



**The political economy of structural reform in
natural resource use: observations from New
Zealand**

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Draft: Comments welcome. My background is environmental economics not structural reform so advice on the comparison would be appreciated.

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Jared Diamond's popular book 'Collapse' takes material from archaeological findings as well as more recent experiences with environmental challenge to suggest that humans face a significant challenge if we are to avoid a global crisis in resource availability and consequent social collapse. While many economists and even Diamond himself may be optimistic that humans have the inventiveness to avoid such a catastrophe, the way in which we are most likely to do that is through restructuring our institutions and our economies to identify and appropriately respond to resource challenges as they occur.

In this paper I outline and illustrate some ways in which the political economy of structural reform to address natural resource issues is similar to and different from non-environmental structural reforms. In particular I will contrast the two issues in the New Zealand context where non-environmental structural reform is well advanced while natural resource/environmental reform varies from well advanced to nascent.²

Why structural reform is needed

The gloomy 'predictions' of resource crisis by Meadows et al (1972) in the 'Limits to Growth' have not eventuated (yet) because of human, primarily economic responses that were automatically set in train by the incipient crises themselves. For example, we may argue that oil and mineral markets operate sufficiently well to provide advance warning of shortages and incentives to limit use and find alternatives before we actually run out.

Other resource issues are not as well integrated into our economies. For example fisheries are overexploited all over the world, rainforests are still being rapidly depleted (and not replaced by plantation forests) in many regions, groundwater stocks are falling in many places, over use of nutrients (e.g. from fertiliser) in developed countries are creating local and regional problems, air pollution causes sickness and premature death in most major cities, the climate is changing. Because these problems involve externalities, markets do not provide clear information on scarcity or incentives that could lead to solutions. In many instances, the natural resource is a 'commons' (e.g. fisheries or groundwater) or its protection can be thought of as a public good (e.g. stable climate, biodiversity). When these are significant resources, the failure of markets to adequately internalise the externalities involved make some form of government involvement critical. Despite a rich academic tradition and enormous amounts of regulation including some very successful mechanisms, we still have not implemented effective and efficient responses to most of these problems.

We... believe that if a profound correction is not made soon, a crash of some sort is certain. And it will occur within the lifetimes of many who are alive today. Meadows et al (2004)

The global intensification of agriculture, which is essential to feed the world's growing population, will require greater use of irrigation and greater application of fertilisers. This will not be sustainable unless water is used more efficiently and nutrients are managed to avoid deleterious effects on water quality. The institutions that aim to ensure this are mostly ineffective and inefficient.

² I use the terms 'natural resource' and 'environmental' as synonyms in this context for simplicity. I am concerned with externalities relating to natural processes that have significant economic impacts.

Global increases in income and population inevitably lead to greater energy demand. Currently the institutions for managing energy demand and supply do not fully account for the environmental impacts of those choices and unfettered growth will lead to continued inefficient use of energy, poor fuel/energy choice and acute impacts on local air quality and climate change.

These are not 'green' issues that can be dismissed as the concerns of rich westerners. They strike at fundamental sectors of our economies, including energy and agriculture. They could lead to economic collapse on a similar or greater scale than macroeconomic mismanagement in the Soviet Union or Argentina.

The basic theory and some working models for institutions to address all these problems exist. Strong property rights, technology standards, market based instruments (including eco-taxes, and tradeable permits), are all part of our tool kit. While more development and testing of these instruments is needed, in particular to apply them to specific circumstances, one of the critical challenges is the political economy that makes implementation extremely difficult even when the environment and economic gains are obvious.

Political considerations often block creation or implementation of obviously sensible policies. For example many fisheries within the European Union are under critical threat but ministers are unable to agree on the severe catch limitations required to protect them. In a quite different environment, it is clear that the rapid wholesale clearance of forests in South East Asia is not in the economic interests of the countries as a whole and certainly not in the interests of the local communities who previously benefited from the forest services. In this case policies and law often exist to regulate logging but they are frequently not implemented because of the strength of the business interests involved and the weakness of government institutions.

Where policies are implemented, the political economy often distorts the instrument so that it is not as effective or as efficient, or makes them so inequitable that those concerned about the distributional impacts deter future applications.

The European Union has recently created the emissions trading system to meet its Kyoto obligations. Overall this system has many good features. One peculiarity is that countries are required (not just allowed) to grandparent credits to firms despite the potentially huge rents associated with them and the clear economic gains from auctioning credits. In part because of this grandparenting rule and the implicit recognition of the large rents associated with that, the allocation mechanism is only set for 5-year periods. This avoids giving away too much wealth through rent creation and capture. This also however creates perverse incentives for strategic behaviour to affect the next allocation rule. Another policy response to these rents is that firms that exit and enter the industries affected face special rules that distort their incentives. The claim (though not expressed in these words) is that it is unfair for firms that close to continue to receive rents and that new entrants should receive the same rents as the existing firms. Political economy considerations can undermine extremely promising instruments. Not only is this immediately damaging but it also gives those instruments a bad name.

How are the challenges similar to those in non-environmental structural reforms?

As with macroeconomic reforms to address economies in financial crisis, these issues cannot be addressed through incremental strengthening of our existing regulations alone. Effective resolution requires that the economy and environment be closely integrated in all key decisions. This requires structural reform.

New Zealand: Similarities between economic and environmental reforms

New Zealand carried out wide ranging and drastic reforms between 1984 and 1995 (Evans et al, 1996). These reforms included significant changes in financial and goods markets (including massive reductions in agricultural subsidies), taxation, health, education, local government and labour markets, monetary reform, corporatisation and privatisation, and radical reformulation of public sector management.

Many separate issues were dealt with simultaneously to create a package of interrelated reforms. As would be expected with this scale of reforms, there were considerable 'losers' both within government and within the private sector. The recognition of these vested interests led the government to push the reforms through quickly, maintain momentum and create a feeling of inevitability. This also partly allowed losses to be offset with gains (e.g. loss of agricultural protection matched with reduced costs of imports because of tariff reductions, tax reductions and deregulation of transport).

...the comprehensive restructuring that simultaneously reduced protectionist policies throughout the economy was a key factor underlying the significant but incomplete NZ reforms. Scrimgeour et al (1996)

The speed and scope of change made it difficult for interest groups to mobilise. It made it harder for specific groups to argue that they should be exceptions to the general process of reform.

'It was felt that economic liberalization should be implemented as quickly as practicable, in order to reduce adjustment costs, prevent interest groups from regrouping and inhibiting change, and to give politicians less time to turn their backs on reform' Bollard (1992)³

Although some of the issues were quite different and involved different interest groups, they were treated in an intellectually cohesive way. Policies were developed jointly rather than in isolation. Many policies involved significant technical regulatory challenges. Key officials in the departments of Treasury and Commerce were knowledgeable about neoclassical economics and they brought in top international expertise to deal with specific issues.

³ As cited in Johnston and Frengley (1994)

The politicians... acted out of a conviction that their policies would solve the problems they saw in the New Zealand economy and its government, not because of a desire to see any theory implemented for its own sake. However, the body of advice that was developed by professional policy advisers in the government, especially those in the Treasury, was based on substantial elements of the literature on institutional economics and contemporary macro- and microeconomic theory. Expositions of the theoretical underpinnings with details of the relevant literature can be found in other sources including the briefing papers prepared by the New Zealand Treasury (1987)... Scott et al (1997)

Effective natural resource and environmental reforms would similarly affect a wide range of sectors and actors. If they could be implemented jointly, the gains would be greater, perverse side effects could be avoided and the overall negative effects on specific individuals would likely be ameliorated. For example in the realm of climate policy, farmers could face charges for their agricultural emissions (e.g. methane from animals) but also credit for the carbon sequestration benefits from plantation forest blocks and regenerating natural forest. If a carbon tax (or auctioned permit system) were also applied to fossil fuel emissions, farmers would also benefit from the resultant tax cuts when the additional revenue was recycled. Policies to reduce nitrous oxide emissions (a greenhouse gas) would be complementary with those to reduce nitrate flows into waterways. A positive momentum, similar to that in the non-environmental reforms, could be created in environmental reform.

Environmental reforms have a solid consistent intellectual foundation available in environmental economics. As with the earlier reforms there is no one magic solution to a set of heterogeneous problems. However similar principles apply to all the problems (all arise from externalities) and the same set of tools can be applied in a variety of situations though with different degrees of reliance on each and different specific characteristics. Again this is similar to the earlier reforms.

Special/Unique challenges (opportunities?)

Strong similarities between the earlier reforms and the environmental reforms we need suggest that New Zealand could potentially implement these in a coherent and comprehensive way, repeating the success of our earlier experience. Environmental reforms would however differ in four critical ways that may make this much more challenging. First, environmental crises are often invisible to the layperson until it is too late. Second, the regulatory environment for implementing environmental reform is much weaker than it was for the previous reforms both because environmental issues are different and also because they would occur at a different point in New Zealand's history. Third, environmental problems and their solutions intrinsically involve natural sciences in a way that previous reforms did not. Thus the solutions require excellent communication between policy makers, economists and scientists. Fourth, to a large extent the previous reforms reduced the 'rents' generated by distortionary policies. In contrast, environmental regulation often creates significant rents. I now discuss each of these issues with a specific example from New Zealand.

1 Crises not visible

The earlier New Zealand reforms were triggered by an economy-wide, well recognised crisis.

The deregulation decision was triggered by difficulties in refinancing increasing levels of public debt. Total public debt had skyrocketed from levels of 10% or less of GDP in the early 1970s to over 50% of GDP just a decade later Johnston and Frengley (1994)

In contrast, many environmental problems accumulate gradually and by the time the crisis is visible, resolving them is extremely difficult or even impossible. Climate change is a classic example of this because of the long residence time of greenhouse gases in the atmosphere. The resources may be depletable (groundwater that can suffer salt water intrusion) or the effects of the damage may be irreversible or extremely costly to reverse (PCBs in the sediments in waterways; nuclear waste). Even where the resource is not truly depletable (e.g. it can renew itself over a long time period) the recovery may be very slow if the level of depletion is high (e.g. overexploited fisheries).

Even those problems that do not accumulate often have invisible effects that can only be recognised by experts through complex science. Thus the crisis may not be easily recognised by the general public. Carcinogenic chemicals are a classic case of this where it is difficult to connect higher rates of cancer to exposure to chemicals through epidemiology and make this convincing to the public until many people have died.

Example: Water quality in Lake Taupo

Lake Taupo is an 'iconic' lake in the centre of the North Island. It has a generally high level of water quality. Recently, worryingly high nutrient levels are being recorded in the lake and there are concerns that hazardous algal blooms could become frequent and that the clarity of the lake might be diminished. This would be damaging to New Zealand's 'clean, green' image that is used in exporting many products as well as damaging tourism and reducing the many benefits that New Zealanders gain from use of the lake.

The lake has been the object of concern since the 1970s when an extensive system of riparian boundaries (planting along waterways) was created. This reduced the problem of nutrient flows in surface water significantly but new problems are now arising. The problem arises because of the unusual hydrology of the catchment. The porous volcanic soils mean that most nutrients seep gradually into groundwater, which moves slowly toward the lake.

It will take on average 45 years for stream inflow concentrations to reflect land use change in the catchment and around 15 years for levels of nutrients and phytoplankton in the lake to approach equilibrium with streamflow nutrient concentrations. The report further surmised that the present-day lake water quality has equilibrated with land use of the 1940s Bennett et al (2006) reporting work by David Hamilton (University of Waikato)

By the time the crisis of hazardous algal blooms are visible to the public (and hence the politicians) we will have reached a point where it may take years to see any improvement in lake quality because even if new nutrient flows are reduced the legacy of more than 50 years of heavy fertiliser applications will still be feeding through. It is hard to gain support for potentially expensive policies that will not lead to gains in the foreseeable future. If the problem had been recognised and addressed early it might have been low cost to address. Some agricultural land in the catchment is marginal and could have been withdrawn from use or never developed. Fertiliser use is well recognised to have been excessive especially during the period of strongly subsidised agriculture.

2 Weaker implementation environment

New Zealand's earlier reforms were carried out in an unusual constitutional environment and with the help of many good minds within and outside New Zealand.

The early pace of the reforms reflects in good part the deep-seated nature of the initial crisis, widespread recognition, particularly in the business community, of the need for change, strong intellectual and administrative support from key public sector advisers and New Zealand's constitutional arrangements. In New Zealand a governing party with a clear parliamentary majority can legislate its program with few constitutional impediments. The major nonconstitutional constraints on the executive are internal party unity, electoral support, and the disciplines imposed by external financial flows. Evans et al (1996)

Part of the earlier reforms (and simultaneously a reaction to them) was a political reform that moved New Zealand to a 'Mixed Member Proportional' electoral system, which has since led to many coalition governments. While the debate rages about the merits of this change, it is clear that it is much harder for central government to carry out significant reforms rapidly.

In addition, as in most countries the ministries responsible for natural resource and environmental policy and management tend to be weaker than departments such as Treasury or Commerce (Ministry of Economic Development); they have less resources, less ability to attract the most talented staff, and intrinsically weaker roles in the policy development process. They tend to be represented at Cabinet level by more junior politicians.

New Zealand managed to implement a consistent and sophisticated system for fisheries management during the last period of reforms (discussed below). It is proving much more difficult to implement coherent domestic climate policy even though from an intellectual point of view the appropriate regulatory structures are much simpler than in fisheries.

Environmental problems, and the appropriate solutions to them, tend to vary spatially (Oates, 1998). Global issues such as climate change, ozone depletion, and biodiversity protection (part local), which are appropriately dealt with at central government level, are the exception rather than the rule.

Example: New Zealand Resource Management Act 1991

The Resource Management Act (RMA) gave regional and local authorities responsibility for all regional and local environmental issues. While local decision making has advantages in terms of local accountability and appropriate political incentives as well as allowing spatially heterogeneous issues to be dealt with in an appropriately heterogeneous way, it also makes policy design and implementation problematic (Kerr et al 1998).

Most environmental reforms in New Zealand would need to be enacted and implemented through 16 regional councils and 74 territorial local authorities.⁴ Not only does this involve duplication in policy design and coordination but the level of expertise in councils varies dramatically. The central government can play a role by setting standards for pollution concentrations and providing advice on regulatory structures but at least in New Zealand does not decide the details of policies that have only local impact.

Regional Councils generally do not have a strong electoral mandate. Voter turnout in local elections is low relative to national elections. Balancing this, through the RMA

⁴ The 16 regional councils include 4 that are 'unitary' authorities, i.e. combining local and regional.

councils are required to consult heavily. This should in theory improve the quality of the regulations but it also makes it difficult to implement them.

Regional councils and local authorities also have no power to raise taxes except through property taxes so some environmental taxes (other than charges for services such as waste disposal or water usage) are barred from use. Because of restrictions in the RMA it is also difficult for them to create efficient tradeable permit systems. And, they do not have the power to change this legislation – that must be done at central government level. Finally, while some regional councils are well resourced because of the sheer size and high income levels in the tax base on which they draw, others are severely strapped for resources. Some of these problems can be overcome with cooperation among councils or central government support but others are fundamental to the nature of the regions and environmental challenges and will be difficult to resolve.

3 *Involvement of natural science*

Many environmental issues can be resolved only with the intimate involvement of natural scientists. The science is often complex and frequently highly uncertain. It cannot be fully understood by the layperson so requires a level of trust in the science providers. Lacking direct scientific understanding, outsiders must rely on the quality of science processes to ensure that the advice given is objective and of high quality. The quality of the processes is a function of the funding and governance structures of research institutions and of the peer review processes. For example, providing a strong system to synthesise international scientific information on climate change has been a challenge. While the IPCC, which does this, has many strengths, it has still been challenged and its stature weakened by actors with strong agendas.

In New Zealand nearly all fundamental scientific research relevant to environmental policy is provided through Crown Research Institutes. The quality seems high (I'm an economist so not really fit to judge) and collaboration among scientists is generally good. The synthesis of different scientific perspectives on policy issues is not as strong as it might be however. Institutes compete for funding which creates difficult tensions. The level of uncertainty is inevitably high on many issues given the ratio of scientists to issues in such a small country.

Even trusted, high quality science is not always sufficient as policy design often requires that the science be actively integrated with economics (and other disciplines). This requires economists who can communicate well with scientists and vice versa. In New Zealand, scientists are regularly engaged with policy makers so are better at this communication than their more academic peers overseas but it is still an issue.

With issues where it is impossible to 'prove' the science (i.e. almost everything), because it is usually possible to find scientists with differing opinions scientific input can be manipulated by special interests even where there is broad consensus among scientists.

The problem of reliance on highly technical input occurs in traditional structural reform also, for example designing a regulatory framework for deregulated electricity or telecommunications is an extremely complex economic challenge. They are however economic problems so require communication and judgement on technical

issues among economists rather than across disciplines. Economists are more likely to be able to judge the quality of advice from others within a different branch of their own field. Politicians and policy makers need to communicate with one academic discipline rather than many.

Scientific input is a problem not only in the initial design but a recurring issue. Because environmental and natural resource issues generally involve significant public goods and externalities they cannot be efficiently fully privatised. Even if water-use rights are fully privatised, the non-use public good values of water (e.g. stream flows for maintaining biodiversity) cannot be privatised. In addition, the private users do not have efficient incentives to respond to new information on the availability of water or patterns of ground-water flow within a catchment.

Environmental standards and the emissions controls and charges that implement them must be regularly revisited in light of changing public preferences, new scientific knowledge and changing environmental conditions. Because public preferences cannot be directly measured and aggregated (despite the valiant attempts in the valuation literature) and because of scientific uncertainty, these adjustments are not purely technical. They must involve political processes. This opens up possibilities for recurrent political intervention and strategic behaviour that must be carefully managed.

Example: New Zealand Fisheries Management⁵

The New Zealand Individual Transferable Quota (ITQ) system was introduced in 1986, in the middle of the broad economic reforms in New Zealand. In brief, the system puts a cap on harvest levels of each fish stock (now over 500) to try to ensure sustainability. The rights to shares of the year's harvest are held privately as quota. The quota can be leased or sold freely. All commercial catch must be matched by quota holdings or a deemed value (fine) is paid. Since the system was introduced in 1986 and the initial quota allocations were made the system has been subject to much fine-tuning but only one major structural change (a move to defining quota as shares of the cap rather than tonnes). The system is generally regarded as successful in improving the economic value of the fisheries. Newell et al (2005) show that profitability has risen strongly and particularly strongly for stocks that were initially overfished. Industry is generally supportive of the system and for most stocks compliance is good.

The harvest caps are revisited each year to respond to new scientific information. Levies on quota are used to fund research to support the process of review. The industry has a high degree of control over the topics for which the funding is used. The justification for this is that they are most affected by changes in cap and that they have a vested interest in the sustainability of the stocks. Most research is conducted by NIWA, a Crown Research Institute with a strong reputation.

The process of cap review has not been without problems however. At least two orange roughy stocks have collapsed – those fisheries are now closed. New scientific

⁵ This section draws on work with James Sanchirico and Richard Newell and particularly on Kerr et al (2004) and Newell et al (2005).

information on the age structure of the population (especially their age of breeding) was responded to too late. Hoki, another key commercial species, is now certified as sustainable by the Marine Stewardship Council. The certification is, however, strongly contested by environmental groups on scientific grounds.

The core of the problem is that sustaining a fish stock is not always economically optimal. Orange roughy is a slow breeding stock that can only support low catch rates. However catching fish offshore is capital intensive and it is more efficient to catch large amounts at once even if this means that the stock later collapses. When the stock collapses the capital can be moved to a different stock. Thus the interests of the industry are not always aligned with the intent of the legislation.

This problem combines with scientific complexity and uncertainty. New Zealand now regulates more than 500 stocks through the ITQ system. In contrast, the research budget to collect and analyse data on these stocks is tiny. NIWA has only one research boat for New Zealand's enormous exclusive economic zone. Only 5 major commercial species have anything approaching a real stock assessment. Industry can be argued to exploit this uncertainty.

Because of the extreme uncertainty about most if not all stocks, decisions about setting caps are largely negotiated. The structure of those negotiations and the roles of science and scientists are important. Industry challenges the NIWA scientists and any environmental representatives. It employs its own scientists. Their control over research budgets, combined with the financial resources available to their negotiators because of the economic values at stake, gives them a strong negotiating position. Thus the science issues can undermine the ultimate value of otherwise strong regulation.

4 Rent creation

New Zealand's previous reforms mostly involved removing rents (import substitution, credit controls...excessive employment within government agencies) rather than creating them. Major redistributive effects were a function of structural adjustment costs (e.g. farmers who went bankrupt), tax changes (benefits spread) and social welfare cuts.

In contrast, structural reform of natural resource issues often creates huge scarcity rents. The reforms are implicitly or explicitly creating property rights where none existed before. These rents are often quite hard to observe, particularly to non-economists.

Traditional 'command and control' regulation, which directly regulates pollution/resource use levels or technology use, imposes costs. Similarly any price-based regulation (e.g. taxes or permits) that reduces pollution or constrains natural resource use will impose costs. Firms will pass some of these costs on to consumers, workers etc. in the same way as the incidence of taxation. In fact, if the regulation is efficient, other than lump sum transfers, the distribution of costs will be identical across instruments.

The rents are unavoidable – how they are allocated does vary by instrument and with the specific design of instruments. Tradeable permit systems create valuable new

property rights. These values are captured by industry when permits are grandparented – given away – or government if they are auctioned – this is rare. Environmental taxes give the rents to government. Ecosystem service payments give them to landowners.

The rent creation has potential political economy advantages because they can create a focused interest in structural reform in the business sector. They can be used to ‘buy off’ politically powerful interests. This was important in the US Acid Rain programme (Stavins, 1998; Joskow and Schmalensee, 1998), even though the regulated nature of the industry meant the rents were minimised, as well as in the New Zealand fisheries. Large rent creation can ease structural reform.

In some cases business can promote the environmental reforms. While they of course claim that they are doing this for altruistic reasons, their active participation can affect the rent allocation. An example of this was the UK greenhouse gas emissions trading system (preceding the EU system), which involved an auction where firms put in tenders to reduce (relative to an unclear baseline) their emissions. Not only were firms paid to reduce rather than paying to emit, but the prices paid were high relative to prices in similar markets.

Large rents, however, can also lead to prolonged fights over allocation that delay implementation and bias the architecture of the system. A non-environmental example of this was the long process to allocate the telecommunications spectrum in the United States, which ended with a very complex auction with revenues going to government. Industry ultimately supported this because they were unable to solve the allocation problem and until they could the resource was seriously underutilised. The economic costs of underutilisation were judged more important than the rents. (Ref – Cramton?)

The large rents, and their distribution can have large equity implications. These are directly concerning. Boyer and Laffont (1999) argue that constitutional constraints on instrument choice might sometimes be optimal to avoid excessive political discretion over their allocation.

Equity concerns can also create a backlash against the use of instruments. Concerns about the equity of ITQ systems in fisheries, where rents are generally allocated to a subset of the fishing community, have blocked use of ITQs for many years. The US has had a ban on the implementation of new ITQ programmes until very recently.

Example: Climate change policy – agricultural emissions charge.

Agricultural emissions related to land use make up over 60% of New Zealand’s gross greenhouse gas emissions. Thus although the options for mitigating gases are fairly limited because of technological constraints, even small reductions could be significant for our contribution to climate mitigation. The emissions come from a large number of relatively small farms, each of which has unique characteristics. Thus a price-based instrument would be an obvious choice to induce reductions. The New Zealand government tried to introduce a small agricultural emissions research levy based on numbers of animals slaughtered in 2003 but was forced to back down because of rural backlash.

Sin et al (2005) show why. Because New Zealand farmers are small players in an international market the demand they face is elastic. This means they are unable to pass any charge on to consumers. Combined with this, emissions levels are high so the impacts of full charging would be large. The direct impact of a NZ\$50 charge would be about \$50 thousand per year for the average dairy farm, or nearly 40% of recent profits. The impact on sheep/beef farming would be similar.

In contrast, the emissions reductions that are likely to be achieved with a \$50 charge are on the order of only 6% relative to business as usual (Hendy et al (2006)). Thus we would achieve small efficiency/environmental gains at the cost of very large income and wealth transfers.

The obvious solution to this problem would be to use a tradeable permit approach and grandparent permits to farmers to offset their large losses. The difficulty is identifying an appropriate and acceptable grandparenting rule. New Zealand farming is very sophisticated and flexible and animal numbers and hence measured emissions move significantly from year to year for any one farm. We can predict that any proposed rule will be highly contentious because of the scale of rents involved.

Future directions...what can environmental reformers learn from previous structural reforms?

Can New Zealand repeat its earlier reform experience and achieve radical structural adjustment rapidly across a range of related issues? If so, can we avoid some of the costs of the previous experience? Are the potential gains big enough to find ways to compensate losers? Do we need to present the reforms in an integrated way?

Excellent economists have produced a wealth of material on how to effectively and efficiently regulate natural resource use and environmental externalities. Policy progress in most countries however is very slow. If economists do not engage fully in this challenge, scientists will invent solutions for themselves.

The scientists who see these issues approaching crisis point are impatient with the existing process. The 'field' of ecological economics responds exactly to this need. Its practitioners now have significant influence among natural scientists and in political processes despite the many concerns about methodological rigour expressed by other economists. Their influence arises because they communicate well with the natural scientists. Their prescriptions may lead us down bad paths.

One of the major instruments ecological economists promote (and others less so) is 'ecosystem service payments'. As currently implemented these are relatively ineffective – because they involve voluntary take up and hence selection; are expensive to government – because all rents go to the landowners; and involve complex contracts where policy makers try to minimise these problems. This complexity in turn inevitably means that the landowners who benefit tend to be more sophisticated and wealthier. This is unfair.

We need to find ways to turn our knowledge into effective practical policies that can be implemented in all aspects of resource use. Can we learn from other structural reforms that have achieved this in other fields – I hope so.

References

- Bennett, Tim, Suzi Kerr and Anja Feise-Preston (2006) "Setting a Long Term Architecture for a Nutrient Management Regime in the Lake Taupo Catchment: Lake Taupo Water Quality Protection Programme" Draft paper, Ministry for the Environment.
- Bollard, A. *New Zealand: Economic Reforms, 1984-1991*. San Francisco: International Center for Economic Research, 1992
- Boyer, Marcel; Jean-Jacques Laffont. Toward a Political Theory of the Emergence of Environmental Incentive Regulation *The RAND Journal of Economics*, Vol. 30, No. 1. (Spring, 1999), pp. 137-157.
- Diamond, Jared. *Collapse* Penguin, London (2005)
- Evans, Lewis; Arthur Grimes; Bryce Wilkinson; David Teece. Economic Reform in New Zealand 1984-95: The Pursuit of Efficiency *Journal of Economic Literature*, Vol. 34, No. 4. (Dec., 1996), pp. 1856-1902.
- Hendy, Joanna, Suzi Kerr and Troy Baisden (2006) 'Simulating Greenhouse Gas mitigation policies using the Land Use in Rural New Zealand-climate (LURNZ-climate) model' Draft Motu working paper.
- Johnston, Warren E., Gerald A. G. Frengley. Economic Adjustments and Changes in Financial Viability of the Farming Sector: The New Zealand Experience *American Journal of Agricultural Economics*, Vol. 76, No. 5, Proceedings Issue. (Dec., 1994), pp. 1034-1040.
- Joskow, Paul L., Richard Schmalensee. The Political Economy of Market-Based Environmental Policy: The U. S. Acid Rain Program *Journal of Law and Economics*, Vol. 41, No. 1. (Apr., 1998), pp. 37-83.
- Kerr, Suzi, Megan Claridge and Dominic Milicich "Devolution and the New Zealand Resource Management Act" NZ Treasury Working Paper 98/7 <http://www.treasury.govt.nz/workingpapers>
- Kerr, Suzi, Richard G. Newell, and James N. Sanchirico (2004) "Evaluating the New Zealand Individual Transferable Quota Market for Fisheries Management" in *Tradeable Permits: policy evaluation, design and reform* ed. OECD, Paris. Paper prepared for OECD workshop *Ex post evaluation of tradable permit regimes*, Paris, January 2003; Motu Working paper 03-02
- Meadows, Donella H., Dennis L. Meadows, Jørgen Randers, and William W. Behrens III. (1972). *The Limits to Growth*. New York: University Books.
- Meadows, Donella, Jørgen Randers, and Dennis Meadows (2004) *Limits to Growth: The 30-Year Update*, Chelsea Green Publishing Company
- Newell, Richard G., James N. Sanchirico, and Suzi Kerr (2005) "Fishing Quota Markets" *Journal of Environmental Economics and Management* Vol. 49 pp. 437-462
- Oates, Wallace (1998) "Thinking about Environmental Federalism" *Resources*, Issue 130 Winter
- Scott, Graham; Ian Ball; Tony Dale New Zealand's Public Sector Management Reform: Implications for the United States *Journal of Policy Analysis and Management*, Vol. 16, No. 3, *Special Issue: The New Public Management in New Zealand and beyond*. (Summer, 1997), pp. 357-381.
- Scrimgeour, F. G., E. C. Pasour, Jr. A Public Choice Perspective on Agricultural Policy Reform: Implications of the New Zealand Experience Source *American Journal of Agricultural Economics*, Vol. 78, No. 2. (May, 1996), pp. 257-267.
- Sin, Isabelle, Emma Brunton, Joanna Hendy and Suzi Kerr (2005) "The likely regional impacts of an agricultural emissions policy in New Zealand: preliminary analysis" Motu Working Paper 05-08
- Stavins, Robert N. What Can We Learn from the Grand Policy Experiment? Lessons from SO₂ Allowance Trading *The Journal of Economic Perspectives*, Vol. 12, No. 3. (Summer, 1998), pp. 69-88.