





## About NZIER

Established in 1958, the NZ Institute of Economic Research Inc (NZIER) is a non-profit incorporated society based in Wellington. Our aim is to be the premier centre of applied economic research in New Zealand.

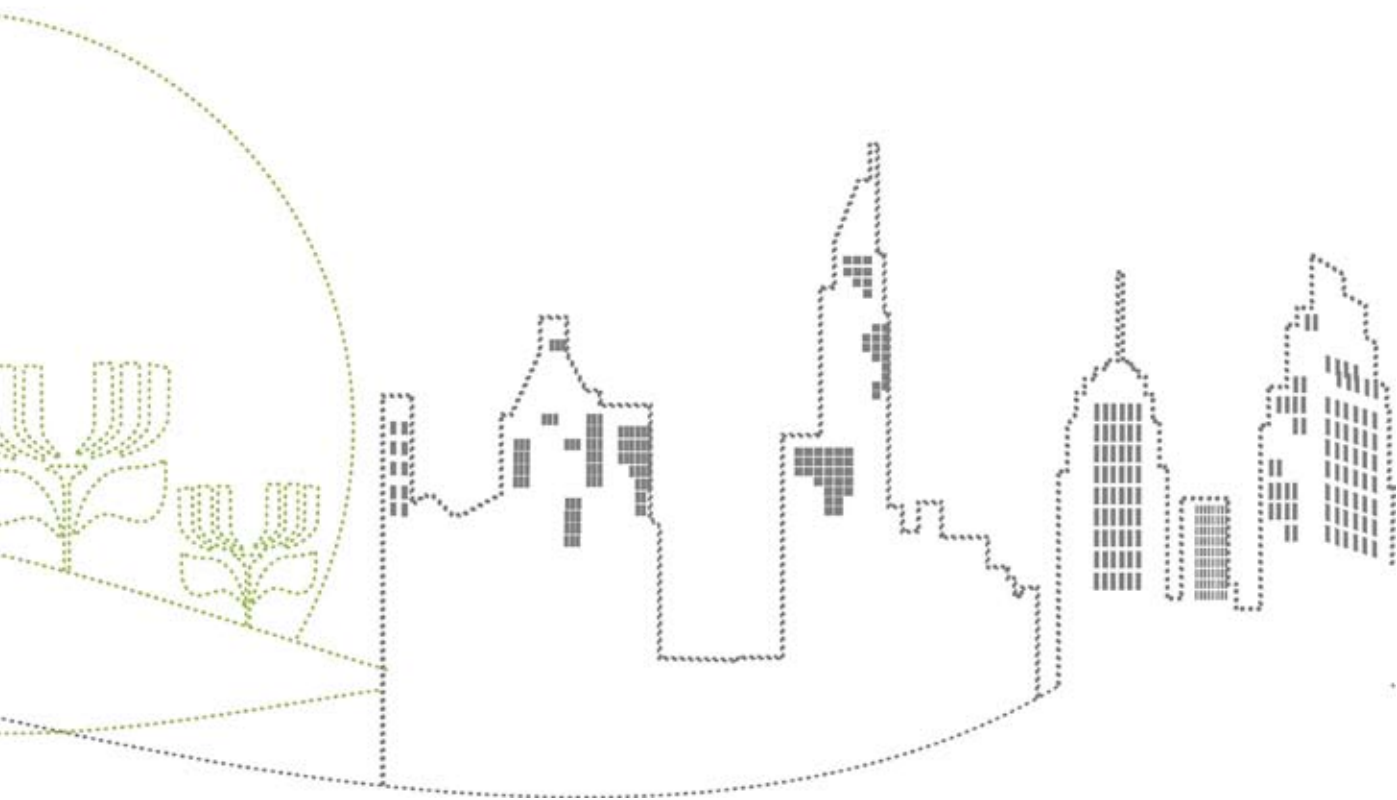
We pride ourselves on our independence and reputation for delivering quality analysis in the right form, and at the right time, for our clients. NZIER is also known for its long-established Quarterly Survey of Business Opinion and Quarterly Predictions.

Each year NZIER devotes some of its resources to undertake and make freely available economic research and thinking, aimed at promoting a better understanding of New Zealand's important economic challenges.

The preparation of this paper was funded from those resources.

## Authorship

This report has been prepared at NZIER by Peter Clough and reviewed by Jean-Pierre de Raad. Suggestions from John Ballingall, Alison Dalziel and John Stephenson and the assistance of Sarah Spring and Jessica Matthewson are gratefully acknowledged.



## Contents

Key points	4
Testing priorities for sustainability	6
Current environmental policy priorities	10
Reprioritising for sustainability	16
The outlook for sustainable development	18
Implications	20
Appendix A - References	22
Appendix B - A brief history	24

© NZ Institute of Economic Research (Inc) 2009

ISSN 1170-2583

Images purchased from Dreamstime.com | © Didou | © Paolosordi



## Key points

Sustainable development remains high on the international agenda, even as policy makers are distracted by the political and fiscal fall-out of the global financial crisis. Its continued prominence is illustrated by various countries' use of fiscal stimulus to fast-track the "greening" of the economy.

For New Zealand, getting its sustainability policy right is important not just because of reputation risks to its trade, but because any regulation should be cost-effective and efficient. This is particularly so in light of New Zealand's poor economic growth performance, and the need, now more than ever, to ensure value for money from any government expenditure and to avoid undue impositions on private initiatives.

Given this context, this paper considers New Zealand's current sustainable development policy in light of international approaches to sustainability which focus on maintaining stocks of natural, physical, institutional and human capital. It examines environmental priorities against the following criteria:

- scale of the value at risk
- immediacy of threat
- coverage
- uniqueness
- controllability.

We find that New Zealand's environmental priorities are not well targeted at sustaining critical stocks or on effects that New Zealand policy can realistically expect to control. Their net benefit to New Zealanders is therefore open to question. This suggests a change in focus could both improve environmental and economic outcomes for the country at large.

Of the current environmental priorities, work on urban air quality and protecting biodiversity and ecosystems would be the highest priority. This is because of the high loss of life quality and premature death from the former and the high proportion of species at risk that are unique to New Zealand.

Meeting international climate change obligations and maintaining momentum to achieve an effective international agreement also deserves a high ranking. But actually reducing greenhouse gas emissions is a low priority for New Zealand.

Water demand management and water allocation rank high because of their potential to affect availability and cost of water for production and consumption processes.

Lowest priority, apart from greenhouse gas emissions reduction, goes to waste reduction and waste management business support. This is largely because the stocks which they are addressing – landfill space and the employment pool – have high substitutability and limited externalities.

A more comprehensive review of environmental issues using the above criteria may well highlight other areas that could change the agenda and the rankings on the current list.

Using the criteria, we question the prominence of some sustainability policies of recent years. Overall, we suggest the need for some rebalancing of climate change policy away from a focus on emissions reduction towards adaptation to changes, a redirection in conservation policy, and a refocus of waste minimisation initiatives to those that can be demonstrated to produce net benefits.

The broad prioritisation of the sustainable development policy programmes is only a first step to a more efficient policy mix. Indeed, it is one thing to identify that policy should be delivering more in one area and less in another, but the real economic question is how much to deliver across the different areas. Each specific proposal would need to pass a cost benefit test as part of a regulatory impact analysis. Full quantification is a difficult and costly task (and it is not always warranted). In this paper we propose some actions that would support cost benefit assessments.

Another challenge for better allocation of resources to environmental objectives is to establish a consistent approach to identify the marginal values of environmental changes. At present, decisions on environmental changes are being determined in local government or judicial settings, and the weight given to economic evidence is variable. There is thus a high likelihood of inconsistency and inefficiencies in decisions across the country.

Commissioning non-market valuation studies of the sort currently carried out is unlikely to be a cost-effective solution to this issue. But determining environmental stocks and how changes in them affect local demands, supply scarcities and opportunities for substitution, provides a relatively tractable way to reduce that variability and achieve greater efficiency in resource use across the country at large.

# Testing priorities for sustainability

As the world economy stumbled into what may be the deepest recession of the past 70 years, sustainable development has remained high on the international agenda. Some countries have taken the opportunity to fast-track the “greening” of the economy by targeting fiscal stimulus to renewable energy and energy efficiency.<sup>1</sup>

It is important to get such sustainability policies right. Sustainable development requires economic, social and environmental sustainability. In New Zealand, the approach to pursuing environmental objectives is dominated by regulation and standards that place limits or constraints on economic activity. It is important that both new and existing regulations are designed and operated to be cost-effective and efficient.

Efficient regulation is crucial in light of the long-standing concern about New Zealand’s poor economic growth performance. And with a serious budget deficit to contend with, the government could not be more clear that it expects agencies to get better results within current resources.

Given this context, this paper considers how we could go about the task of assessing whether we have the policy priorities right for sustainable development.

## What is sustainable development?

Ever since the World Commission on Environment and Development in 1987 defined sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”, there has been disagreement about what it might mean in practice. Some saw it as a new paradigm for displacing GDP from its position as an indicator of progress, some saw it as an empty label of no real substance, while others saw it as not being much different from the conventional economic idea of maximising welfare over time.

Encompassing the twin notions of social development within environmental limits, sustainable development was picked up by politicians, international conferences and multi-lateral agencies. Appendix B provides a more detailed overview of the evolution of sustainable development and the important conceptual issues that shape the policy debate. That debate is far from settled, and as recently as September 2009 the French Commission on Measurement of Economic Performance and Social Progress issued a major report recommending supplementing GDP with alternative statistics on income, consumption, accumulated wealth and distribution to provide a richer picture of sustainable well-being (Stiglitz et al 2009).

The search for a way to implement the idea of sustainable development converged on the idea of sustaining the capacity of various capital stocks available to a country or community – natural capital, physical capital (such

---

<sup>1</sup> The US administration announced \$US100 billion available for energy efficiency and renewable developments. In the UK a paper co-authored by Sir Nicholas Stern outlines criteria with which to assess the potential of public spending proposals to both stimulate the economy and ameliorate risk of environmental damage (Bowen et al 2009).

as infrastructure and machinery), human capital (health and education), and institutional capital.

This stock approach lends itself to applying familiar ideas about depreciation and capital renewal and transformation to matters of sustainability. For example, it suggests that depletion of natural capital could be acceptable if it is transformed into physical or human capital that more than maintains the future wealth capabilities of the community. But the approach also recognises that if natural capital depletion is practically irreversible in meaningful human timeframes, or if that capital produces valuable services that are without substitutes or prohibitively costly to replicate, it becomes more valuable to protect it in its natural state to sustain the benefits it provides for future generations.

The natural environment lends itself more readily to such a capital stock approach than social and cultural aspects of sustainable development, which are more difficult to measure and more dependent on political value judgements about income distribution or access to resources. Natural stocks can be measured, substitutability of services defined, and the irreversibility of changes assessed, so that sustaining the stock value can be made a cornerstone of policy prioritisation.

## Sustainable development in practice

New Zealand was early to get sustainability onto its statute books. Sustainable management of natural and physical resources was included in the purpose of the Resource Management Act 1991. But sustainable management is not sustainable development. It was not until 2003 that New Zealand formalised its Sustainable Development Programme of Action. In this respect New Zealand was one of the late adopters among OECD countries, well behind countries such as Australia, the Netherlands, Sweden or the United Kingdom (see Appendix B).

All countries have faced the problem of inculcating and co-ordinating sustainable development across agencies, and in developing indicators to track progress. New Zealand's response was distinctive in being more process than outcome oriented, and less inclined than other countries to embed sustainable development in legislation and focus overall implementation leadership in effective central agencies.

As a result, some programmes introduced under the guise of sustainable development had questionable effectiveness. The new government elected in 2008 wasted no time in scrapping some (carbon neutral public service), suspending others pending review (the emissions trading scheme, air quality and water quality standards) or creating new processes to revitalise policy development (freshwater).

Vague and sometimes misleading views of sustainability are also behind notions such as food miles, water footprints and livestock's long shadow which could produce consumer backlash against New Zealand produce in significant markets. Thus, there is benefit in demonstrating progress towards sustainability, but it is important to shine the spotlight on our policy mix to ensure the policy programme priorities make both economic and environmental sense.

## Refocusing on the environment

Although there is more to sustainable development than environmental protection, changes in the state of the environment are relatively visible and attract much attention from those concerned with sustainability. One of the central planks of sustainable development is to set environmental policies that are demonstrably effective in addressing an environmental problem, as well as being efficient and not unduly costly.

An archetypal environmental issue is that of species preservation, or rather reducing the risk of species extinction – an irreversible change in the environment. This issue exhibits characteristics that point to policy intervention – irreversibility, incomplete markets, uncertainty and non-articulated values.

In a much-quoted paper, Harvard economist Martin Weitzman (1998) likens biodiversity protection to Noah's problem in filling the Ark. Given limited resources (vessel capacity), which species should be brought on board to ensure the widest possible range of species survive to repopulate the earth? Like libraries which contain distinct but overlapping collections of books, species contain overlapping pools of genetic information, so the preservation task is to protect the widest genetic distinction but also have sufficient of the common genetic stock to lower the probability of information being lost entirely if one or more species should fail to survive.

Allocating effort to ensure survival puts a focus on species characteristics such as their "genetic distance" from other species, extinction probabilities and the threats they face. A species that combines a high probability of extinction with absence of any close relatives would warrant extra conservation effort to ensure its survival. Conversely it would be more cost effective putting effort into making a relatively safe species safer, rather than protecting closely-related but more threatened species, as this increases security of their common genetic base.

These results are contrary to the conventional approach in conservation policy, in which attention has often focused on rarity or identification of new species, with the effect of spreading efforts more thinly across protected species, reducing security for all. Scientific arguments for directing efforts in conservation now give more weight to genetic distance, but decisions are still moderated through a public policy process, in which public preferences for certain species may be more influential over politicians than the technocratic advice of scientists and economists.



## Criteria for assessing priorities

The considerations in species preservation have lessons that can also be applied to other environmental stocks under threat. In economic terms, genetic distinction is about the availability (or lack of) close substitutes, extinction probability is related to the nature of the threat, and the size and extent of the species at risk affects how much society will be willing to forgo to protect it.

With this as context, what would be a practical and robust approach to determine priorities for environmental policy?

Conceptually, society wants to protect species or sites that contribute most to retaining biodiversity relative to their opportunity costs. The same objective applies to any other environmental “property” – clean air, clean water, contaminated site remediation, protection from incursion by alien species.

This raises the question of what amount society would be willing to forgo – in terms of actual expenditures by private individuals or taxpayers, or forgone opportunities incurred through precautionary restraint of activities – to reduce the risk of any degradation of the environment.

The answer lies in the characteristics of the risk and the expected value of that degradation. These characteristics are:

- scale of the value at risk – big potential impacts and high probability of occurrence attract a high priority for attention
- immediacy of threat – the more rapidly growing the threat, the earlier it deserves attention to pre-empt it growing out of control
- coverage – the more widespread the threat, the greater the total impact, but also the greater the overall costs of control, so other things being equal, a relatively low level but widespread threat would have lower priority than a relatively high level but localised threat
- uniqueness – the more unique or lacking in substitutes the resource under threat, the greater the priority for attention
- controllability – the less the local control over the resource (and the greater the influence of external factors) the lower the priority for local action.

These characteristics can be used as criteria for assessing threats to environmental stocks and ability to alleviate them, and so prioritise those issues that are most likely to merit policy action and result in positive net benefits.

Such a prioritisation would not be the end. Each specific proposal would need to pass a cost benefit test as part of a regulatory impact analysis. But the method described here is suitable for working out whether we have the broad priorities right in our sustainable development policy programme.



# Current environmental policy priorities

Table 1 below shows priorities listed by the Ministry for the Environment in its 2008 briefing to incoming ministers, in order of decreasing priority. The Resource Management Act and Treaty of Waitangi issues are primarily about processes. They may impact on physical environmental stocks in various ways. But it is difficult to foretell what those impacts will be. The other four relate directly or indirectly to protection of environmental stocks of value to economic and community functioning.

The government has recently restated its environmental priorities as work on climate change, freshwater management, biodiversity, waste management and air quality, plus reform of the Resource Management Act to remove or at least streamline regulatory burdens on productive activity.

Applying the criteria on page 9 to compare priority environmental issues, a first step is to clearly identify the “stock” which policies are intended to sustain. Some of these are straightforward – the stock of living organisms, or biota, the stock of freshwater sources – but others fall outside the normal ambit of environmental stocks. For instance, New Zealand’s reputation as a participant in international treaties has the characteristics of a capital stock, built up over time and difficult to restore if it were to be damaged.

The next sections consider three of these environmental policy priorities in light of the criteria proposed on page 9

Table 1 Environmental priorities at the end of 2008

1	Climate change	Meeting international obligations
		Reducing greenhouse gases
		Adaptation
2	Freshwater	Water quality (localised, but with health and reputation implications)
		Demand management
		Allocation
3	Resource Management Act	Outcomes
		Allocation matters
4	Treaty of Waitangi	Incorporation of issues into decision processes
5	Biodiversity	Reducing pressures on current biota
6	Marine Environment	Near shore environment
		Oceans

Source: This is the ordering in the Briefing to Ministers regarding issues for the environment in general. In a section specifically on environmental sustainability, the same issues appear in a different ordering, with the RMA and Treaty issues at the top and climate change at the bottom.

# Climate change revisited

## The issue

The stock at risk for climate change amelioration policy is the capacity of the global atmosphere to assimilate greenhouse gases without creating or accelerating disruptive climate change. Arguably the stock could be extended to all other storage in the global carbon cycle – living matter (biomass), soils and oceans – but international treaties do not yet recognise the feasibility of dealing with more than emissions and a limited range of carbon sinks in forests and ground cover.

The stock at risk from failure to adapt to climate change is potentially the whole of New Zealand's land, water and associated ground cover and infrastructure developed around the current climatic patterns. Clearly some locations face more immediate risk from climate changes than others, but there is a general economic advantage in building some resilience against likely change impacts into economic and social infrastructure.

## Criteria applied

On the criteria introduced above, the main focus of climate change policy in recent years, emissions reduction, is not the most crucial priority for environmental policy. New Zealand accounts for around 0.3% of global CO<sub>2</sub> emissions and even reducing these to zero would have no appreciable effect on the climatic changes experienced in New Zealand. Atmospheric composition is a global externality so it requires a co-ordinated international response to effect any change. New Zealand's interest is in doing what it needs to support the emergence of an effective international response.

As one of the limited number of UNFCCC Annex 1 nations to have taken on emission reduction commitments under the Kyoto Protocol, New Zealand's influence on international agreements may be slightly bigger than its share of global emissions, but it is hardly likely to be decisive in persuading other countries to take on stringent targets. Indeed, pursuing aspirational "stretch" targets for emissions reduction which are unlikely to be met without incurring economic and social disruption is hardly going to enhance New Zealand's reputation for sensible policy or attract other countries to take on binding emission reduction commitments. The "leadership" that New Zealand can show is limited by the likelihood that others will follow.

## Implication

Maintaining New Zealand's reputation as a constructive, pragmatic participant in international efforts is a higher priority in climate change policy than pursuing an all gases all sectors carbon pricing scheme ahead of other countries, which poses significant risk of costly short term business contraction and carbon leakage that may take some time to recover from. Focusing action on things that are controllable would give reputation a higher priority than restraining atmospheric emissions, and similarly the risks to land, water and associated infrastructure would imply a greater emphasis on adaptation issues and the avoidance of decisions that exacerbate future risks.

This does not mean New Zealand need do nothing about curtailing emissions.

There is a risk of adverse repercussions on trade and other international affairs from a perception of free-riding on the efforts of others: this perception and the response driven by it is largely outside of New Zealand's control but can be influenced by demonstrating serious policy progress. In this sense the climate change policy may have a "demonstration effect" in projecting a position across the world that could warrant a re-weighting in the ranking. But such perceptive issues are unlikely to be paramount in driving other countries attitudes towards their own climate policy or their retaliation of countries that lack it.

A measured approach to climate policy that supports emergence of a functioning international market in carbon credits yet moderates the costs incurred and risks to New Zealand's competitiveness until other countries come on board, limits price measures to those activities where they can be most readily applied, and slows the spread to more difficult sectors is more likely to be a sustainable policy than one that imposes big adjustments on the economy with no assurance that other countries will undertake the changes necessary to create an effective international response.

## **Biodiversity – a tide that's not turning**

### **The issue**

New Zealand has highly distinctive natural biodiversity, evolved in situ over a long period of relative isolation from other land masses. Since human settlement its distinctive mix of flightless birds, small reptiles and plant communities have been easy prey for introduced predators and weed species, and have suffered from widespread habitat modification. Biodiversity conservation in New Zealand is not just about setting aside reserves and sanctuaries to allow them to recover, but also involves active management to keep encroaching threats at bay.

New Zealand's 2002 Biodiversity Strategy, *Turning Back the Tide*, expressed the aim of stemming the rise in threatened and endangered species. To date there is little evidence of the tide having turned: the distribution of selected indicator species continues to decline (Statistics New Zealand 2009). The Strategy recognises that the portfolio of conservation parks and reserves has a disproportionate share of protected areas in high country and mountain land but insufficient coverage of the lowland habitats that have been much more depleted and threatened.

### **Criteria applied**

The ultimate stock is the range and diversity of New Zealand's distinctive species that contribute to economic welfare through ecological services (e.g. nutrient cycling, water flow modulation, soil conservation etc) and other uses (recreation, tourism and aesthetic ambience). A major plank of conservation policy to reduce the probability of species extinction is to provide a stock of land areas and habitats under designation for conservation management within which species can survive and thrive.

But recent policy towards conservation designations has moved in the opposite direction to what is required to reduce the probability of biodiversity loss: the most significant addition to reserve lands in recent years has been to add more high country and mountain land through the review of Crown pastoral leases. It has also involved purchasing additions to the Crown estate (such as government purchase of the St James Station in 2008) by depleting the Nature Heritage Fund that was set up to support conservation across a wider range of ecosystem types, including those on private land. The new government has halted these processes, pending their review.

Over a quarter of New Zealand's land area is now under a conservation designation of one form or another, and the Department of Conservation also manages land without such designation that was assigned to it in the carve up of Crown lands when the Department was created in 1987. While the conservation estate accommodates activities which support local economic activity, business and employment, the direct economic return from the estate as a whole is quite low and neither covers the full cost of the visitor facilities, nor of the conservation management activities in general, both of which continue to be supported from general taxpayer funds.

## Implication

Given the characteristics of conservation in New Zealand, reducing the probability of biodiversity loss would appear to require a greater proportionate attention to securing land or favourable management agreements with private landowners over lowland habitats currently under-represented in protected areas.

This will not be cheap given the opportunity costs of some of this land, and would be assisted if greater revenue could be raised off the existing estate. While the legislation has been interpreted as limiting commercial uses of designated land managed for conservation, there is no such justification for such constraints on the non-designated land: the value to conservation is low, and the opportunity cost of foregone activities can be quite high (NZIER 2002). There appear to be opportunities for realising more value from the non-designated land, through such things as rentals for new wind farms, mining, tourism operations or even land swaps to secure areas of more value to conservation. All of these could provide more resources for conservation management and research activities, in line with the high priority for conservation among New Zealand's national priorities.

## Waste policy – a waste of effort?

### The issue

Waste is a growing concern in developed countries like New Zealand. This is particularly true for the solid waste that is very visible in the volumes collected for disposal.

Waste remains one of the priorities of the new government. It has had a

lot of policy attention over the past ten years, culminating in the Waste Minimisation Act 2008. This aims to reduce the amount of waste generated and disposed of in New Zealand and to lessen the environmental harm of waste. It also aims to benefit the economy by encouraging better use of materials throughout the product life cycle, and by providing more employment through more local waste recovery and reprocessing. The Act imposes a levy on all waste disposed to landfills, to generate funding to help local government, communities and businesses fund waste reduction initiatives, effective from July 2009.

In the past there were demonstrable market failures from a relatively unregulated waste industry, characterised by a large number of old, poorly managed and unregulated landfills. A high involvement of local government in waste collection and disposal distorted the prices paid for waste services through rate-funding. But tightened consenting requirements and improved standards under the 1991 Resource Management Act reduced the number of operating landfills from 327 in 1995 to 95 in 2005.

Mispricing of waste services has also reduced due to more councils moving to "pay per throw" bag charges, the influence of landfill full costing guidelines, and greater involvement of specialist private waste management companies with commercial disciplines. The 2002 Waste Strategy added further targets for waste reduction and led to voluntary schemes such as the Packaging Accord to further reduce, reuse, recover and recycle materials.

The disposal of waste in landfills in New Zealand has slowed recently, and volumes disposed decreased by 29% per unit of economic activity between 1995 and 2006 (MfE 2007). On the face of it, therefore, existing policies were already decoupling economic growth from waste generation, before the new Act was developed. It may be that waste is being diverted to disposal in clean-fills or other unrecorded sites, but there is no information to verify this. The decision to impose a levy on landfills but not on clean-fills appears contrary to what would be required to counteract this possible diversion.

Despite these improvements, waste policy formulation continues, with a direct but narrow interest in waste management. The Ministry for the Environment's "Environment New Zealand" report (2007) explicitly states that "the development of the New Zealand Waste Strategy and its targets illustrates a shifting focus away from controlling effects of waste disposal towards minimising the amount of waste requiring disposal and increasing how efficiently valuable resources are used" [p.140]. In other words, waste policy is no longer guided by the effects basis of the Resource Management Act, but minimising waste is an end in itself. When waste policy refers to "resource efficiency" it means reducing the physical volume of material going to "waste", without reference to the cost of such reduction. This is reflected in the language of waste minimisation and the slogan "towards zero waste" which although having resonance in social marketing, in economic terms is a costly and unachievable goal due to diminishing marginal returns from waste abatement.

A tax or levy on wastes going to landfill could change disposal behaviour or provide revenue for waste reduction initiatives, but no single instrument

can serve both these aims indefinitely. A behaviour-changing levy needs to be large and noticeable enough to encourage diversion of waste, and if successful would reduce the revenue it collects. A revenue-raising levy needs to be low and inconspicuous, but is an inefficient way to collect revenue as it has greater transaction costs than existing broader-based revenue instruments like GST, income tax and property rates.

Waste policies have increased the volume of recycling in New Zealand, but this now exceeds the capability to reprocess material within New Zealand and the recycling industry has depended on the export of materials, particularly to China. Since the global financial crisis gathered pace in 2008, demand for such materials in international markets has weakened, leaving many recycling schemes facing reduced revenues. Council-backed free roadside collection for recycling, or storing materials for which there is no current viable market outlet are coming under increasing scrutiny as councils respond to financial stringency.

### Criteria applied

There is no natural stock at serious risk of depletion, and no demonstrable source of welfare loss from the current level of waste disposal. As landfills become fewer in number and subject to higher management standards and full cost pricing, the risk of externalities from them harming the surrounding environment becomes lower. Compared to other countries that New Zealand commonly compares itself with, New Zealand is not short of landfills or space for new ones, and economic considerations point to a different mix of material disposal and recycling than found elsewhere. The main "stock" being protected by introduction of a levy to raise revenues to support waste minimisation initiatives at local government level is employment in the waste management and recycling businesses, but employment is not a non-substitutable resource facing irreversible decline.

### Implication

Waste policy in New Zealand has achieved much over the past decade but further extensions for sustainability purposes are questionable. The new Act's levy on wastes disposed to landfill bears no relation to measurable externalities coming from landfills, most of which are now relatively new and managed to high standards, and as a revenue raising device it is simply inefficient. It has no appreciable benefit in reducing the depletion of environmental stocks or their contributions to economic welfare. Pursuing targets for waste minimisation and maximising material recovery, reuse and recycling, without explicit consideration of the costs and benefits, will itself be wasteful of non-material resources such as labour, energy and capital, diverting them from other activities of value to the community.

# Reprioritising for sustainability

How do the government's five environmental priorities stack up against the stock-related criteria set out above?

The result of our assessment is summarised in Table 2. We have added the marine environment as this is likely to receive renewed attention with extension of territorial interests over the continental shelf.

The assessment is necessarily subjective. A more detailed debate amongst scientists, policy makers and other affected parties may come up with a different set of results. But this assessment serves as a coherent basis to consider whether current policies are oriented to sustaining environmentally-relevant capital stocks.

Assigning scores on a one to five scale to each criterion and summing across the criteria provides one way of comparing the relative "tractability" of different issues to policy actions in New Zealand. This assumes an equal weight for each criterion – something that could also be debated by communities of interests.

Table 2 also shows the priority to different issues that would be suggested by such a process, in descending order of priority for the broad category of issues. Our assessment indicates a different order of priorities than that indicated by the Ministry of Environment. The same approach could be applied to 'score' other policy candidates – this could alter the composition of the list altogether.

The highest priority lies with urban air quality. This is because of the high loss of life quality and premature death from air pollution related respiratory complications. Ranking equally high is 'biodiversity and ecosystems', reflecting the high proportion of New Zealand species at risk which are unique to New Zealand. These can only contribute to global biodiversity by being protected in situ here. The air quality issue in New Zealand tends to be localised and seasonal (reflecting increased solid fuel burning in winter), whereas biodiversity issues are more widespread.

High ranking also attaches to meeting international climate change obligations and adaptation measures for reasons discussed above.

Water demand management and water allocation rank high because of their potential to affect availability and cost of water for production and consumption processes. Serious water quality issues are more localised and attract slightly lower priority, as do marine environment issues where less local control is possible: however, the extension of territorial control over the continental shelf implies some expansion of activity in this area.

Lowest priority, apart from greenhouse gas emissions reduction, goes to waste reduction and waste management business support. This is largely because the stocks which they are addressing – landfill space and the employment pool – have high substitutability and limited externalities. Greenhouse gas reduction policies may deserve higher ranking, because of their high visibility in international circles, but it is not the pre-eminent policy priority that it has been made out to be in recent years.



Table 2 Comparison and priority of issues across criteria

Issue	Resource stock	Scale of value at risk	Immediacy of threat	Coverage in New Zealand	Distinction (lack of substitutes)	Contingent on external factors	Local control	Suggested priority
<b>Air Quality</b>								
Urban air quality	Air sheds	Locally high	Medium	Localised	High	Low	Low	1=
<b>Biodiversity &amp; Ecosystems</b>								
Reducing pressures	Biota	Maybe High	Medium	NZ-wide	High	Low	Medium	1=
<b>Climate change</b>								
International obligations	NZ Reputation	Medium	High	NZ-wide	High	External High	Medium	3
Adaptation	Land, water	Maybe High	Low	NZ-wide	High	External High	High	5
Reducing greenhouse gases	Atmosphere	Low	Medium	NZ-wide	Medium	External High	Negligible	12
<b>Freshwater</b>								
Demand management	Water sources	Locally High	Medium	Localised	Medium-High	Medium	High	4
Allocation	Water sources	Locally High	Medium	Localised	Medium-High	Medium	Medium	6
Quality	Water sources	Locally High	Medium	Localised	Medium	Medium	Medium	7=
<b>Marine environment</b>								
Oceans	Biota, space	Medium	Medium	Widespread	High	Medium	Medium	7=
Near-shore environment	Biota, space	Maybe High	Medium	Localised	Medium	Low	High	9
<b>Physical wastes</b>								
Business support	Employment	Low	Medium	Localised	Low	Medium	High	10
Waste reduction	Landfill space	Low	Low	Localised	Low	Low	High	11

Source: NZIER

# The outlook for sustainable development

## The end is nigh?

The state of environment that the current and future community experiences depends on past and current generations' willingness to pay for its protection, through voluntary actions, regulatory restraints and tax-funded provision of public goods.

The recession of 2008/09 has focused minds worldwide on what is necessary spending and what is not. It might be argued that policies for environmental protection or sustainable development are luxuries that can be done without. There is a well recognised tendency for environmental quality to increase with rising incomes.<sup>2</sup> So when incomes contract it might be expected that willingness to pay will also fall.

However, if environmental policies were grounded on economic principles and the aim to maximise the welfare contribution of environmental assets, one might expect some adjustments at the margin, but little change overall.

The fiscal fall-out from the global recession is unlikely to be a reason, therefore, for a wholesale abandonment of environmental policies for sustainable development. But it highlights the need to scrutinise policies and expenditures, and prioritise actions that have the greatest effect. It may also mean deferring some actions on grounds of affordability. But there is still value in sustaining the attributes of environmental quality if they were soundly chosen in the first place, particularly if global recession is short-lived and does not signal a fundamental change in public preferences.

## Risks to New Zealand

Sustainability continues to retain currency in the international arena, and exert a hold on consumers in New Zealand's major markets. There are considerable risks to New Zealand's trade, given its location and status as a developed country, from simplistic notions of environmental impact influencing consumers in New Zealand's major markets. Demonstrating continued commitment to sustainability and actual progress against some meaningful sustainability indicators is part of the response to these risks. But it requires a different mix of priorities and actions than that evident in New Zealand's past forays into sustainable development policy.

## Food miles

One risk that has already surfaced in the campaigns in Europe is to choose foods according to their "food miles". This is a misleading and incomplete measure of the environmental impact of supply. Although it and buy-local campaigns appear to be thinly veiled protectionist measures promoted by

<sup>2</sup> This is recognised in the so-called "environmental Kuznets curve", which from actual observation of countries' development paths shows environmental degradation increasing in the early stages of development, but declining after passing some threshold in per capita income growth.

local producers, they are sufficiently easy notions to grasp that they could influence a large share of the consumers in these affected markets.

Food mile campaigns have been current since about 2006 and to date have yet to have an appreciable impact on New Zealand produce sales, although they remain long term business risks (Ballingall & Winchester 2009).

### **Livestock shadow**

Another is the idea that livestock products are inherently bad for the environment: this has gained some traction from reports such as Livestock's Long Shadow (FAO 2006) which estimated that increasing demand for livestock products as incomes increased around the world causes increasing environmental degradation, demands on water, and energy inputs. That report targeted the inefficiencies of livestock production in developing countries and specifically noted the "shadow" would be less if countries attained the efficiencies that have been achieved in New Zealand, but there is a risk of consumers tarring all livestock products with the same brush.

### **Water footprints**

The idea of water footprints is more directly relevant to sustainable development. This idea explicitly presumes that the more water "embodied" in products the worse the impact on the environment. This may be true of produce from water-scarce regions with poor environmental regulation but is not from relatively water-rich regions like New Zealand.

The idea of water footprints reflects a tangle of rich country concerns for environmental protection and fair trade with developing countries, and they compound the risk to reputation of New Zealand's produce by commonly quoting embodied water figures for animal products based on stall-fed production systems which bear little relation to New Zealand's predominantly pasture-fed livestock. Countries that have a comparative advantage in water-using production could alleviate environmental pressures in water-scarce regions by exporting more water embodied in their products. Everyone would be better off, including the environment. But this is lost in the simplistic water footprint measures.

### **Climate change action**

The fear of potential effects on New Zealand's international reputation has also been prominent in debate on climate change targets but it has almost certainly been over-played. Some action is warranted, as New Zealand may lose credibility if it does nothing at all, and as a small trading nation it is vulnerable to protectionist border tariffs or other measures against its products brought in under the guise of environmental objectives. But despite claims of New Zealand's honest broker role enabling it to punch above its weight in international negotiations (Nixon & Yeabsley 2002), there is no evidence that the reputation effect requires New Zealand to take a lead and incur more stringent, and economically damaging, measures ahead of its trading partners.

# Implications

This paper suggests a practical but methodical way of assessing New Zealand's environmental priorities. The main finding is that there is scope for realignment of effort to improve both environmental and economic outcomes for the country at large. The direction of sustainable development policy that has emerged in New Zealand to date appears unlikely to improve environmental sustainability.

More detailed analysis could be undertaken of the policy priorities to refine these results and ensure actions achieve both sustainable and efficient resource use.

## Getting deeper insights into priorities

It is one thing to identify that policy should be delivering more in one area and less in another, but the real economic question is how much to deliver across the areas.

This requires, implicitly or explicitly, some consideration of the gains and losses from marginal expansion or contraction in each area. A prerequisite would be some way of quantifying the stocks and risks on a consistent basis, if we are to maximise return to New Zealand from the policy effort.

An investigation combining elements of desk study and discussions among those with interest in the resources, would extend the analysis to more resource issues than those examined in this report (e.g. freshwater, marine) and provide a firmer basis for assessing priorities across environmental resources.

This requires a form of cost benefit analysis of resource allocations across each policy area. Fully quantified cost benefit analyses are costly to undertake. But more can be done in quantifying gains and losses of policy priorities than is currently apparent in a range of policy areas.

Part of the quantification lies in development of sustainable development indicators, and the creation of satellite accounts for natural resources such as forests, fish stocks and water to be viewed alongside the national economic accounts. The current sustainability indicators are more like statistics than indicators, and more can be done to develop them into economically informative indicators, for instance relating environmental outcomes to associated measures of economic activity to give a richer picture of trends in resource use efficiency.

## Beyond emissions reduction

One of the consequences of focusing on the sustainability implications of environmental policy is to question the prevalence of some policies that have been prominent in recent years. In particular it points to some rebalancing of climate change policy towards adaptation policy away from a focus on emissions reduction, a redirection in conservation policy, and a

refocus of waste minimisation initiatives to those that can be demonstrated to produce net benefits.

Deeper investigation could point to further rearrangement of priorities. For instance, water management is currently receiving a lot of attention. But instances of scarcity are highly localised – Ministry of Agriculture and Forestry figures show that only 4% of the net balance of water nationwide is subject to allocation. Whether overcoming that scarcity requires a complete reform of water management with all the institutional change that entails, or simply modification of processes that are already allowed but little used (such as water trading), could be examined in light of the effects on stocks and supplies relative to demand in different regions.

Changes in priorities over time are to be expected in policies that are responsive to changes in circumstances, information and perceptions about the changing state of the world. Periodic review of policies in light of the changing state of the stocks would assist that evolution of policy. For instance, in waste policy it is at present economically optimal for New Zealand to have a different mix of material disposal and recovery than other countries that face greater externalities arising from higher population densities on land and sites, and different economies of scale and scope in recovering and reusing materials. But if local or national conditions change, then New Zealand's policies need to change accordingly.

## The value of different environmental attributes

Another challenge for better allocation of resources to environmental objectives is to establish a consistent approach to identify the marginal values of environmental changes. At present, decisions on environmental changes are being determined in local government or judicial settings, subject to lengthy deliberations, and the weight given to economic evidence is variable. There is thus a high likelihood of inconsistency and inefficiencies in decisions across the country.

Part of this is directly related to the absence of established values for some of the resource use effects that are weighed in the balance of the resource management processes. Commissioning more non-market valuation studies of the sort currently carried out is unlikely to be a cost-effective solution to this. But determining how environmental stocks and changes in them affect local demands, supply scarcities and opportunities for substitution provides a relatively tractable way to reduce that variability and achieve greater efficiency in resource use across the country at large.

## In sum

The current global economic turmoil provides a reason to stop and take stock of the direction of sustainable development, but not for abandoning the idea. To ride out the turmoil, New Zealand needs to be able to make the most of all its resources, including those obtained from the natural environment. This means freeing up the use of resources from delays and inconsistencies that apply to current allocation mechanisms, but also giving due weight to the protection of environmental attributes against irreversible changes that impose costs on the future which, stripped back to basics, is what sustainable development is all about.

# Appendix A References

Australian House of Representatives (2007) Sustainability for survival: creating a climate for change: Inquiry into a Sustainability Charter; Standing Committee on Environment and Heritage, Canberra

Ballingall J & Winchester N (2009) "Distance isn't dead – An empirical evaluation of food miles-based preference changes"; NZIER Working Paper 01/09

Beckerman W and Pasek J (1997) 'Plural Values and Environmental Valuation'; Environmental Values 6.: 65-86.

Bowen A, Fankhauser S, Stern N & Zenghelis D (2009) "An outline of the case for a green stimulus", Policy Brief, Grantham Research Institute on Climate Change and the Environment, UK.

El Serafy S (1989) "The proper accounting of income from depletable natural resources" in Environmental Accounting for Sustainable Development by Ahmed YJ, El Serafy S & Lutz E (Eds), UNEP-World Bank Symposium Report, pp 10-18

FAO (2006) Livestock's long shadow, UN Food and Agriculture Organisation, Rome

Faustmann, Martin (1849) "On the determination of the value which forest land and immature stands possess for forestry"; English Edition in M Gaine (Ed) (1968) Martin Faustmann and the Evolution of Discounted Cash Flow; Institute Paper 42, Commonwealth Forestry Institute, Oxford University

International Energy Agency (IEA 2008) World Energy Outlook, OECD, Paris

Gregory R, Mendelsohn R and Moore T (1989) 'Measuring the benefits of endangered species preservation: from research to policy'; J. Env. Management 29, 399-407.

Hartwick JM (1977) "Inter-generational equity and the investment of rents from resources"; American Economic Review 67:972-974

Kerr GN & BMH Sharp (2003) "Choice modelling: Mitigation on Auckland Streams" Paper to Annual Conference of the New Zealand Agricultural and Resource Economics Society, AERU Discussion Paper 150, Blenheim

Metrick A & Weitzman ML (1994) "Patterns of behaviour in biodiversity preservation"; Policy Research Working Paper 1358, The World Bank

Metrick A & Weitzman ML (1998) "Conflicts and choices in biodiversity preservation"; Journal of Economic Perspectives, 12(3), 21-34

Ministry for the Environment (2007) Environment New Zealand 2007, Wellington

Ministry for the Environment and the Treasury (2007) "The Framework for a New Zealand Emission Trading Scheme" <http://www.climatechange.govt.nz/nz-solutions/trading-scheme-reports.shtml>

Ministry of Finance (2007) Norway's strategy for sustainable development; [www.regjeringen.no/upload/FIN/rapporter/R-0617E.pdf](http://www.regjeringen.no/upload/FIN/rapporter/R-0617E.pdf)

Montgomery C, Brown G and D Adams (1994) 'The Marginal Cost of Species Preservation: The Northern Spotted Owl'; Journal of Environmental Economics and Management, 26.

Moran D, Pearce D & Wendelaar A (1996) 'Global biodiversity priorities: a cost effectiveness index for investments'; Global Environmental Change 6(2) 103-119

Nixon C & Yeabsley J (2002) "New Zealand's Trade Policy Odyssey" Research Monograph 68, NZIER, Wellington

NZIER (2002) "Quantifying the opportunity cost of New Zealand's mineral potential"; Report to the New Zealand Minerals Industry Association

NZIER (2004) "Sustainable infrastructure: a policy framework"; Report to the Ministry of Economic Development's Infrastructure Stock-take, Wellington 2004 [http://www.med.govt.nz/irdev/econ\\_dev/infrastructure/reports/nzier/index.html](http://www.med.govt.nz/irdev/econ_dev/infrastructure/reports/nzier/index.html)

NZIER (2008) "The impact of the proposed emissions trading scheme on New Zealand's economy"; Working Paper 2008/02, Wellington

Office of the Auditor General (OAG 2007) Sustainable development: implementing the Programme of Action, Performance audit report, Wellington

OECD (2001) Policies to enhance sustainable development; General Secretariat SG/SC(2001)5

OECD (2006) Good Practices in the national sustainable development strategies of OECD countries; Secretary-General OECD

OECD (2008) Sustainable development: linking economy, society and environment, Insights Series, OECD, Paris

Pearce D, Markandya A & Barbier E (1989) Blueprint for a Green Economy, Earthscan Books, London

Pezzey JCV & Toman MA (2002) "The economics of sustainability: a review of journal articles" Discussion Paper 02-03, Resources for the Future, Washington DC

Rostow WW (1960) The Stages of Economic Growth – a Non-Communist Manifesto; Cambridge University Press

Royal Dutch Shell Ltd (Shell 2008) Shell Energy Scenarios, The Hague

Saunders C, Barber A & Taylor G (2006) Food Miles – Comparative Energy/Emissions Performance of New Zealand's Agriculture Industry, Agribusiness and Economics Research Unit research report 285, Lincoln University [www.lincoln.ac.nz/story\\_images/2328\\_RR285\\_s6508.pdf](http://www.lincoln.ac.nz/story_images/2328_RR285_s6508.pdf)

Statistics New Zealand (2007) "Environmental protection expenditure account for the Public Sector – Years ended June 2001 to June 2003", Wellington

Statistics New Zealand (2009) Measuring New Zealand's Progress Using a Sustainable Development Approach; Statistics New Zealand, Wellington

Stavins RN, Wagner AF & Wagner G (2002) "Interpreting sustainability in economic terms: Dynamic efficiency plus intergenerational equity"; Faculty Research Working paper RWP 02-018, John F Kennedy School of Government, Harvard University

Stiglitz JE, Sen A & Fitoussi J-P (2009) Report by the Commission on Measurement of Economic Performance and Social Progress, Paris, [http://www.stiglitz-sen-fitoussi.fr/documents/rapport\\_anglais.pdf](http://www.stiglitz-sen-fitoussi.fr/documents/rapport_anglais.pdf)

Toman MA, Pezzey J & Krautkaemer J (1995) "Neoclassical growth theory and 'sustainability'"; Chapter 5 in Bromley DW (Ed.) Handbook of Environmental Economics, Blackwell

United Nations Environment Programme (2009) A Global Green New Deal, Economics and Trade Branch, <http://www.unep.org/greeneconomy/>

Weitzman M (1993) 'What to preserve? An application of diversity theory to crane conservation'; Quarterly Journal of Economics CVIII(1) 157-184

Weitzman M (1998) "The Noah's Ark Problem", Econometrica 66(6), 1279-1298

Weitzman M (2000) "Economic profitability versus ecological entropy"; Quarterly Journal of Economics CXVI(1) 237-263

World Commission on Environment and Development (WCED 1987) Our Common Future, New York

World Development Report (2003) Sustainable Development in a Dynamic World – Transforming Institutions, Growth and Quality of Life; World Bank

## Appendix B - A brief history

The modern notion of sustainable development (SD) first came to prominence in the 1987 World Commission on Environment and Development. From this came the often-quoted Brundtland definition of “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED 1987), with its implicit notion that current pursuit of economic and social advancement should not be at the expense of irreversible changes in the natural environment that cause costs for future generations to bear.

Having identified world poverty and the state of the natural environment as the world’s most important challenges, the WCED’s concept stressed meeting human needs within environmental limits. Both poverty and unfettered economic growth put pressure on the environment, so a more environmentally responsible growth was required to alleviate both poverty and environmental degradation.

The idea of sustainable development was enthusiastically picked up by governments and subsequent international gatherings, including the 1992 Earth Summit in Rio de Janeiro and the 2002 World Summit on Sustainable Development in Johannesburg. Yet there has always been ambiguity about what the term means and how to put it into practice, and countries have approached it in different ways, according to their circumstances and political inclinations.

Part of the popular appeal of sustainable development was its novel pairing of the terms “sustainable” with “development”. This held the promise of shifting the debate about progress from narrowly defined growth in GDP to other aspects of the social and environmental dimensions, including questions of income distribution, health and educational status of the population, and measures of environmental health.

After the initial excitement about the new big idea came speculation about what it would actually entail. Some saw it as the long-heralded “new paradigm” that would knock monetary measures such as GDP off their paramount position in guiding world affairs. Some saw it as the epitome of “thinking globally, acting locally”, even seeing it as justification for encouraging greater self sufficiency and reducing the impact of trade and transport around the globe. Those convinced of the ability of centralised planning to improve on market performance took it as another reason to regulate private activities.

Economists in general were more circumspect. The idea of sustainability had previously appeared sporadically in economics, and can be traced back to the dismal prognosis of Thomas Malthus in the early 19th century about the inevitability of population growth outstripping food supply unless checked by famine, disease or war. Later that century Faustmann’s optimal forestry rotation formula offered the prospect of sustained yield harvesting, an idea which was picked up in other areas of bio-economics,



most notably in fisheries.<sup>3</sup> In the 1960s WW Rostow's forays into development economics referred to the idea of take-off to self-sustaining growth.

The evolution of natural resource economics in the 20th century took a lead from the Hicksian notion of income as what can be consumed without being left worse off. Hartwick's (1977)<sup>4</sup> prescription for natural resource extraction proposed using the economic rent (or super-profit over and above the normal profit from such an investment) for investment in some other income earning capital, effectively transforming natural capital into artificial capital rather than using it for current consumption. Similarly, El Serafy (1989) proposed separating the proceeds from a declining resource stock between a portion for consumption and a portion for reinvestment that would sustain income yield beyond the point of economic exhaustion of the resource.<sup>5</sup> Most of these earlier brushes with sustainability, however, referred to single resource stocks, with little recognition of issues around substitution or irreversibility. The Brundtland definition differed in being potentially broader, encompassing all natural and environmental resources, and including other aspects of development beyond growth in per capita GDP, such as the education and health status of people.

Nevertheless, some economists questioned whether SD was a useful concept, or whether it added anything over a properly constituted economic framework that aimed at maximising the net present value of welfare over time, in which welfare was some function of consumption of goods, environmental quality and socio-economic conditions (Beckerman & Pasek 1997). Early attempts to define sustainability in terms of economic flow measures, for instance as a non-declining income track over time, were readily shown to be worse for maximising the present value of long term welfare than development paths that allowed short term declines to achieve greater long term growth in the components that go into welfare (Pearce et al 1989).

Some economists moved to the idea of sustaining capabilities of various types of capital available to communities: the natural capital embodied in environmental resources such as water, soils and biota; the artificial capital of buildings, machinery and other plant; the human capital embodied in the skills and knowledge of people; and the social capital of networks and institutions that facilitate co-operation within and between groups, including shared norms, common values and understandings. Thus the OECD (2001) states "sustainability occurs when development does not erode, but rather maintains or enhances environmental, economic, social and human capital". Statistics New Zealand (2007) more explicitly states "sustainability requires maintaining or enhancing the stocks of natural, physical, financial, human, social and cultural capital", where cultural capital is the set of values, history, traditions and behaviours which link a specific group of people together.

---

3 Faustmann, Martin (1849) "On the determination of the value which forest land and immature stands possess for forestry"; English Edition in M Gainé (Ed) (1968) Martin Faustmann and the Evolution of Discounted Cash Flow; Institute Paper 42, Commonwealth Forestry Institute, Oxford University.

4 Hartwick JM (1977) "Inter-generational equity and the investment of rents from resources"; American Economic Review 67:972-974.

5 El Serafy S (1989) "The proper accounting of income from depletable natural resources" in Environmental Accounting for Sustainable Development by Ahmed YJ, El Serafy S & Lutz E (Eds), UNEP-World Bank Symposium Report, pp 10-18.

The debate over sustainable development has added two key notions to the idea of economic progress. One is the idea of inter-generational fairness, and the extent to which current activity is restrained in favour of retaining features of the natural environment for the benefit of the future. The other is the question of the substitutability between natural capital and artificial capital, and whether use of natural resources is transforming them to a more useful form, or simply depleting the stock and the ability to use it in future. This in turn hinges on distinction between renewable resources and those whose depletion is practically irreversible in timeframes relevant to human considerations.

The recent interest in sustainable development also reflects a long term shift in public and political preferences towards integrating a wider range of elements and explicitly longer time horizons into resource use decisions. As these wider elements and long term impacts are effects on third parties, the move to sustainable development is fundamentally an exercise in taking externalities more explicitly into account in current decisions. Practical measures that should favour sustainability include removing subsidies that exacerbate environmental damage (e.g. on fossil fuels), extending payment for environmental services that are currently free (e.g. water abstraction and discharges) and generally raising the efficiency with which resources are used.<sup>6</sup> These measures would also be in the economic prescriptions for allocative and dynamic efficiency in resource use, which has led to the suggestion that sustainability can be viewed in conventional economic terms as “dynamic efficiency plus inter-generational equity”.<sup>7</sup>

The debate about sustainability has not been quelled by the global financial crisis, and as recently as September 2009, a Commission on the Measurement of Economic Performance and Social Progress, set up by the French president and drawing on an international panel of experts, reported on alternatives to GDP (Stiglitz et al 2009). It recognised long-held concerns about the adequacy of current measures based on GDP, and recommended:

- improving measures of economic performance in a complex economy, for instance by explicitly dealing with changes in quality as well as quantity of output and getting a better handle on measurement of government sector outputs
- moving from a focus on production towards well-being, with measures that give more prominence to income and consumption, accumulated wealth, distribution of income and wealth among households and broader measures to take account of non-market activities (e.g. services produced within the home)
- adopting a pragmatic approach towards measuring sustainability, identifying a well-identified dashboard of indicators that are interpretable as variations of some underlying stocks of natural, social and physical capital.

---

6 OECD (2001) Policies to enhance sustainable development; General Secretariat SG/SC(2001)5.

7 Stavins RN, Wagner AF & Wagner G (2002) “Interpreting sustainability in economic terms: Dynamic efficiency plus intergenerational equity”; Faculty Research Working paper RWP 02-018, John F Kennedy School of Government, Harvard University.

## Taking environmental considerations into account

Conventional economics has approached the issue of environmental effects in two ways:

- extending the national income calculation from a gross to a green national product
- using national income as a welfare proxy to be maximised subject to environmental and social constraints being met.

The first approach would involve quantifying and valuing the effects of economic production on the environment and adjusting the measure of national product accordingly. The welfare function then becomes one of maximising a modified “green national product” or similar measure. In practice this has proved computationally challenging and contentious, because of the difficulty of identifying, quantifying and valuing all the relevant effects.

While it is recognised that GDP is an incomplete measure of welfare, a number of alternative measures of economic progress are currently being examined for use by agencies around the world. Measures such as the Genuine Savings Index have focused on determining changes in wealth (adjusted net savings) as an indicator of sustainability<sup>8</sup> and a country’s ability to sustain an income stream. Another alternative measure is the Genuine Progress Index, combining GDP with indicators of environmental state and social well-being, such as education and health status.

Although such extended national accounting was described by Nobel Laureate Robert Solow as “an almost practical step to achieving sustainable development”, there are numerous practical obstacles to their compilation. Current estimates in practice account for key environmental stocks – such as energy depletion, mineral depletion, net forest changes, CO<sub>2</sub> emissions – and education spending as a proxy for human capital accumulation. But they do not include other aspects of social capital, and for policy purposes these aggregate estimates need to be supplemented by disaggregated environmental performance indicators. This is the approach adopted by the United Nations System of National Accounts, which recommends compilation of satellite accounts for key resources that are to be viewed alongside, rather than within, a country’s main national accounts.

The other approach is to maximise the conventional proxy measure of welfare (gross domestic product or similar) but subject to a number of constraints being met – both physical (environmental compliance) and social (such as income distribution targets). Process objectives (such as due consultation with Māori and other stakeholders) could also be set. In effect regulations and standards could be used to define an environmental, social and cultural “space” within which economic activity can operate, limiting the likelihood of undue environmental degradation.

Such maximisation subject to constraints should not be misconstrued as a narrow mathematical programming routine, in which primacy is given to

---

<sup>8</sup> World Development Report (2003) Sustainable Development in a Dynamic World – Transforming Institutions, Growth and Quality of Life; World Bank.

the measurable economic benefits ahead of “restrictive” environmental or social considerations. It is simply a way of giving effect to environmental and other issues that are difficult to give due weight or value to in other ways. It does not prevent environmental improvements being achieved, nor need it be particularly limiting – constraints can be set tightly or loosely, they may be set as “stretch targets” that improve on the status quo, and they need not be binding if activity can continue within them. It is rather a conceptual way of bringing externalities into account and assuring that economic, environmental and social objectives are advanced together.

The capital stock approach to sustainable development is readily applicable to environmental issues for which stocks can be measured, their “natural” characteristics – such as their susceptibility to degradation and ability to regenerate – can be determined, and economic values applied to their changes in state according to the value of outputs that flow from them. It is more difficult to apply to the social and cultural dimensions of development, as educational and health indicators may not be closely correlated to productivity or income potential and desired outcomes will reflect value judgements on matters such as income and resource distribution.

## In search of environmental values

A necessary (but not sufficient) condition of sustainable development is giving due weight in development decisions to endowments of the natural environment and reducing the probability of irreversible losses of natural resources that cause real costs for the economy in future. This function is commonly performed by comparing prices for inputs and outputs. But as many environmental resources such as freshwater, clean air and mobile wildlife are not traded in markets, there are no readily observable values to apply to them.

Environmental resources are often shared resources and managed as public goods, with decisions subject to interest group lobbying aimed at influencing political decision processes. Their value may be under-stated because they are not subject to tangible market exchanges, or because everyone has a stake in them but no-one has clear responsibility for their management, and because the effects of environmental degradation are hard to measure or only become apparent long after the damage has been done. The measured responses of market operation, of gathering scarcity causing an increase in price which encourages innovation to find alternative sources or substitutes, simply are not possible when no-one has an incentive or a responsibility for measuring the extent and condition of the resource. Threshold effects on their rate of change about which there is limited information are a further complication.

For economists, the absence of a price does not mean a resource has no value. When clean water becomes scarce, its value increases to that of the next best alternative supply, whether that be achieved by a pipeline bringing it in from elsewhere or the cost of commissioning and running a plant for desalination of seawater. To the extent that air quality degradation contributes to deterioration in public health and increases in health expenditures, there is value to be obtained in reducing the degradation, if

possible, to reduce those costs. A whole branch of economics has evolved to develop means of non-market valuation of environmental resources that are difficult to subject to market exchange.

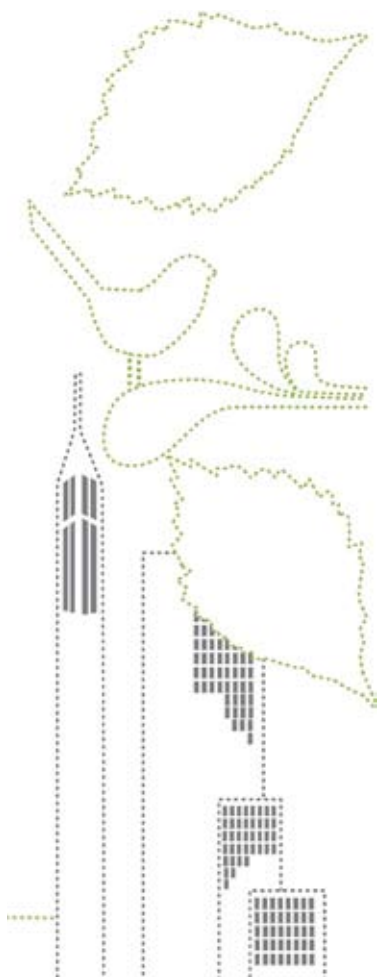
The state of environment that a community experiences depends on its willingness to pay for conservation or restoration, through individual voluntary actions, regulatory restraints or tax-funded expenditures of public agencies. Various non-market valuation techniques attempt to elicit inherent public value of specific environmental attributes, either through the preferences revealed through demands for related marketed products or through surveys of stated preferences.

Recent applications of these techniques have yielded values in the region of \$100 - \$300 per household per year to protect a single species or set of species in a specific location, in line with results of similar studies overseas. However, these values from what people state they are willing to pay for environmental protection do not match the observable evidence of what they actually do pay, directly as individuals or indirectly through collective agencies. So these techniques have yet to provide a practical means of establishing relative preferences for, and hence the value of, protecting different types of environmental attribute.

## Dealing with the time dimension

In a conventional neoclassical growth model, per capita welfare will decline over time, as the present value cost of postponing welfare into the future exceeds the benefit of so doing, in a discounted analysis. Along such a time-path, the accumulation of built capital and maintenance of natural capital may be too low to maintain or expand welfare in the future. So the usual prescriptions for economic efficiency, of internalising externalities and correcting market failures, while necessary for sustainability, are not sufficient to achieve it on their own. Sustainability may still be consistent with inter-temporal Pareto efficiency, but achieving it requires a different pattern of intervention than suggested by the conventional policy prescriptions (Toman et al 1995).

There is currently no universally accepted prescription for this pattern of intervention, despite a now-extensive literature describing the conditions under which conventional criteria (like the maximised present value criterion) converge or diverge with sustainability objectives and standards (Pezzey & Toman 2002). What the literature does indicate is that innovation in technology can have substantial effect on the sustainability of future development paths, as can the transitional arrangements for moving from an unsustainable to a sustainable path, although how to achieve such transition in practice is largely unexplored. Against this background practical approaches to sustainable development have been tentative and incremental, focusing on process and emphasising aspects where sustainability and efficiency requirements are likely to coincide, such as the internalising of external effects in resource use choices.



## Sustainability in practice – New Zealand

In New Zealand, the spirit of sustainable development (SD) found early expression in the Resource Management Act 1991, the purpose of which is sustainable management of resources. This is not the same as sustainable development, as the Act is about managing adverse effects on the environment rather than achieving socio-economic outcomes, but the Act defines environment broadly to include people and communities, encouraging some to attempt to incorporate social progress in the operations of the Act. SD was also infused through various other central and local government initiatives, in particular those of councils adopting the principles of Agenda 21 that emanated from the 1992 Earth Summit in Rio, but it was not until 2003 that the New Zealand government formalised its approach in its Sustainable Development Programme of Action (SDPA).

The Sustainable Development Programme of Action lists 10 guiding principles and four broad dimensions to sustainable development. These dimensions are:

- Looking after people
- Taking a long term view
- Taking account of social, economic, environmental and cultural effects
- Encouraging participation and partnerships.

It also articulated 10 principles for policy and decision making:

- Consider long term implications of decisions
- Seek innovative, mutually supportive solutions
- Use best information available to support decisions
- Address risk and uncertainty, taking a precautionary approach
- Transparent participatory partnerships with local government and others
- Decouple economic growth from pressures on the environment
- Respect environmental limits, with integrated management
- Consider global implications (connections, multi-lateral agreements)
- Empower Māori in development decisions affecting them
- Respect human rights, rule of law and cultural diversity.

It gave effect to SD by selecting four broad areas for programmes of action – quality and allocation of freshwater, energy, sustainable cities, and investing in child and youth development. Other government initiatives, such as the Waste Strategy and the activities of the Energy Efficiency and Conservation Authority, were clearly inspired by sustainability, although with origins that pre-dated the SDPA. The energy programme of action gave rise to the 2007 New Zealand Energy Strategy. The water programme culminated in drafting of a proposed National Policy Statement in 2008, which was widely regarded as unsatisfactory, and was put on hold by the incoming government, pending completion of new consultation and analysis.

SD also caught the imagination of some in the private sector. The New Zealand Business Council for Sustainable Development, modelled on a similar world body, commissions research and disseminates ideas on sustainable practices in business, ranging from energy efficiency and business positioning for emissions trading to product accreditation and green marketing. Other non-governmental organisations have arisen to develop and promote their vision of sustainable development, such as the Sustainability Council, Sustainable Future and Sustainability Aotearoa New Zealand. Some individual businesses introduced Triple Bottom Line accounting, or considered sustainability reporting under the Global Reporting Initiative Guidelines.

Some of these private initiatives drew strength from the perception that the official action on sustainable development was not working as well as it might. Sustainable Future (2007) prepared a stakeholder evaluation of the SDPA which found that performance and communication were below the level that could have been expected, and that the programme lacked specific milestones against which to measure progress and clarity over the governance structure, in which many were responsible but no-one was clearly accountable. That conclusion was echoed by the Office of the Auditor General (2007) who found that the number of agencies responsible for leadership, co-ordination and governance of the programme work streams meant the oversight for the whole programme was unclear.

The government then turned its attention to more specific actions towards environmental sustainability, in particular:

- Helping households towards sustainability
- Business partnerships for sustainability
- Eco-verification – demonstrating sustainability of New Zealand products
- Government procurement of sustainable goods and services
- Public service carbon neutrality
- Towards zero waste.

These were more amenable to setting measurable goals against which to judge progress, but were more focused on reducing “footprints” than assessing whether the action would yield a net benefit. This is most apparent in the adoption of the term “zero waste”, which in economic terms is an undesirable and unattainable goal as long as waste reduction, recovery and recycling exhibit increasing marginal costs and diminishing returns with successive levels of effort.

How much these actions achieved in furthering sustainability of critical environmental stocks, and at what cost, is questionable. For instance, employing staff and other measures to achieve carbon neutrality in the public service implies a relatively high cost per tonne of carbon abated, given the relatively low levels of emissions of many office-based public agencies, but this does not appear to have been a primary consideration in the establishment of this programme.

The new government elected in 2008 in the midst of the global financial crisis took little time to cut back some of these programmes which were delivering little demonstrable benefit (e.g. Carbon Neutral Public Service) and suspended other policies pending review (e.g. the emissions trading scheme, and implementation of national environmental standards on air quality and water quality). It has also moved to relieve the burden of undue regulation on businesses by streamlining the Resource Management Act. The term sustainable development itself has almost disappeared from the lexicon of public debate on economic and environmental policy.

Work on developing sustainable development indicators continues, as was evident in the release of *Measuring New Zealand's Progress Using a Sustainable Development Approach: 2008* (Statistics New Zealand 2009). This applies a modified framework developed by the Swiss Federal Statistics Office to organise indicators under the target dimensions of environmental responsibility, economic efficiency and social cohesion. The indicators report New Zealand's performance over the past 20 years against a series of targets or directions determined to be consistent with sustainability. For instance, sustainability targets in the environmental area include the increasing distribution of selected native species, reduction in greenhouse gas emissions and reduction in nitrogen in rivers and streams; in the social area they include increasing educational attainment of the adult population, increasing proportion of speakers of te reo Māori; and in the economic area, they include an increase in the real net stock of total assets per person, decrease in greenhouse gas intensity of the economy, and increase in labour productivity.

The current indicator framework draws distinction between sustainability, which focuses on whether resource stocks are maintained over time, and development which also considers how resources are used and distributed to meet needs. However, the current indicator set is not particularly informative about the critical economic questions, such as how much natural capital needs to be conserved and how much utilised to create physical capital. The report states that "each of the target dimensions has equal importance, reflecting that in the long run no dimension can be achieved at the expense of others" (Statistics New Zealand 2009, p.9). However, this rather misses the point that whether environmental stocks are being depleted, conserved or restored depends on the value implications of transformations at the margin: some stocks can be utilised and depleted to increase welfare, whereas others need to be protected and enhanced, depending on the characteristics of the stocks and their circumstances.

As marginal costs are likely to increase and marginal benefits decrease with successive improvements in environmental condition, sustainable targets are likely to shift according to such influences on value as changes in the demand for services, availability of substitutes, or technologies for utilisation. But the current indicators provide no sense of how these economic considerations are reflected in the targets against which progress is measured, and they clearly need more refinement.



## Sustainability in practice – other countries

Governments first agreed to prepare national sustainable development strategies at the Rio Earth Summit in 1992, but of the 30 OECD member countries, only 23 had prepared formal strategies by 2006 (OECD 2006). Some of these prepared their strategies early and may already be on subsequent or revised versions, including Australia, France, Japan, the Netherlands, Sweden and Switzerland and the UK. Others have prepared their first national strategies more recently, including New Zealand, Denmark, Germany, Ireland, Norway, Poland, Portugal and the Czech and Slovak republics.

The European Union released a sustainable development strategy for its member states in 2001 and began revising it in 2006. Denmark, Finland, Iceland, Norway and Sweden also developed a Nordic Strategy for Sustainable Development which was revised in 2005. Some countries, notably Canada and the USA, have not devised a strategy, which may be related to Federal structures which slow down the agreement of national measures. In Canada's case, sustainable development has been incorporated in legislation since 1995 but 28 federal departments and agencies have been tasked with developing their own sustainable development strategies before formulating an overall national plan.

Although there are points of similarity between their approaches, each country has addressed sustainable development in its own way. The balance between economic growth, social progress and environmental protection is articulated differently in each country, but in countries such as Australia and the UK the economic dimension is arguably more prominent than in New Zealand's SDPA. Nordic countries such as Norway and Sweden are distinctive in including objectives on international co-operation to promote sustainable development and combat poverty outside their borders in developing countries, making it a guiding principle for their aid policies. Countries also differ in how they co-ordinate movement towards sustainable development across disparate departments and agencies, with some (Canada, Norway) vesting oversight in a strong central agency, and others (UK) creating a government agency specifically for that purpose.

All countries are developing indicator sets to track progress towards sustainability. Most countries are explicit about integrating economic and environmental policy in their indicator sets, although the emphasis varies between them. The UK and Canada are explicit about improvements in quality of life. But Australia, Canada, UK and Norway are all similar in making sustained economic activity an explicit part of the objectives of sustainable development.

New Zealand has not been an early adopter or leader in its approach to sustainable development. Its Programme of Action is distinct in the lightness of reference to both economy and environment in its guiding principles, in its emphasis on processes rather than measurable outcomes, and in its implementation in which responsibilities were so widely spread across the government sector that there was limited oversight of the whole. Recent public work-streams have moved towards more measurable goals, but there remains a vacuum at the heart of the programme about what are the market, regulatory or institutional failures that threaten sustainability and need to be addressed through sustainable development policy.

At the international level, sustainable development remains a work in progress with, in recent years, attempts to share practical experience across countries in dealing with a convergence of environmental, developmental and security challenges (OECD 2008). While the financial crisis may divert attention from the non-economic aspects of sustainable development in the short term, it is unlikely that the language and understandings engendered by sustainable development will be abandoned once the immediate crisis is past.

## Australia

Australia adopted a National Strategy for Ecologically Sustainable Development (ESD) in 1992, with an orientation to maintaining ecological processes. Its broad principles are:

- Integrating environmental and economic goals
- Proper valuation of environmental assets
- Equity between and within generations
- Dealing cautiously with risk and irreversibility
- Recognising the global dimension.

In addition, national strategies have been developed consistent with ESD with respect to greenhouse gases, biodiversity, forests and rangelands.

Assessing how successful these principles and strategies have been in changing policy outcomes is beyond the scope of this paper. But the Australian approach has been markedly more “economic” in its language, with its focus on integration of environmental and economic activity, environmental valuation, equity, and viewing irreversibility as a distinct category of risk pertaining to the environment. Developing strategies in ecological domains also provides a means of setting measurable goals that can be used for monitoring progress.

## Canada

Canada incorporated sustainable development into its Auditor General Act in 1995, at the same time establishing a Commissioner of Environment and Sustainable Development. The stated objectives of its approach to SD are:

- Sustaining natural resources, jobs and industries
- Protecting the health of people and ecosystems
- Meeting international obligations
- Promoting equity
- Improving the quality of life and well-being.



Canada has also identified a series of “instruments” for furthering SD:

- An integrated approach based on sound science, incorporating full cost accounting, environmental assessments, ecosystem management
- Working together
- A mix of policy tools, eg voluntary actions, information provision, economic instruments, government expenditure, command and control (regulation)
- The greening of government operations
- Establishing the necessary management context for implementation.

Again the language is instructive here: the list of policy tools could have been lifted from a text book on economic analysis of policies towards externalities.

In addition to these general approaches through the public sector, in 2001 the government established a not-for-profit trust called Sustainability Technologies Canada to support technological innovation that will assist in moving Canada to a more sustainable position. This is predicated on the view that “stick” measures such as environmental pricing or regulation alone may prompt insufficient innovation and lead to business contraction or relocation to other countries, unless there are positive alternatives being developed that would make substitution feasible within the domestic economy.

Non-profit organisations have also been influential in developing alternative measures to GDP that reflect aspects of sustainability development. These include the GPI Atlantic,<sup>9</sup> a genuine progress index used to measure developments in the Atlantic provinces, and the Canadian Index of Well-being developed by the Institute of Well-being, which combines measures that are clear, valid, and regularly reported, to round out understanding of Canada’s economic reality and longer-term prosperity with information on the social, health and environmental conditions that shape progress in communities.

## United Kingdom

The United Kingdom early on embraced the idea of sustainable development, as it was extensively examined in the so-called Pearce Report to government which was later published in book form as “Blueprint for a Green Economy” (Pearce et al. 1989). The report stated that for sustainability and efficiency it was necessary to take environmental issues into account more systematically than had hitherto been the case, with consistent valuation of the environment, and that natural resource accounting and economic instruments all had a role in doing so. It had something of an academic’s wish-list about it and some of its suggestions have since proved impractical, but much of it remains valid in showing that conventional economics could be quite compatible with sustainable development if some peripheral areas of economics were brought into the mainstream to make it more comprehensive.

---

<sup>9</sup> <http://www.gpiatlantic.org/ciw/index.htm>

The UK government issued its first sustainable development strategy in 1994, and another in 1999 under the title "A better quality of life". Since then effort has concentrated on the development of 68 indicators for tracking progress under the following broad headings:

- Economic growth (Economic output, Investment, Employment)
- Social progress (Poverty and social exclusion, Education, Health, Housing, Crime)
- Environmental protection (Climate change, Air quality, Road traffic, River water quality, Wildlife, Land use, Waste).

This is a melding of economic, environmental and social dimensions, and has been accompanied by moves towards more integrated public policy analysis with similar scope, as well as improving the sustainability of government's operations. Departments are now required to prepare plans identifying their potential contributions to sustainable development and how to achieve them. Indicators alone do not guarantee better management, without clear direction and guidance on overall objectives, but it would be hard to ascertain priority areas and progress against them without reliable and comprehensive indicators. How far sustainable development has changed decisions on economic, social and environmental issues in the UK is a moot point, in view of controversy over recent decisions on new coal fired power stations and airport expansion.

## Norway

Norway is not a country that New Zealand commonly compares itself with, although they share some characteristics in common: a similar sized population spread over an elongated and mountainous territory, similar dependence on climate for extensive hydro-power developments, and a sizable indigenous population (in Norway the Sami) with distinct culture and interests to be included in the political process. The analogy should not be stretched too far, as Norway has distinct advantages in being connected to the markets and power systems of neighbouring EU countries, but it provides an instructive example of how a self-perceived small country approaches the challenge of sustainable development.

Norway's cabinet accepted the first national sustainable development strategy in 2002, and sustainable development action plans within that were released in 2004, co-ordinated by the national finance ministry and with progress reports presented in the government's budget. The national strategy for sustainable development states that "The overriding objective for Norway and the international community is to make development ecologically, economically and socially sustainable. The basis for continued utilisation of nature and natural resources must be maintained. Within these constraints we will promote stable, healthy economic development and a society with a high quality of life, and we will play a part in helping the poor people of the world to achieve material welfare and a higher quality of life." (Ministry of Finance 2007)

The action plan focuses on seven selected priority areas:

- International co-operation to promote sustainable development and combat poverty

- Climate change, the ozone layer and long-range air pollution
- Biological diversity and the cultural heritage
- Natural resources
- Hazardous substances
- Sustainable economic development
- Sami perspectives on environmental and natural resource management.

The emphasis of the action plan is not so much on the individual measures it describes, but its function in establishing mechanisms to promote more cohesive and co-ordinated efforts. In preparing the action plan, the Norwegian Government focused on the need for clear objectives and verifiability. The Government considered it essential to integrate sustainable development efforts into ordinary political activities and into the budgetary process, where many of the most important priorities are determined, so all ministries follow up the action plan within their own spheres of responsibility. The action plan now includes a preliminary set of indicators of sustainable development for tracking progress. The instruments being used to implement the plan include international co-operation, economic instruments such as eco-taxes and tradable permits, administrative instruments, research and development, public procurement, impact assessment and licensing procedures, and information.

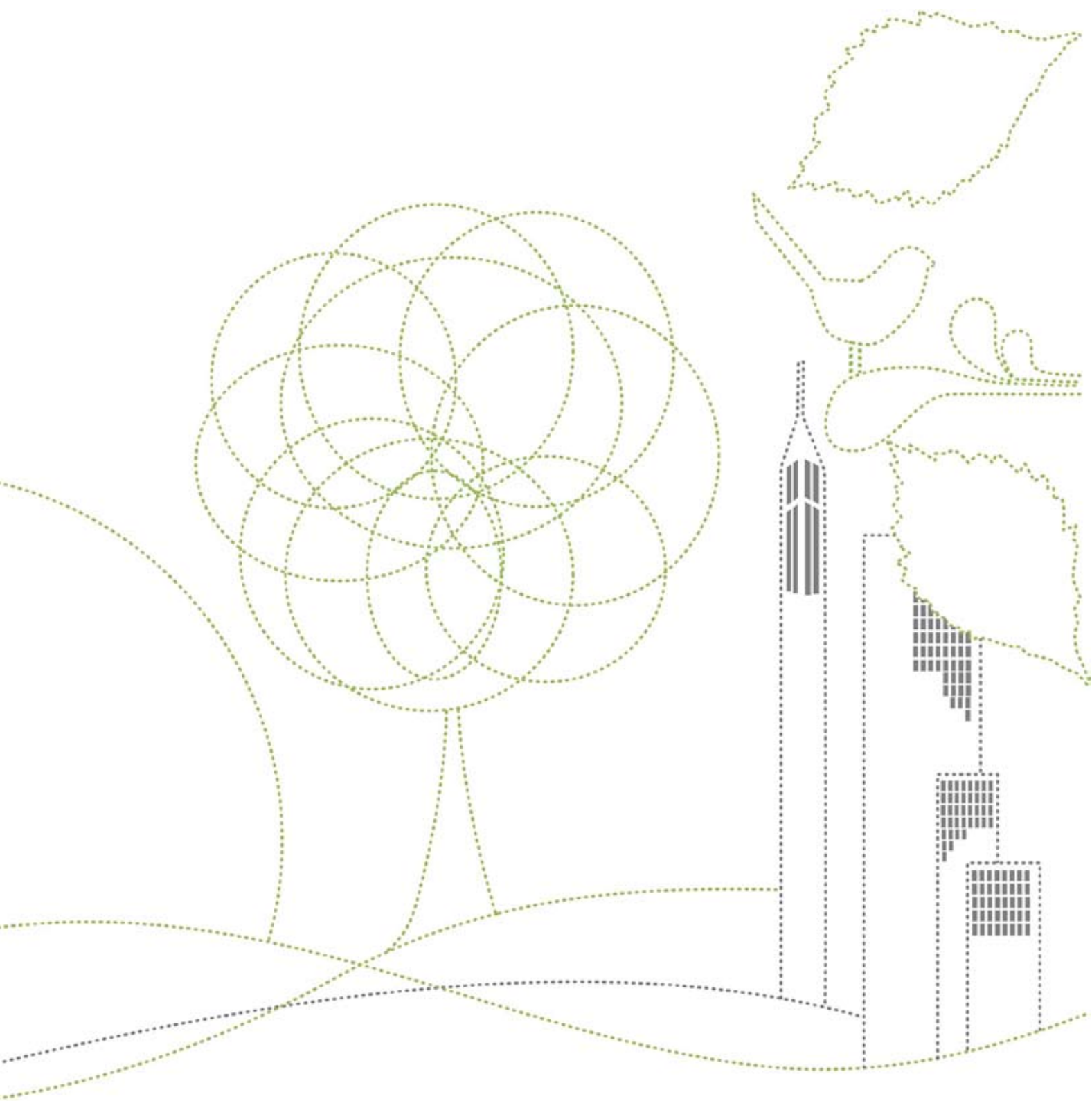
Distinctive features of the Norwegian approach are its external orientation towards relieving poverty in developing countries, and its embedding of sustainable development in the heart of government processes within the finance ministry. Drawing on international experience of planning for sustainable development, the Norwegian approach stresses the importance of:

ensuring that the objectives, division of responsibilities and follow-up mechanisms set out in the plan are as concrete as possible, to avoid large-scale, lengthy processes that do not actually achieve much

focusing attention on selected priority issues within the field of sustainable development, so that the plan is as concrete and targeted as possible, based on analysis of important development trends

linking the sustainable development effort to central economic policy documents and decisions, to avoid a situation where sustainability or environmental policy are pursued as separate issues.

Central to the Norwegian approach are improving co-ordination and coherence of policies across ministries, which in economists' language could be described as ironing out regulatory and market failures that have costly consequences. In a sense sustainable development is not so much a new paradigm as giving effect to the old paradigm, that making the most of the economy's resources and achieving economic efficiency in their use requires mechanisms that as far as possible internalise externalities and reduce transaction costs.



8 Halswell St, Thorndon | PO Box 3479, Wellington  
Tel: +64 4 472 1880 | Fax: +64 4 472 1211  
econ@nzier.org.nz | www.nzier.org.nz

NZIER's standard terms of engagement for contract research can be found at [www.nzier.org.nz](http://www.nzier.org.nz). While NZIER will use all reasonable endeavours in undertaking contract research and producing reports to ensure the information is as accurate as practicable, the Institute, its contributors, employees, and Board shall not be liable (whether in contract, tort (including negligence), equity or on any other basis) for any loss or damage sustained by any person relying on such work whatever the cause of such loss or damage.