research that compared the attitudes and beliefs of the public with those of the science community in New Zealand, on the issue of genetic engineering (GE). In recent years, GE has engendered a lot of discussion and heated debate among scientists and the public, and Small's paper outlines the philosophical, theoretical and practical arguments on why empirical ethics studies should be used to monitor changes over time in social norms, moral values and beliefs, particularly with respect to new technologies.

This Special Issue provides a sample of the diversity of New Zealand ecological economic and sustainability research in New Zealand. The papers' innovative approaches to the issues provide unique perspectives on some of New Zealand's most pressing sustainability issues. In doing so, these papers clearly identify New Zealand as a hotbed of innovative thinking in the sustainability space.