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Biophysical Limits and their Policy Implications: The Nature of the Problem

This paper was presented at the Institute of Policy Studies/
Manaaki Whenua Landcare Research conference 'Biophysical
Limits and their Policy Implications', held at Victoria
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Advertising for this conference reminded us of the Club of Rome's 1972 report *Limits to Growth* (Meadows et al., 1972). That controversial report delivered a stark reminder that human civilisation was on an unsustainable growth trajectory: the inevitable consequence was overshoot and collapse. This trajectory was hard for people to grasp because it was exponential.

So, nearly 40 years later, what has changed? We've seen the rise and embedding of neoliberalism; technology and the internet dominate our lives; we have the rapid rise of China and India,

and changes to global trade patterns; we've suffered the global financial crisis, and so on. Over the past quarter of a century the world economy has quadrupled. This growth has benefited hundreds of millions of people, but at the same time 60% of the world's major ecosystem goods and services which underpin livelihoods have been degraded or used unsustainably (UNEP, 2011).

So, are the Club of Rome's scenarios so dire that we can expect major collapse beyond 2100? That will be a widely debated topic of this symposium. I think most of us will agree, however, that our current trends of population growth and resource consumption are currently unsustainable. Which brings me to 'the nature of the problem'.

The nature of the problem

When we talk about increasing resource scarcity there is a common assumption that the earth is running out of resources. So, to halt this rapid decline, we must indeed halt economic growth.

On the other hand, there are those who believe that resource depletion can largely be addressed with the use of substitutes or by developing new technologies: so, essentially, future behaviours around resource management can be an extension of the past.

In my view the nature of the problem is not about the earth running out of key renewable resources. It is about gross inefficiencies around *how* these resources are managed; it is about how limits are set and how new technologies are disseminated. It is the failure of *institutions* to recognise and respond to increasing environmental pressures, complexity and uncertainty, and failure to manage resources within the context of systems dynamics where feedbacks and non-linearities are ever present.

Take water, for example. Despite the depletion of watercourses, glaciers and aquifers in many regions, the earth is not running out of water. In fact, most countries have more than enough water to supply their populations' growing needs *and* to sustain the flows needed

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to protect the natural environment. The problem, rather, is that our societies are doing a poor job of *managing* these water resources. We are not simply at the mercy of an increasingly scarce and variable natural resource.

To put this in context: global agriculture currently uses about 3 trillion cubic metres of water per year, or 71% of global withdrawals. Much is wasted. Global estimates of irrigation efficiency suggest that around 60% of water destined for irrigation never reaches the crop (McKinsey & Co, 2009). It leaks out or

day or another generation) to one which seeks a dramatic reduction in our ecological footprint through internalising those pressures. Arguably, the transition required to bring us onto a sustainable growth path is as much about the political economy as it is policy about tools and solutions, perhaps even more so.

Many of these policy solutions are well known to us and have been used in different contexts over the years. But many of these instruments are not widely applied in resource management. That is because this stuff is hard; the politics

innovation, infrastructure, and institutions and governance in promoting green growth. Discussion around institutions and governance notes the importance of building capacity to improve governance, and stresses that this means not necessarily from the top down. In this context, an essential element of managing shared natural resources is co-operation and collective action by stakeholders.

However, on the whole the strategy still emphasises the use of market and regulatory instruments as a means to manage environmental externalities. Yet market solutions struggle when 'politically-charged' receiving environments are ignored: that is, those receiving environments characterised by entrenched positions and adversarial posturing. Regulation imposes generic rules on idiosyncratic situations, leading to inefficiencies and dissatisfaction.

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evaporates before it gets to the crop, or is wasted at the other end by over-irrigation resulting in run-off or leaching, driving another set of environmental problems.

Is technology the answer? Water technologies have resulted in more efficient use of water. This is particularly true for the agricultural sector, where experience shows that drip irrigation systems can cut water use by 30–70% while simultaneously increasing yields by up to 90%. But, although the use of this system has grown significantly over the last 20–30 years, it is still only used in 1% in the world's irrigated areas (Revenga, 2000).

More efficient water technology alone will not be sufficient to fully address water scarcity. It will also require difficult policy choices that allocate water to the most economically and socially beneficial use, and incentives to encourage the adoption of technologies.

Government responses

Governments are thinking hard about what is required to make the transition from a model of economic growth that has tended to forget about the environmental externalities (or leave them for another

are challenging. So we have a situation of having a smorgasbord of policy solutions but being unable to implement them. Our focus needs to move beyond providing more evidence about why these policy tools are desirable, to one that looks at the *context* within which they are deployed.

For many countries, emerging concepts such as 'green growth', 'green economy' and 'green industries' are starting to feature on the political agenda. Many of the policy solutions are not new, but are reframed in a political context where growth is maximised within the bounds of sustainable biophysical limits. The OECD's recently published Green Growth Strategy, *Towards Green Growth*, sets out a pathway forward for economies integrating economy and the environment (OECD, 2011). While stressing that there is no 'one size fits all' approach for implementing strategies for green growth, it argues that there are commonalities. Most importantly, flexible and dynamic economic policy lies at the heart of any strategy for green growth.

The policy framework advocated by the OECD highlights the importance of policy design, market instruments, regulations, consumer behaviour,

The New Zealand context

To illustrate my point, let's discuss New Zealand's resource management regime. New Zealand is lucky to be endowed with a plentiful supply of natural resources. Until relatively recently this abundance has made management simple – it is not difficult to allocate abundant resources. But times are changing. In the case of water, New Zealand has large stocks but not always in the right place at the right time or in the right amount. In some areas (Canterbury is not the only trouble spot) limits *are* being reached and exceeded. This is particularly evident where irrigation and run-off from farming is putting pressure on our freshwater resources.

Freshwater is not the only natural resource under pressure in New Zealand. We are also seeing increasing scarcity in our healthy and productive soils, air quality (in some locations), aquaculture space, land for houses, indigenous biodiversity, and so on.

Like the rest of the world, we face the 'limits' challenge of climate change. Rather than a limit driven by the scarcity of resources that are extracted from the earth, the concern is now another resource: the absorptive capacity of atmospheric sinks. I might add here that although pollutants played a minor role in the Club of Rome's *Limits to Growth*

report, their analysis shrewdly predicted the possibility of 'limits' imposed by climate change (Eastin et al., 2010).

Increased scarcity of resources in New Zealand is also influenced by us being an agriculturally-based exporting nation. The success of New Zealand's economy is heavily influenced by overseas demand for our products. So, despite the fact that New Zealand is relatively isolated from the main centres of global population and consumption, and has a relative abundance of natural resources, international forces will continue to influence demands on our natural resources. These demands are creating pressures to manage resources within limits.

This means some tough decisions need to be made about defining environmental limits and allocating those limits in a way that enables the economy and society to grow within or above those limits. Decisions on New Zealand's natural resources will be made more and more in a context that is shaped by increasing resource scarcity, increasing uncertainty (due to both human environmental change and human innovation) and accelerating socio-economic change. As a ministry charged with delivering robust environmental policy, the Ministry for the Environment must look to the future – 99 years out – with a view to facilitating inclusive and adaptive governance approaches.

This brings me back to the Club of Rome and their 1972 report. A common concern shared by this group of intellectuals, nearly 40 years ago, was that mankind faced a future predicament of grave complexity caused by a series of interrelated problems. Moreover, traditional institutions and policy would not be able to cope with this complexity, let alone come to grips with their full context.

New Zealand's institutional response

Increasing scarcity and complexity are going to require institutions that can cope with shocks and increasing conflicts and can adapt to changing conditions, and, where possible, transform crisis into opportunity. This begs the question as to whether New Zealand's policy and administrative regime is equipped to deal

with scarcity and change. In other words, can we effectively respond to what the future holds?

The short answer is no. We currently manage our resources within an administrative framework that is rigid; therefore, making responses to change is difficult. And this observation is not limited to the Resource Management Act (RMA), but applies to broader resource management legislation.

The RMA has typically used an administrative and adversarial system to allocate rights. There is flexibility under the RMA for alternative approaches to

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natural resource management, such as market allocation, but these have not been widely adopted by local authorities and have been resisted by communities. So, in other words, the alternative market-based options provided for by the RMA have to a large degree been difficult to implement because of the litigious nature of the receiving environment.

Coming back to the nature of the problem, we seem to be in a situation where tools that are permissible are not being used despite our current regime providing for their use. This is not helped by the adversarial nature of the RMA.

One way to view this is as institutional failure.

The ministry's thinking around collective institutions

In light of these issues, the Ministry for the Environment is thinking hard about institutions and how they can be better placed, or better designed, to internalise environmental pressures.

When I say institutions, I don't mean bricks and mortar. They are the frameworks which underpin human interactions and the way we live our lives.

They are perfectly analogous to the rules of the game in a competitive team sport (North, 1990). That is, they consist of formal written rules as well as unwritten codes of conduct that underlie and supplement formal rules. Our framework of analysis is to examine policy responses and mechanisms through an institutional lens, with a view to thinking about what 'game rules' and 'players' are best placed to deal with the tough decisions.

The Land and Water Forum is an institutional response, involving 'players' concerned with water management. Historically, debates about water

management have been polarised, with sector groups – both industry and environmental – taking extreme positions in the hope that this will move the balance their way. The collaborative Land and Water Forum process has been instrumental in creating for the first time a 'receiving' environment that is conducive to new policy solutions. That is, people have been prepared to listen to each other and work towards a common view. This offers the potential of a way forward.

The emissions trading scheme (ETS) is another institutional response which represents a market-based response that goes well beyond the RMA. Through pricing, the scheme incentivises reductions in greenhouse gas emissions. It also provides flexibility in how participants can comply, enabling them to choose the least-cost way to reduce their emissions.

Collective action

The collective governance of local resources by local people is an institutional response we are particularly interested in. In other words, the receiving environment is creating its own solutions. The ministry

has been studying the thinking of two Nobel Prize winners in economics, Vernon Smith and Elinor Ostrom, who have increased our understanding of collective institutions in managing natural resources.

The work of Vernon Smith has alerted us to the distinction between 'constructivist' management regimes and 'ecological rationality'. The former refers to the planned ways in which our resources are currently governed – through legislation, national policy statements, environmental standards, plans, etc. The latter focuses on the *emergent* arrangements that can arise from human behaviour, despite the lack of deliberate design. Emergent arrangements can be based on trial and error and survival, and

explore their viability and success in a New Zealand context.

We have found many cases throughout New Zealand where collective self-governing institutions have emerged to deal with specific resource management problems. These institutions are familiar to many of us: the Fiordland Marine Guardians, Te Korowai o te Tai o Marokura (Kaikoura Guardians), the Opuha irrigation scheme and the Whaingaroa Community Catchment Management Initiative are a few that we have been looking at.

The Lake Taupo Protection Project is an institution set up to deal with the protection of water quality in Lake Taupo. It received an \$81 million grant, of which central government has contributed

government) and developing multi-stakeholder action plans which focus on reducing nutrients in the lakes.

Key observations

What are we learning about these collective institutions? First, as we have seen in the Rotorua ('Te Arawa') Lakes Restoration Project and the Lake Taupo Restoration Project they tend to operate within reasonably prescribed limits, or in other words within formalised legal and administrative frameworks. In some instances (Opuha Water Partnership and the Fiordland Marine Guardians) they operate in accordance with their own individualised management regimes but within the bounds of formal administrative frameworks. In doing this, they have successfully managed some of the difficult trade-offs and limit-setting, along with simultaneously achieving conservation and economic growth objectives.

We are starting to gain a deeper understanding of the incentives and the socio-political contexts which underpin and drive these locally-based institutions. Social capital, strong leadership and resourcing are important factors. Many are vulnerable and face ongoing socio-political and cultural challenges. We are also starting to look at the issues associated with these self-governing institutions particularly in terms of their implications for our current policy regime. These include capture, Treaty issues, participatory instead of representative democracy, and resourcing and capability.

It is an open question as to how we can encourage this sort of institutional innovation here in New Zealand. Certainly, collective institutions are not a panacea for increasing resource scarcity. But they offer flexibility and a means of internalising decision making that may fit well with the pragmatic nature of New Zealand people and our willingness to adapt as circumstances change.

Conclusion

In conclusion, there are three things I would like to leave you with concerning the nature of the problem.

New Zealand, like the rest of the world, is facing increasing scarcity of

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have some attractive features: institutions which are adaptable, have the ability to accommodate trade-offs, and which rely on reciprocity and trust.

Ostrom's empirical research agenda grew out of a critique of emerging theory around collective action. Hardin's tragedy of the commons is probably the most familiar. Hardin delivered a pessimistic outlook for collective action, inferring that rational self-interested individuals will, by nature, pursue self-interest to their own and society's detriment. Ostrom has demonstrated, through a vast collection of empirical research, that many self-governing institutions have stood the test of time in providing flexible management of common pool resources. They also provide a successful means of limit-setting. These self-organised institutions can internalise decision making, therefore solving the political economy problems, such as making difficult trade-offs. The longstanding success of these collective institutions has led the ministry to

\$37 million. The Joint Committee and Protection Trust comprises a mix of government, iwi and community representatives tasked with reducing nitrogen from the Lake Taupo catchment by 20%. The farm-to-forestry deals aimed at reducing the amount of nitrogen in the lake have leveraged the ETS in providing incentives for landowners to improve their practice.

The Rotorua ('Te Arawa') Lakes Restoration Programme is another institution involving the clean-up of, in this case, the Rotorua lakes. A memorandum of understanding between the Crown and the Rotorua Lakes Strategy Group was signed to formally establish a working relationship between the parties involved. The first major project carried out under this programme was the Ohau diversion, a major engineering project to divert flows from Lake Rotorua via Lake Rotoiti into the Kaituna river. This collective institutional approach has proved successful in securing funding (\$144 million, half from central

natural resources; and looking ahead, our resource management regime will be subject to greater complexity and uncertainty.

Second, formal and administrative resource management institutions will

continue to struggle in this changing context. To be successful we will need new and flexible institutions to break out of today's constrained environment.

Thirdly, we need a long-term policy view – one that looks 99 years out – to

ensure that our institutions not only can solve the problems of today, but are resilient to deal with the unknown challenges ahead of us.

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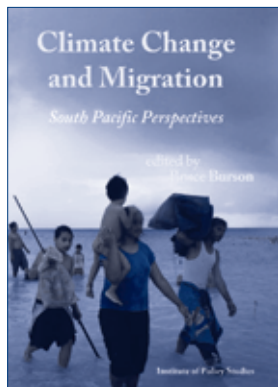
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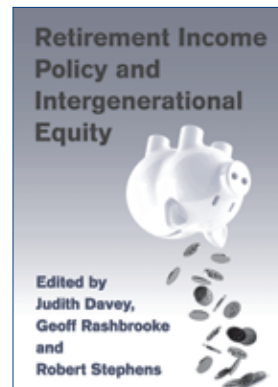
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Edited by
Bruce Burson

Many South Pacific island states are vulnerable to the impacts of climate change. Indeed, some are already experiencing population movement due to environmental events and processes likely to be exacerbated by future climate change. Yet others are at risk of disappearing altogether over the coming century and beyond. The potential for climate change to generate population movement over the coming decades, therefore, raises substantial domestic and international policy challenges. This edited volume is the result of a conference held in Wellington in July 2009 that examined these and related issues. Drawing on a range of perspectives, this volume identifies concepts, frameworks, and possible policy responses to deal effectively with what may become one of the greatest humanitarian challenges of the 21st century.

Bruce Burson is a human rights lawyer specialising in refugee and migration law and policy. He was the principal conference organiser on behalf of the Institute of Policy Studies.

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Retirement Income Policy and Intergenerational Equity

Edited by
Judith Davey,
Geoff Rashbrooke and
Robert Stephens

Population ageing is widely recognised as a major issue throughout the world. A crucial implication of ageing is its impact on retirement income policy. Having a reliable income in retirement or being able to look forward to a comfortable standard of living is important for everyone. It is not just a concern for older or even middle-aged people.

Retirement income policy raises questions of fairness and intergenerational equity. Whether a tax-funded pension system is sustainable depends on the balance between the number of recipients and the number of taxpayers who can contribute to it. If the financial support of pensioners is indeed a 'burden', then how could that fiscal burden be shared between current and future taxpayers, and pension recipients?

These and related issues are discussed in *Retirement Income Policy and Intergenerational Equity* in a series of papers from a wide range of perspectives. These papers were originally presented at a conference run by the Institute of Policy Studies, with the support of the Retirement Commissioner, in July 2010.

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