

# POLICY Quarterly

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## Special Issue: Mining on Conservation Land

Origins of the Legislation and Policy  
Relating to Minerals in Conservation Areas

*Philip Woollaston*

3

Access to Minerals

*Tom Bennion*

7

Mining in the New Zealand Economy

*Geoff Bertram*

13

Mining and Development:  
Lessons from the United States

*Gundars Rudzitis*

20

A Mining Industry View

*Chris Baker*

26

An Assessment of Proposed  
Changes to the Child Support Formula

*Stuart Birks*

31

The Political Economy of Child Care Policy  
Contradictions in New Zealand and Canada

*Maureen Baker*

39

Applying Complexity Theory to  
New Zealand Public Policy: Principles  
for Practice

*Elizabeth Eppel, Anna Matheson  
and Mat Walton*

48

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## Editorial Note

In the late 1970s and early 1980s the New Zealand Government embarked on a set of massive investment projects, under the generic title 'Think Big'. The hostile public reaction sparked by that drive for large-scale industrial development left a big imprint on national politics for two decades. Dissatisfaction with the lack of public input under the previous planning statute, the Town and Country Planning Act, led to its replacement by the Resource Management Act 1991. The extreme difficulty of extracting from official sources the necessary information to allow properly-informed public debate and participation gave popular impetus to passage of the Official Information Act 1982. A widespread feeling of unease that an unholy alliance of big-industrial developer interests with key Ministers and officials had overridden the system's few checks and balances on unbridled 'development' at the expense of the environment and the wider economy led to the 1985 Environment Summit and the subsequent establishment of the Department of Conservation and the Ministry for the Environment. The government departments at the forefront of Think Big – Works, the Forest Service, Energy, Trade and Industry – were abolished.

Opposition to Think Big came in a variety of forms, and the lessons drawn from the expensive (for taxpayers) failure of the programme were correspondingly diverse. For some participants, Think Big seemed proof of the neoliberal claim that governments cannot 'pick winners' and hence should not try. For others (including the present writers) the problem was not the practice of project selection per se – since this is inescapably a task faced in various guises by any modern government – but the particular approach adopted by the Muldoon administration. The hallmarks were use of a parliamentary majority to override normal regulatory checks and balances; a contempt displayed towards ordinary members of the public in the course of a debate in which official information was withheld and manipulated as a means of disempowering constructive public participation; and heavy dependence by Ministers and officials on analyses, arguments and promises served up by project promoters and their allies among local lobby groups.

For veterans of Think Big politics, the events of 2010 had a strong element of *déjà vu*. In March, the Ministry of Economic Development produced a discussion paper promoting the extension of mining into parts of the conservation estate protected under schedule 4 of the Crown Minerals Act. The paper conspicuously lacked any substantial economic analysis of the costs and benefits of the proposed policy. Over the following nine months no such official analysis emerged into the light of day. No systematic analytical work was even attached as background to the Cabinet papers for the meeting in July 2010 when the sanctity of Schedule 4 was reaffirmed. The public submissions process, street demonstrations, and eventual Government about-face, arose basically from an instinctive unease well-founded in folk memory, and from a sense of important industry policy being made on the basis of ideology and industry lobbying rather than careful, reasoned analysis by officials.

Hoping to fill the analytical gap, the Institute of Policy Studies convened a symposium on the Schedule 4 debate in August 2010. This issue of *Policy Quarterly* carries five of the papers presented at that event, or written up afterwards by presenters. Philip Woollaston, the Minister of Conservation at the end of the Fourth Labour Government, reviews the origins of the legislative changes surrounding mining development in the Crown Minerals Act 1991, and the legal difficulties that prevented mining from being covered along with all other sectors by the provisions of the Conservation Act 1987. He points to 'vague language and limitations placed on the requirement to consult' as serious weaknesses of the

Crown Minerals Act, and hints at the desirability of bringing mining into the Conservation Act on the same footing as other commercially-motivated developments.

Tom Bennion reviews the origins of the common-law 'severed estate' under which ownership of the land surface is separated from Crown ownership of minerals on and under the surface, and summarises the legal procedures covering mining access to private land, Crown land, the conservation estate in general, and Schedule 4 land. He suggests that new legislation being proposed by the Government in late 2010 is likely to turn the clock back to the pre-1991 situation of direct conflict between mining legislation and the principles of the Conservation Act, and wonders whether placing the minister of energy alongside the minister of conservation in the proposed new decision-making system could have perverse consequences, possibly unforeseen.

Geoff Bertram assembles some of the quantitative information required as input to an informed public debate, and produces a league table of varieties of mining in order of probable net benefit (if any) to the economy in the broad sense. His conclusion – that quarrying gives the best quantifiable economic payoffs, and gold and silver the worst – points to the importance of treating project proposals separately on their individual merits, not generically on the basis of any preconceived view that mining is either a saviour or a nemesis. He reviews some important work commissioned a decade ago (and apparently forgotten since) by the New Zealand Government on the economic impact of a negative shock to the nation's 'clean green' branding image, and on the proper valuation of the country's mineral endowment as an asset.

Gundars Rudzitis reflects on US historical experience with large-scale mining and surveys some of the empirical literature on development in the US West, which in his view demonstrates the superior durability and quality of 'amenity-driven development' as an alternative (and successor) to mining. Counties which rely upon high environmental quality to attract tourism and services employment appear to have superior economic performance over time relative to mining counties, reflecting the latter's great job insecurity, lower wages, and high costs of cleaning up after departing miners. Whether New Zealand can improve on the US record is not clear, but Rudzitis argues strongly for keeping mining development out of the most sensitive parts of the conservation estate and away from key tourism destinations.

Chris Baker presents the mining industry view, rehearsing many of the arguments put forward by Straterra during the 2010 public debate, and arguing that the eventual abandonment of the Government's plans for Schedule 4 was the result of media bias, public ignorance, and emotive campaigning. In his view, properly-conducted economic analysis would demonstrate the general desirability of expanding large-scale mining.

The IPS provided the Ministry of Economic Development with an opportunity to contribute, both to the symposium and to this issue of *Policy Quarterly*. Unfortunately, because of the sensitivities surrounding the issues, this was not possible. Nevertheless, in the forthcoming public debates over mining of non-Schedule 4 conservation lands, and the proposed development of a huge lignite-mining operation in Southland by the SOE Solid Energy, the Ministry could do the public of New Zealand a considerable favour by producing credible, independent and well-grounded analysis of the economics.

This issue of *Policy Quarterly* includes three other important articles: Stuart Birks assesses the proposed changes to the child support formula; Maureen Baker explores the political economy of child care, with particular reference to Canada and New Zealand; and Elizabeth Eppel, Anna Matheson and Mat Walton reflect on the contribution of complexity theory to public policy. All in all, we trust that readers will find much to stimulate and challenge them in this issue.

Geoff Bertram  
Jonathan Boston

Philip Woollaston

# Origins of the Legislation and Policy Relating to Minerals in Conservation Areas

On 4 September 1990 I introduced into Parliament the Protected Areas (Prohibition on Mining) Bill – sometimes referred to as PAPOM. It was a government bill, introduced in my role as minister of conservation. The genesis of the bill was long and tortuous, though by no means as long as the seven years it took for parts of it to find their way into the statute book as the Crown Minerals Amendment Act No 2 1997.

The growing awareness in the 1960s and 1970s that natural resources are not infinite and the environment not infinitely robust led to the increased political strength of the environmental movement in New Zealand, through campaigns such as Save Manapouri in the 1960s and the Native Forest Action Council beech forest

campaign of the 70s. In the first half of the 1980s the Muldoon government's vaunted 'Think Big' policies led to further polarisation over massive projects such as the Clyde Dam. The failure of 'Think Big' and the election of a reforming Labour government in 1984 led to an effective liberation of the environmental movement. That is not to say that the fourth Labour government was a 'green' government. It was not. The internal disagreements over environmental issues and policies were as pronounced as the more notorious divisions over economic

policy, with the 'green' members in a significant minority.

That the snap election of July 1984 caught both the Labour Party and the electorate unprepared was fortunate for Labour, which was able to claim a mandate to 'change things' without the baggage of too much policy detail. It was also helpful to the minority in the caucus who saw environmental and resource management policy as having the same sort of significance as economic policy.

Following the 1984 election an uneasy alliance emerged between the economic

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Philip Woollaston served as a Minister of Conservation during the fourth Labour government, and represented the Nelson electorate during the 1980s.

reformers in the Labour caucus (the 'Rogernomes') and its greener members, both having as short-term goals the abolition of damaging mechanisms such as SMPs (supplementary minimum prices),<sup>1</sup> fertiliser subsidies and suspensory loans for land development,

## ... DOC had no role ... in either monitoring or exercising discretion over consents for mining on conservation land ... despite being required to manage the land.

as well as the dismantling or weakening of the powerful construction arms of government: the Ministry of Works, Forest Service, Ministry of Energy, Department of Lands and Survey, Mines Department, etc. For the Rogernomes the objective was privatisation of their quasi-commercial operations, and for the environmentalists it was to join up the 'green dots' and create both a viable conservation agency and the mechanism for better and more transparent assessment of environmental costs and benefits of resource use proposals within government at all levels.

Much has been written about the changes to the machinery of government undertaken during that government's first term and I won't traverse the same ground, other than to say that the uneasy alliance was over by early 1987 with the establishment of the state-owned enterprises, Department of Conservation (DOC) and Ministry for the Environment. Attention was now focused on divisive issues such as the allocation of the remaining indigenous forests and high country land either to conservation or to private production, the creation of property rights in fish stocks, and, of course, the treatment of mining applications on Crown-owned land.

The classification of land which was allocated to DOC was a major and time-consuming exercise involving considerable research and fieldwork. To complete it was clearly going to take many years. The land which was not national park or already classified under the Reserves Act, the Forests Act

or the Wildlife Act became 'stewardship land' – a statutory holding pen – until it could be assessed and, if merited, given more precise statutory protection. This process was further complicated by the different – and sometimes overlapping – classifications inherited from different

departments operating under different statutes which reflected different periods of our history. In October 1987 Helen Clark (then minister of conservation) told Parliament:

There are plans for extensive reviews of conservation legislation within the next 3 years. A high priority will be a review of the legislation governing the different kinds of reserves. At present, 11 Acts of Parliament govern the protected areas and 36 different kinds of protected area are provided for.

She went on to say: 'It will be a major operation.'<sup>2</sup>

The objective was a bill to be called the Protected Areas Bill, which would cover all protected areas within the jurisdiction of DOC. Just over a month later Fran Wilde, associate minister of conservation, outlined the proposed timetable:

It is intended that the discussion document will be published in mid-1988, with proposals for legislative change to be before the Government in late 1988 or early 1989. It is expected that new legislation or amendments to existing legislation will go before the House in mid-1989 to late 1989.<sup>3</sup>

The timetable was ambitious. DOC was struggling with limited resources to establish itself from the fragments of a number of departments, and the government, preoccupied with major social and economic reforms on a number of other fronts, did not see reserve classification as a priority. A discussion document was released in

1988 and over 300 submissions received, but by January 1989 when I succeeded Helen Clark as minister of conservation progress was slow. Nevertheless, I was still hopeful, telling Parliament in September 1989 that:

the 20 different categories of protected area administered under 4 Acts of Parliament will be reduced to 5 categories in the proposed legislation: conservation park, reserve, sanctuary, wilderness area, and local purpose area. However, the present National Parks Act will remain intact, and will not be included in the proposed legislation.<sup>4</sup>

The reference to national parks is worth noting. Public submissions and other feedback had made it clear that any government that altered the special status given to New Zealand's national parks would do so at its peril. Recent reaction to the proposal to remove the 'schedule 4' protection from parts of some national parks suggests that the same sentiment is alive and well some 23 years later.

While all this was going on the public debate over mining in protected areas continued to grow. The issue was not new. A number of licenses for mining activity in ecological areas, consented to by the minister of forests prior to 1 April 1987, were contentious and more applications were being received. Not surprisingly, government departments held similar views to their client groups in the NGO and industrial sectors, with DOC advising its minister in June 1988 that after 1 April 1987 the Ministry of Energy 'saw significant changes in the land management priorities contained in the Conservation Act and no longer was prepared to trust the department to act reasonably in monitoring the conditions'.

The upshot of this disagreement was a Crown Law opinion, interpreted by the Department of Conservation as stating that DOC had no role at all in either monitoring or exercising discretion over consents for mining on conservation land which were issued prior to 1 April 1987, despite being required to manage the land. Moreover, they also concluded that some conditions applied since that

date were *ultra vires* and could not be enforced.

There was no disputing DOC's conclusion that legislative amendment was urgently needed. Part of the immediate problem – monitoring and control of the pre-existing leases – was eventually dealt with in section 34 of the Conservation Law Reform Act 1990, which was introduced to Parliament in August 1989. This act was the second part of the conservation legislation trifecta and dealt with the management of conservation resources while simplifying the complex web of advisory boards, etc, left by the precursor legislation. The rationalisation of the classifications of protected areas under the DOC's aegis – the proposed Protected Areas Bill – was to be Part 3.

However, the thorny issue of new mining applications over the conservation estate remained.

It might seem a logical assumption that the vesting of the conservation estate in the DOC would mean that the Conservation Act, with its protective philosophy, would hold sway and the minister's consent would be given or withheld accordingly. Unfortunately, that was not the legal reality. The minister of conservation's ability to consent, to impose conditions or to withhold consent for mining activities flowed from the Mining Act 1971 and was governed by it, not the Conservation Act. Some clarity might be gained by the issue of a policy document on the subject, and in late 1987 Helen Clark stated that she was 'working on a draft document that will outline guidelines by which I will determine whether to consent or not to consent to mining licence applications in conservation areas'.<sup>5</sup> However, the policy and guidelines would still have to conform to the Mining Act.

That point was not lost on seasoned campaigners such as the Maruia Society's Gwenny Davis and Guy Salmon, who obviously realised that, however good the guidelines, case-by-case decisions under the Mining Act would not achieve their goal. In November 1988 the society's Maruia Declaration was presented as a petition to Parliament, with over 154,000 signatures. It sought, *inter alia*, 'the closure to mining of national parks,

reserves, and specially protected areas' and subsequently received a favourable recommendation from the Planning and Development Select Committee.<sup>6</sup>

The release of Helen Clark's discussion paper on guidelines and the active lobbying of environmental groups were accompanied by a corresponding increase in publicity and lobbying from the mineral industry, particularly the

protected areas proposed in 1987 has not subsequently taken place. While there has been some alignment of the Reserves Act and the Conservation Act, there are both overlaps and confusing differences between them and the Reserves Act struggles to deal with the national taonga of our nature and scientific reserves in the same legislative breath as local domains and gravel pits. Whether because of that

## ... it was obvious that the piecemeal consideration of applications ... was divisive, expensive for mining proponents and opponents alike ...

Mining and Exploration Association. There was also a flurry of applications for mineral exploration in protected areas. In July 1989 DOC reported to the minister of conservation that there were current applications in respect of ecological areas in Westland, north-west Nelson and western Southland, with a need to determine '20-odd' applications. DOC's advice went on to raise the 'more strategic' question of whether such sensitive land should be open to prospecting, and by implication subsequently to mining, at all.

I am not sure at what point the 'strategic question' – already asked and answered by the Maruia Declaration and a select committee of Parliament – became a legislative proposal, but it was my desire to entrench as far as possible the protection from mining and prospecting of the most sensitive areas in the Protected Areas Bill. Quite apart from any personal views I had on the mining of those areas, it was obvious that the piecemeal consideration of applications (and in some cases subsequent litigation) was divisive, expensive for mining proponents and opponents alike, and was diverting scarce resources within the department from the work it had been set up to do.

However, by the start of 1990 I had to accept that the Protected Areas Bill, requiring lengthy and complex drafting, was not going to make it onto that year's legislative programme. As an aside, I think it a pity that the rationalisation of

or for other reasons, there does not appear to be an accessible and authoritative database of protected areas and their classifications, which I find surprising.

At the same time as the logical vehicle for greater protection of the most sensitive areas was stalling by the roadside, the controversy over applications for mineral activity in ecological areas and over other sensitive conservation land was intensifying. DOC's hands – and mine – were to an extent bound by the Mining Act presumption that Crown land was open for mining and the requirement that each application be considered under that act. A DOC proposal that the minister of energy close 60,000 hectares of the Northwest Nelson Forest Park (destined to become part of the Kahurangi National Park) to mining activities was opposed by the Ministry of Commerce and remained stalled on the minister of energy's desk. The environmental groups, sensing an imminent change of government, were becoming more agitated.

On 29 March 1990 I managed to secure space in the legislative programme for a smaller and less complex Protected Areas (Prohibition on Mining) Bill. The intention was quite clear: to prohibit mining (including prospecting) in all national parks, plus national reserves, nature reserves and scientific reserves under the Reserves Act and all wilderness areas, sanctuary areas and ecological areas under the Conservation Act.<sup>7</sup>

The bill also extended a similar protection to Antarctica (a policy

announced in the 1989 white paper on Antarctica). This provision later became, in amended form, Part 2 of the Antarctica (Environmental Protection) Act 1994.

A significant feature was that the bill allowed (in clause 3) the extension of the same protection to other areas of conservation land (but not land outside the conservation estate) by order-in-council, on the joint recommendation of the ministers of conservation and energy. There were thus two possible paths to the protection of land not already in one of the above categories: either a specific decision of the two ministers that a particular piece of land should become a 'protected area', a decision which would certainly be taken only after consideration of advice from both the Department of Conservation and the Ministry of Commerce but which did not require public consultation; or by having the land gazetted as belonging to one of the protected categories – a much lengthier process, subject to public consultation with statutory rights of submission and objection. My recollection is that the 'fast track' procedure was seen as an emergency measure which would be rarely used. A possible example might be to protect the special values of land being investigated for national park status – a process lasting years rather than months – if a mining proposal seemed imminent.

This meant that the PAPOM regime made it easier to add further protected areas than to remove the protection, as the bill contained no means of exempting land in one of the listed categories and no mechanism for revoking a declaration made under clause 3. To do either of these things would have required an act of Parliament. The only other way to undo the effect of the bill would have been to change the status of a particular piece of land so that it no longer fell into a protected category. In the case of national parks and national reserves, that would also require an act of Parliament.<sup>8</sup> For wilderness, sanctuary and ecological areas, gazettal can only be revoked after the same degree of public consultation as that required to create them.<sup>9</sup> In the case of nature reserves and scientific reserves public consultation is also required,<sup>10</sup> and even then the minister's powers of

revocation are limited.<sup>11</sup> It was certainly intended that the protection should be permanent, other than in the unusual circumstance that the values for which an area of land had been specially protected had ceased to exist to such an extent that it no longer belonged in that category. This contrasts with the comparative ease with which the ministers of energy and conservation can amend the 4th schedule of the Crown Minerals Act (CMA).<sup>12</sup>

It has been widely assumed that requiring an act of Parliament to revoke national park or national reserve status gives a greater degree of protection than is accorded the other 4th-schedule categories. A high degree of protection was clearly the original intention, contrasted with the simple gazette notice that might once have been the alternative. However, the speed and visibility of legislation is largely in the hands of the government of the day and whether it is in fact stronger than the extensive public consultation now required by the Conservation Act<sup>13</sup> is a moot point. However, there are significant differences between the Conservation Act definition of consultation and that in the Crown Minerals Act.<sup>14</sup>

In particular, the vague language and the limitations placed on the requirement to consult in section 61(5) of the CMA contrast starkly with the requirements of section 49 of the Conservation Act. Another strange feature is the provision in section 61(6) that no ecological area can be added to the schedule unless the minister of energy and the minister of conservation have reassessed the particular scientific value for which the land is held and also assessed the value of any Crown minerals in the land. That provision not only requires them to second-guess the scientific assessment that led to the area being gazetted, it also seems to suggest that the land should be prospected for minerals in order to decide whether it should be closed to prospecting!

The ecological areas, which were at the focal point of the issue more than two decades ago, seem to be the biggest losers in the transition from the PAPOM Bill to the 4th schedule of the CMA. Their category has been removed from the protective regime, and only

two ecological areas – Parakowhai (or Parakawai) and Otahu – are named in the schedule. (The Ministry of Economic Development recently commissioned a section 61 report on the Parakowhai Ecological Area, presumably with a view to its possible removal.) I think I understand the horse trading that led to the absolute prohibition of any of the 34 ecological areas named in the 4th schedule of the Conservation Act being protected under the CMA 4th schedule – presumably pursuant to the West Coast Accord – but there are another 77 (by DOC's count) missing from any list. Fifty of them are in the North Island and 16 in parts of the South Island outside the West Coast.

It is pleasing that some measure of protection from mining activities is accorded most of the areas contemplated in the PAPOM Bill (and here I should pay a tribute to the three women principally responsible for resurrecting it: Judith Tizard, Christine Fletcher and Jeanette Fitzsimons – MPs from three different parties, a nice example of MMP in action), but the protection under the CMA 4th schedule is undeniably weaker than I had envisaged. I think there is plenty of evidence that the protection in the PAPOM Bill is still needed, ideally accompanied by the unified protected areas legislation proposed in 1987. In the meantime, a public register of protected areas and their classifications would be a useful start.

1 The supplementary minimum price scheme under which export prices of wool and meat were guaranteed operated from 1975 to 1985. See, for example, Griffin G.R. and T.P. Grundy (1988) *The Supplementary Minimum Price Scheme: a retrospective analysis*, Christchurch: AERU, Lincoln College.  
 2 *Parliamentary Debates* (Hansard), 7 October 1987.  
 3 *Ibid.*, 10 November 1987.  
 4 *Ibid.*, 14 September 1989.  
 5 *Ibid.*, 24 November 1987.  
 6 *Ibid.*, 4 October 1988.  
 7 I announced this intention at the Maruia Society AGM on 1 April. Nature reserves were not included in the proposal at that time but were subsequently added.  
 8 See National Parks Act 1980, s11(1) and the Reserves Act 1977, s13(2).  
 9 Conservation Act 1987, s18(8).  
 10 Reserves and Other Lands Disposal Act 1977, s24(2).  
 11 *Ibid.*, s24(4).  
 12 Crown Minerals Act 1999, s61(4).  
 13 Conservation Act 1987, s49.  
 14 Crown Minerals Act, s61(5).

# ACCESS TO MINERALS

Controversy over access to minerals is not recent. For example, in 2011 the Supreme Court will hear the *Paki v Attorney General case*,<sup>1</sup> involving Māori claims to continued interests in the bed of the Waikato River. In 1903, under the Coal Mines Amendment Act of that year, the beds of all ‘navigable’ rivers in New Zealand were taken because of a concern at the time about coal being mined under river beds.<sup>2</sup> That law remains in force under the Crown Minerals Act 1991 (CMA) (section 11(2)). The case arises because there has never been a clear understanding of what ‘navigable’ means.

Here is another example. In 1937 the Crown nationalised petroleum. As late as 2002 it became apparent that there was uncertainty about what that entailed. In 2002 the Ministry of Economic Development wrote to key coal mining interests and advised them that the Crown considered that the 1937 legislation (the Petroleum Act 1937), repeated in the CMA, also covered the methane gas around coal seams (also called coal seam gas).<sup>3</sup> As you might imagine, this extends

considerably the land over which rights to access petroleum may be exercised.

#### The basic issue

The common law holds that ownership of the land is to the centre of the earth. It was apparently a Jewish scholar who first enunciated the idea, which was picked up by the Romans, and by the 16th century was an accepted principle of English common law.<sup>4</sup>

Yet in New Zealand today, for almost all land we have a situation which in the United States is known as a split or severed estate, with the surface of lands

and the minerals in separate ownership, and the minerals in nearly all situations held by the Crown. This division is what makes access such a fraught issue in relation to minerals. As John Luxton put it when the CMA was passed:

The issue of access is another contentious matter. This is a problem of competing property rights – the property right of the surface landowner and the property right of the Crown as owner of the substrata. ... In 1873 the comment was made that there was no doubt that one of the most difficult problems that the House had to solve was the way to dissociate surface rights from mineral rights. So that problem remains. This is not an environmental issue; it is an issue of competing property rights – that is, the right of the Crown to extract minerals for the benefits of taxpayers or the property rights of the surface owners to continue to use the surface of the land.<sup>5</sup>

The split or severed estate came about in three ways:

- Crown claim to ownership of gold and silver
- Crown reservation of minerals from titles issued by it

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- special legislation concerning recently valuable minerals – petroleum and uranium.

#### **Crown claim**

In 1568 Thomas Percy, the Earl of Northumberland, was sued by Queen Elizabeth I over mineral rights on the estate granted to him by the Queen. The resulting court decision, the Case of Mines, established the common law principle that the Crown by prerogative right owns all gold and silver. This prerogative right was imported into New Zealand law on the basis that New Zealand was an English settlement, the settlers bringing with them all the laws of England that were 'suitable' to the colony.<sup>6</sup>

## **... the Case of Mines established the common law principle that the Crown by prerogative right owns all gold and silver. This prerogative right was imported into New Zealand law on the basis that New Zealand was an English settlement ...**

The principle has had an interesting application in New Zealand. When Māori began to demand money from Pākehā miners accessing their lands for gold in Hauraki, the Crown intervened to manage the goldfields and paid Māori for access to their lands, but remained coy about openly asserting the Crown prerogative, because of fears that Māori would forcefully reject the assertion.<sup>7</sup> The situation might be described as a 'secret severed estate'.

#### **Crown reservation**

Beginning with the Land Act 1892, the Crown reserved minerals in alienations of land. Since almost all land in New Zealand originates in a title from the Crown (the Crown being responsible for alienation from Māori), this has meant that practically all minerals are vested in the Crown. Under the CMA, minerals are defined<sup>8</sup> widely as 'naturally occurring inorganic substance beneath or at the surface of the earth, whether or not under

water; and includes all metallic minerals, non-metallic minerals, fuel minerals, precious stones, industrial rocks and building stones'. It is worth noting that there have been varying definitions in statutes and legal documents of what exactly constitutes a mineral, and that can be important for the interpretation of old Crown grants, to discover what minerals are covered by them and what are not.

#### **Special legislation**

The Petroleum Act 1937 nationalised all petroleum to the Crown. The Atomic Energy Act 1945 nationalised uranium. Also, the Iron and Steel Industry Act 1959 vested the right to prospect and mine ironsands in the Crown. Apparently this

occurred because a local steel industry was seen as vital to partly replace New Zealand agricultural exports if they were frozen out of the European Common Market.<sup>9</sup> This provision had been repealed by the time of the 1991 act.<sup>10</sup>

The Petroleum Act 1937 has been the subject of a Waitangi Tribunal report.<sup>11</sup> It considered that while petroleum wasn't a special taonga of Māori and enjoying Treaty protection in that sense, the extinguishment in 1937 of the property right Māori enjoyed in it created a 'Treaty interest', which requires recognition in Treaty settlements today, possibly in a sharing of royalties (a conclusion which successive governments have rejected).<sup>12</sup>

#### **The situation under the CMA – private land**

The regime for access to land to obtain minerals under the CMA begins with permits issued by the minister of energy to prospect, explore and mine. Permits to prospect can be issued by the minister for both Crown-owned and privately-owned

minerals, but in the case of permits to explore and mine may be issued only for Crown-owned minerals. (As noted, most minerals are owned by the Crown anyway.) For all permits, entry to land is allowed for what the CMA describes as 'minimum impact activities', which covers geological and land and aerial surveying, and hand sampling (s49(3) and s2). If you are the Crown or you have a permit, you have a 'right' to enter land without the owner's consent provided you give ten working days' notice. Under section 52, the District Court may make an order for access if required. There are some exceptions to this for some types of Māori land (s51). The CMA also provides that any prospecting, exploration or mining on the surface of land that basically does not interfere with all other incidents of ownership or enjoyment of land has a right of access (s57).

For activities other than minimum impact activities there is no right of access. Petroleum is an exception to this (s55). However there is a fallback provision allowing compulsory access to land in the national interest, under section 66. The provision applies where the owner or occupier of land subject to a permit 'fails or refuses to enter into an access arrangement with the holder of the permit' and the permit holder appeals to the minister of energy. If the minister considers that there are 'sufficient public interest grounds', an arbitrator is appointed by order-in-council to determine an access arrangement. The test of 'sufficient public interest' is very broad. The test may be seen as akin to the term 'national interest' in s37(5) of the Mining Act 1971. In respect of that term, Judge Richardson stated in *Stewart v Grey County Council*: 'Under s37(5) the Minister and the Minister alone, is the judge of whether it is in the national interest to declare the land to be open for mining.'<sup>13</sup>

#### **The situation under the CMA – DOC land**

DOC land is excluded from all of the above requirements. That is, minimum impact activities cannot be carried out on DOC land without permission of DOC, nor can they be forced for petroleum or any other mineral in the national



interest (s50 and s55(2)(a)). DOC land can be broken into two kinds, 'ordinary' DOC land and schedule 4 land, which is specially protected.

#### 'Ordinary' DOC land

Sections 61(1) and (2) provide for the minister to reach an agreement for ordinary DOC land to be entered for mining purposes. The provision is not specific to DOC. It simply provides that any minister, when approached, must 'have regard to':

- (a) The objectives of any Act under which the land is administered; and
- (b) Any purpose for which the land is held by the Crown; and
- (c) Any policy statement or management plan of the Crown in relation to the land; and
- (d) The safeguards against any potential adverse effects of carrying out the proposed programme of work; and
- (e) Such other matters as the appropriate Minister considers relevant.

The origin of this provision is the previously difficult situation that existed under the Mining Act 1971. As John Luxton put it when introducing this measure into the House in 1991:

In the past, conservation in mining districts has been left basically to the good sense of the Minister of Mines and the former Mines Department. One might now say that mining in conservation areas is left to the good sense of the Minister of Conservation and the Department of Conservation.<sup>14</sup>

Before the passing of the 1991 act, the Mining Act 1971 was deemed in at least one case (*Stewart v Grey County Council*) not to be subject to the land use control provisions of the Town and Country Planning Act 1977. And, even following the passing of the Conservation Act in 1987, in *Spectrum Resources Ltd v Minister of Conservation*<sup>15</sup> the High Court determined that the Mining Act still prevailed when the minister of conservation sought to review existing mining consents to bring

## The debate over mining on land managed by the Department of Conservation is long standing, and strong views are held on both sides of the argument.

them into line with the conservation values of the 1987 act.

DOC's website explains the current situation:

#### Basis of DOC's decisions

In considering whether or not to grant access, DOC's main concerns, as outlined in section 61 of the Crown Minerals Act, are that:

- the proposal is consistent with the purpose for which the land is held
- the proposal complies with, or is consistent with, the management plan or the conservation management strategy for the area
- there will be no significant negative effects on the environment.

To date most applications for prospecting and exploration have been granted.

Note that DOC also has to consider, under section 4 of the 1987 act, tangata whenua views on any proposal. Section 4 provides that 'All persons exercising functions and powers under this Act shall have regard to the principles of the Treaty of Waitangi (Te Tiriti o Waitangi)'.

#### Schedule 4 DOC land

The current protection provided to schedule 4 lands began life as the Protected Areas (Prohibition on Mining) Bill 1990 and the Coromandel Hauraki (Prohibition on Mining) Bill. Over 600 submissions were received on the bills and 2,500 form letters. Forty hours of evidence was heard. Public polling indicated 62% support for bans on mining in DOC land in the Coromandel area. A select committee recommended that the bills be unified and passed as an amendment to the CMA: the Crown Minerals Amendment Act

(No 2) of 1997.<sup>16</sup> Section 66(1A) currently provides:

66 (1A) The Minister of Conservation must not accept any application for an access arrangement or enter into any access arrangement relating to any Crown owned mineral in any Crown owned land or internal waters (as defined in section 4 of the Territorial Sea, Contiguous Zone, and Exclusive Economic Zone Act 1977) described in schedule 4, except in relation to any activities as follows:

- (a) That are necessary for the construction, use, maintenance, or rehabilitation, of an emergency exit or service shaft for an underground mining operation, where these cannot safely be located elsewhere, provided that it does not result in –
  - (i) Any complete stripping of vegetation over an area exceeding 100 square metres; or
  - (ii) Any permanent adverse impact on the profile or surface of the land which is not a necessary part of any such activity;
- (b) That do not result in –
  - (i) Any complete stripping of vegetation over an area exceeding 16 square metres; or
  - (ii) Any permanent adverse impact on the profile or surface of the land that is not a necessary part of any activity specified in paragraph (a);
- (c) A minimum impact activity;
- (d) Gold fossicking carried out in an area designated as a gold fossicking area under section 98 of the Crown Minerals Act 1991:

(e) Any activity carried out in accordance with a special purpose mining permit for demonstrating historic mining methods as provided for in the relevant minerals programme required under section 13 of the Crown Minerals Act 1991.

In Parliament the then energy minister, Max Bradford, argued that:

The debate over mining on land managed by the Department of Conservation is long standing, and strong views are held on both sides of the argument. The Bill as reported back is a reasonable approach that seeks to balance competing interests,

reports were heard suggesting that a debate about schedule 4 lands should be started. The industry's silence may indicate that it does not appreciate the minister's bold initiative, which brought thousands out onto the streets to protest against mining.

Despite this setback, there are two remaining proposals the government wants to proceed with.<sup>17</sup> The first is a change to the way that new national parks and other lands of high significance get added to schedule 4. Currently, classification decisions for the classes of conservation area listed in schedule 4 of the CMA are the sole responsibility of the minister of conservation. The intention is that 'these classes be automatically

of Energy is notified when DOC has been instructed to investigate potential new national park areas, and an administrative process has recently been agreed whereby DOC informs the Ministry of Economic Development (MED) of a proposed conservation classification one month before it is publicly notified.

We consider that greater upfront consideration should be given to the other potential values of the land by requiring an Order in Council (subject to Cabinet consideration) to be made to implement classification decisions for those conservation classes listed in Schedule 4. These decisions are currently the sole responsibility of the Minister of Conservation.

This is important, particularly when one considers that the current government has stated that it is 'committed to ensuring that New Zealand is a highly attractive global destination for petroleum exploration and production investment, such that we are able to develop the full potential of our petroleum resources'.

The Cabinet paper also suggests that the minister of conservation might not take into account other uses:

Conservation classification decisions are permanent and so once an area is given a high conservation classification, mineral resources can be effectively sterilised and other uses such as for renewable energy or some types of tourism activities can be compromised. As such we consider the automatic addition of areas is only appropriate if statutory processes exist to ensure that mineral values are properly considered in conservation classification decisions that have this effect.

In relation to the proposal to have the minister of energy assist with decisions on ordinary DOC lands, the Cabinet paper says that:

The current provisions fail to recognise that the Crown has distinct interests in both the surface values of land and the underlying minerals, both of which it manages on behalf

## **The current provisions fail to recognise that the Crown has distinct interests in both the surface values of land and the underlying minerals, both of which it manages on behalf of, and for the benefit of, all New Zealanders.**

while still addressing the issues of what additional restrictions to access to Crown minerals we want to have when those minerals are in particular categories of conservation land.

And for the areas under schedule 4 he said:

While the Bill effectively closes these areas to mining, it will enable low impact exploration necessary to identify the margins of resource outside the closed areas and investigations for scientific purposes to continue. Underground mining where access is outside the areas concerned will also be possible.

### **The schedule 4 debate and remaining proposals**

The recent government proposal to open up areas under schedule 4 to mining has lapsed. It is worth noting that while a review of what might be done to encourage mining had been under way for many months before Gerry Brownlee's proposal, no industry groups or expert

added to schedule 4 on their creation or classification' and that this is done 'by Order in Council (subject to Cabinet consideration)'.

The second is that decisions over mining of non-schedule 4 lands should be taken out of the hands of the minister of conservation alone and made joint decisions taken with the minister of energy and resources, with additional factors 'criteria relating to the economic, mineral and national significance of the proposal' being specifically considered.

In relation to the first proposed change, it seems that the government response to many submissions seeking the automatic addition of new national park and high conservation lands to schedule 4 is to reduce the responsibility of the minister of conservation in that process. The Cabinet paper explains:

While there are opportunities to raise the mineral potential of some conservation areas before their classification, this is limited currently. Currently the Minister

of, and for the benefit of, all New Zealanders. The current provisions give pre-eminence to the surface values without any explicit balancing of the two interests. Notwithstanding this most applications for access to Crown land are ultimately approved.

The current provision, s61(2), does allow the minister of conservation to balance competing interests under the heading '(e) Such other matters as the appropriate Minister considers relevant'. However, the intention is to have access determined specifically taking 'full account of the potential national significance and economic benefits of a proposal to explore or mine Crown-owned minerals'. The reasoning is weak. The background discussion paper says:

52 While consideration of the potential economic benefits of a mineral-related proposal is currently possible (land-holding ministers have regard to 'such other matters' as they consider relevant), it is not required. We consider that the Crown's interest in managing Crown resources for the benefit of all New Zealanders needs to be recognised, and additional criteria would achieve this.

53 Additional criteria will not be sufficient in themselves to ensure that mineral and economic objectives are properly considered, because they do not fall within the portfolio or expertise of landholding ministers or their officials. Joint decision making by both the landholding minister and the Minister of Energy and Resources should ensure that the Crown's different interests in the surface values of Crown land and in any subsurface minerals are recognised.

This proposal is then for two changes:

- further criteria to be added for consideration
- the minister of energy and resources to be involved.

On the face of it this proposal would take us back to a situation equivalent to the previous one, with Conservation Act 1987 values competing with those in the

Mining Act 1971. Arguably it goes even further, because now the minister of energy will be sitting at the shoulder of the minister of conservation. One wonders if the industry will thank Brownlee for the further encouragement of anti-mining sentiment that this legislative proposal will no doubt arouse, and which, on the government's own evidence, is not actually required.

In 1991 energy minister Luxton said that:

Mining is an important industry. I ask those people who think that New

the petrochemical industry, using gasification technology to convert lignite to petrochemicals, fertiliser and transport fuels. Lignite can also be converted to briquettes for conventional combustion.

The in-ground lignite resource is estimated at 11 billion tonnes, of which 6.2 billion tonnes (equivalent to 75,000 PJ of energy) is estimated to be recoverable. If extracted at a rate of 20 million tonnes per year, the lignite resource could provide feedstock for most of New Zealand's transport fuel

## One wonders if the industry will thank Brownlee for the further encouragement of anti-mining sentiment that this legislative proposal will no doubt arouse ...

Zealand should not have mining, to think again what the country would be like without it – probably there would be mud huts and plenty of trees.

Sustainable management is more likely to be achieved through ensuring that there are as few barriers as possible to investment in exploration. It is also more likely to be achieved with as few government interventions as possible, consistent with the Crown's role as the owner of the resources in ensuring their efficient development.

But times have changed. Some serious scientific opinion suggests that with continued fossil fuel extraction and use we may end up with mud huts and few trees. The March 2010 government discussion paper recognises this in part. In relation to South Island lignite, amongst the 'most competitively priced lignite anywhere in the world', it accepts that there are going to be significant hurdles:

South Island lignite is a major indigenous energy resource which is amongst the 'most competitively priced lignite anywhere in the world'. The resource is suitable for extraction and use as a feedstock to

and petrochemical requirements for 200 years or more. Given the carbon emissions associated with large-scale lignite processing, development of New Zealand's lignite resources is likely to require new technologies such as carbon capture.<sup>18</sup>

Since the Resource Management Act provides that effects of discharges of greenhouse gases on climate change cannot be taken into account (s104E) (because we have an emissions trading scheme in place), the discussion paper must be referring to other risks. I wonder if the evaluation of the national significance and economic benefits of mining on conservation land might now include, say, the full cost of carbon sequestration, the international damage to our reputation of, say, large-scale lignite mining if it were to take place on such land, and whether, economically, it will reward us to enter into such adventures given our awful performance in the first Kyoto commitment period, and the risk that a second commitment period imposes further economic burdens.<sup>19</sup>

I note a recent comment by minerals law experts Bryan Gundersen and Laurice Avery that:

It should be noted that, as proposed in the discussion document, in relation to current Schedule 4 land, joint approval of the land-holding Minister (that is, the Minister of Conservation) and the Minister of Energy and Resources will be required. This collaborative approach to access agreements may arguably provide even greater protection of conservation estate.<sup>20</sup>

In 1991 there was a large debate about whether minerals should be excluded from the requirement for sustainability. Some politicians argued in the House that making minerals subject to a test of sustainability would require looking at a lower rate of use and transition towards renewable resources. That was rejected. Is Gerry Brownlee inadvertently reviving the debate under his latest proposal?

Submissions on the legislation should be interesting.

- 1 SC7/2010, <http://www.courtsofnz.govt.nz/business/calendar/upcoming-cases/supreme-court>.
- 2 *Mueller v Taupiri* (1900) 20 NZLR 89 (CA).
- 3 Ministry of Economic Development, *Coal Bed Methane in New Zealand: a discussion paper on a proposed legislative framework for the management and allocation of rights*, February 2003, p.11, states: 'In a letter to stakeholders dated 3 October 2002, the Ministry has previously advised that on the basis of these definitions:
  - Coal bed methane is petroleum and not coal under the Crown Minerals Act; and
  - Coal developers need to obtain a petroleum permit if they intend to explore for or develop coal bed methane specifically.'
- 4 'Drawing from Talmudic Law, the jurist Accursius of Bologna wrote the phrase *cujus est solum, ejus est usque ad coelum et ad inferos* (to whom belongs the soil it is his, even to heaven and to the middle of the earth) as a gloss on Justinian's Digest. By the 16th century this maxim had become accepted common law doctrine for determining the extent of the rights enjoyed by a tenant in fee simple ("landowner"). The English Laws Act retrospectively declared that "so far as applicable to the circumstances of the Colony of New Zealand," all statute and common laws of England became "part of the laws of New Zealand." This was confirmed by the Imperial Laws Application Act 1988. Since 1840 to the present day there have been few instances where the court has held that a statute or common law of England was not applicable to the circumstances of the colony of New Zealand. Hence, in the absence of statutes overriding it, the maxim is part of New Zealand law.' <http://www.mandm.org.nz/2010/03/can-state-expropriation-of-minerals-be-justified-part-i.html>.
- 5 *Parliamentary Debates (Hansard)*, 1997, 4 July, p.3042.
- 6 Waitangi Tribunal, *Hauraki Report*, Wai 686, 2006, vol.1, p.257.
- 7 *Ibid.*, vol.2, p.525.
- 8 Crown Minerals Act 1991, s2.
- 9 Ken Piddington, personal communication, 2009.
- 10 By the Resource Management Act 1991 – see schedule 6. See also transitional provisions for some licences under the 1959 act in the CMA, s110(f).
- 11 Waitangi Tribunal, *Petroleum Report*, 2003, Wai 796.
- 12 <http://www.beehive.govt.nz/node/18433>.
- 13 *Stewart v Grey County Council* [1978] 2 NZLR 577 (CA), 581.
- 14 *Parliamentary Debates (Hansard)*, 1991, 4 July.
- 15 [1989] 3 NZLR 351; (1988) 7 NZAR 333 (HC).
- 16 *Hansard* reference.
- 17 Cabinet Paper, *Stocktake of Schedule 4 Crown Minerals Act – Outcomes – 20 July 2010*, paras 34 and 35, [http://www.med.govt.nz/templates/MultipageDocumentTOC\\_\\_\\_44103.aspx?&MSHC=65001&L=0&W=stocktake+of+schedule+4+&Pre=%3Cb%3E&Post=%3C/b%3E](http://www.med.govt.nz/templates/MultipageDocumentTOC___44103.aspx?&MSHC=65001&L=0&W=stocktake+of+schedule+4+&Pre=%3Cb%3E&Post=%3C/b%3E).
- 18 Ministry of Economic Development discussion paper, *Maximising our Mineral Potential: stocktake of schedule 4 of the Crown Minerals Act and beyond*, March 2010, [http://www.med.govt.nz/templates/MultipageDocumentTOC\\_\\_\\_42792.aspx](http://www.med.govt.nz/templates/MultipageDocumentTOC___42792.aspx), p.8.
- 19 Or perhaps, even worse, there is no second commitment period and countries revert to their own systems of carbon tariffs.
- 20 <http://www.contrafedpublishing.co.nz/Energy+NZ/May-June+2010/Crown+land+already+protected.html>.



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Geoff Bertram

# Mining in the New Zealand Economy

Like most productive activities, mining contributes to human welfare. Also like most economic activities, mining is best done where the relevant resources are relatively abundant and where economic costs (in the widest sense) are lowest. Mining will not increase economic welfare – on the contrary, it will often reduce it – if done in the wrong place, or in the wrong way, or without a proper legal and regulatory framework. Mining therefore presents industry-specific problems for regulators and policy makers, which cannot be finessed by overgeneralised rhetoric or glamorous photography. This paper reviews some of the key policy issues to be borne in mind in the ongoing debate over the expansion of mining activity in New Zealand’s conservation estate, and summarises the results of some recent statistical research on the economics of mining in New Zealand.

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## The resource curse

The literature on economic development categorises mining as one of a set of resource-intensive extractive activities that present problems both for macroeconomic management and for governmental integrity. The general term for these issues is the ‘resource curse’. Empirically, the ‘curse’ is a negative observed relationship between reliance on natural-resource exports and economic growth performance: countries which rely heavily on resources-based exports grow more slowly than the average (Van Wijnbergen, 1984; Sachs and Warner, 2001; Gylfason et al., 1999). Probably the best-known example is the deindustrialisation in the Netherlands and then the United Kingdom that followed large-scale discovery and exploitation of North Sea oil and gas, and which became known as ‘Dutch disease’ (*Economist*, 1977).

Three Australian economists led the economic theory of the resource curse: Bob Gregory, Max Corden and Peter Neary (Gregory, 1976; Corden, 1983; Corden and Neary, 1982; Neary and Van Wijnbergen, 1985). In their analysis, a minerals boom would tend to drive up the real exchange rate, thereby squeezing the profitability of other tradable-goods producers and producing a lopsided economic structure in which industrial production for the home market tended to atrophy. In so far as manufacturing contributes more to technological dynamism than

primary commodity production, the restructuring would tend to slow down the economy's growth.

More recently, economists have focused on a second way in which minerals booms damage growth: via erosion of an economy's regulatory and policy-making capability due to the ability of large mining companies to fund intensive lobbying for special favours, a process known as 'rent-seeking' (Bulte, Damania and Deacon, 2005; Mehlum, Moene and Torvik, 2006; Robinson, Torvik and Verdier, 2006). When successful, rent-seeking produces distorted policy regimes which reward the lobbying interests at the expense

equilibrium economics always expects some crowding-out of non-mineral tradables by large mining developments via real exchange-rate appreciation (for a recent example, see table 3 in Layton, et al., 2010, p.23), but the deeper economic policy questions here relate to more diffuse negative spillovers from mining or other large-scale resource-based development, such as damage to the national branding of pastoral and tourism exports, loss of the existence and option values of natural landscapes and ecosystems, and the potential for regulatory capture by large mining interests.

## **'Access' required a project to pass a much less demanding set of tests than those faced by non-mining projects under the Conservation Act, leaving the conservation estate less protected from mining than from other commercial development.**

of the rest of the economy, potentially doing more damage to the growth of small and medium enterprises in sectors that are unable or unwilling to pour scarce resources into countervailing political lobbying to re-level the playing field.

The resource curse is now a staple of the economic development literature. The conclusion from four decades of research on the topic is that there are real negative spillovers from resource-based industries into other tradable goods sectors, and that careful policy management is required to secure growth on the basis of resources-based exports (Gylfason, 2001). Policy makers need to tread carefully, and the wider public needs to be sure that the nation's policy-making and regulatory institutions are not captured and distorted by industry rent-seeking.

In New Zealand, mining has generally been too small a part of the economy to make the resource curse a serious macroeconomic issue. General-

### **Balancing competing values**

Over the period 1978–1984 there was intense public debate over a raft of large resource-based projects promoted under the slogan 'Think Big'. Several of these projects were driven by the government's wish to make early use of the recently-discovered and very large Maui gas field. It remains unclear how much of the political momentum derived from large-industry lobbying and how much from the desire of ministers to burnish their 'development' credentials, but the outcome was a series of legislative and regulatory decisions<sup>1</sup> that heavily discounted environmental and other non-market impacts of the projects and provided substantial underwrites for high-risk large industrial ventures, several of which turned out badly at high cost to taxpayers.

Following the 1984 change of government, a number of lessons from the Think Big experiences were applied to institutional design in the areas of planning law and environmental

protection. One outcome was the Resource Management Act 1991 (regularly targeted by various large 'developer' vested interests as an undue obstacle to their commercial projects). Another was the Conservation Act 1987, which set aside large areas of Crown lands, most of them formerly controlled by the New Zealand Forest Service, to be administered by the newly-established Department of Conservation for the primary purpose of conservation. Only non-consumptive activities – recreation and (appropriate) tourism – were to be 'fostered' (s6e) by the department; all other commercial activities (except for mining) had to secure a 'concession' from the minister of conservation, who was to weigh up a number of potentially competing values, amongst which conservation values were to predominate, before granting permission (s17, especially 17Q and 17U).

Mining was from the outset an anomaly, because mining companies' access to Crown lands was granted by a different minister under the old Mining Act. Mining activities were explicitly exempted from the Conservation Act under section 17O(3), and this separate status was translated into a special 'access' arrangement under section 61 of the Crown Minerals Act (which replaced the Mining Act in 1991). 'Access' required a project to pass a much less demanding set of tests than those faced by non-mining projects under the Conservation Act, leaving the conservation estate less protected from mining than from other commercial development. Hence the current debate over the extent to which mining ought to proceed on conservation lands.

New Zealanders are generally relaxed about mining activity that extracts obviously useful things for the general good. Quarrying, for example, is the dominant open-cut mining activity around the country, and supplies essential inputs to roading and construction. Most places have a quarry in the vicinity. Most of the mining consents in the conservation estate have been for quarrying, and most of those have been uncontroversial.

In considering whether particular types of mining ought to proceed in particular conservation areas, therefore, the issue is not whether the mining sector *in general* should be encouraged or discouraged. The problem is to adjudicate among competing values, including non-market, and often non-quantifiable, ones. This brings us to social cost-benefit analysis (SCBA), the economist's way of systematically thinking through the full implications of a project, taking account of all relevant costs and benefits, both quantifiable and unquantifiable.

Done properly, SCBA provides an antidote to two common pathologies that afflict policy making: the temptation to look only at benefits and ignore costs (under constant pressure from vested-interest lobbyists seeking to 'boost' their pet projects),<sup>2</sup> and the temptation to focus on quantifiables while putting non-quantifiables into the 'too hard' basket.

In an ideal world, of course, everything would be quantifiable. The regulator or analyst would have available full valuations of things like existence value, option value, national brand value, recreational and aesthetic values, and so on. In practice, a large component of informed judgment is required about qualitative issues and non-marketed values. Economists have to be keenly aware of the point at which their professional expertise runs out and judgment from mandated decision makers is required.

One important way in which non-quantifiables can be efficiently and appropriately given their due weight is the classification of a country's land area according to the importance of conservation values in each area, with a correspondingly ascending scale of degrees of protection from mining and other activities that deplete conservation values. The establishment of schedule 4 of the Crown Minerals Act 1991 by amendment in 1997 is a case in point. Schedule 4 is best seen as a device to reduce regulatory uncertainty, and avoid the waste of scarce resources on complex consenting and cost-benefit processes, by the simple transaction-

cost-minimising device of removing the highest-value categories of land from consideration for mining. Its effectiveness in performing that role, unfortunately, relies on the credibility of the protection afforded. Regulatory uncertainty, and its potentially chilling effect on investment in general, is only increased when industry lobbies see real opportunities to overturn institutions and rules rather than to work within them. This has turned out to be the case with schedule 4 because of the weakness of the protection provided by the legislation, which gives two ministers

values can proceed, ought to apply also to any mining project proposed for any part of the conservation estate. Ideally this would be achieved by repeal of s17O(3) of the Conservation Act (which exempts mining from the standard test applied to all other sectors except non-consumptive tourism and recreation). Miners would then have to apply for concessions on the same footing as other sectors. Once a project has been declared to be consistent with the reasonable protection of non-quantifiable values, the quantifiable elements of cost-benefit analysis would come into their own.

## **Schedule 4 is best seen as a device to reduce regulatory uncertainty, and avoid the waste of scarce resources on complex consenting and cost-benefit processes ...**

unfettered discretion to remove areas from the schedule by order in council, following a consultation process that might easily be reduced to tokenism. An important lesson from the 2010 debates is that, at the very least, removal of schedule 4 protection from any piece of land ought to require a parliamentary vote, and the Crown Minerals Act ought to be amended accordingly.

While the sort of absolute prohibition on mining provided by schedule 4 is appropriate for the very highest-value categories of conservation land, there is also scope for a clearly-defined filter to be applied to any project proposed in lower-valued areas of the conservation estate, prior to setting in motion the RMA machinery and detailed cost-benefit assessments. Such a filter is provided for non-mining activities by s17U(3) of the Conservation Act 1987, which prevents the minister of conservation from granting any application for a concession that is 'contrary to the ... purposes for which the land concerned is held'. This preliminary filter, which requires in effect that only projects that do not encroach unduly on key conservation

Bearing that in mind, in the remainder of this article I shall quickly review some areas in which back-of-envelope quantitative calculation may provide some useful insights into the role that mining projects could be expected to play in the New Zealand economy. I focus on mining sectors other than oil and gas, since it is these that are most relevant when looking at the conservation estate.

### **What are schedule 4 minerals actually worth?**

One straightforward cost-benefit shortcut is a threshold test: using whatever quantitative data are available, estimate the cash price that a mining developer might offer for the resource and ask whether this would compensate adequately for the sacrifice of whatever non-market and unquantified values may be at risk. If the price seems reasonable in the eyes of whatever constituency determines the outcome, then the project could proceed; if not, not. This is not a full cost-benefit appraisal, simply a screening device.

I argue that something of this sort happened implicitly in the course of 2010. The government (1) published its proposal for mining to be allowed in schedule 4 lands, (2) put out some (very limited) information on the extent of mineral deposits in those lands (Ministry of Economic Development, 2010), (3) invited public submissions, and then (4) in the end withdrew the proposal in the face of a storm of public criticism. In so far as public opinion was correctly represented by the protests, submissions and final decision, it boiled down to a general feeling that the losses would outweigh the gains, on the limited information available.

The only actual dollar number provided in the government's discussion document was a figure of \$194 billion, described as 'an estimate of the value of New Zealand's on-shore minerals, excluding hydro-carbons' (ibid., p.2). From an economist's point of view this figure is in no sense the value of the resource; it is simply an estimate of gross revenue from its full extraction. Elementary economics requires the subtraction of the relevant costs (of exploration, development, extraction, processing, marketing, transportation, site rehabilitation and so on) to arrive

at an estimate of the net income that the resource could yield – the sum generally referred to as 'resource rent'. This is the return that the New Zealand public, as owners of subsoil minerals (through the Crown), could secure from a perfectly-designed royalty on mining operations.<sup>3</sup> In present-valued form it is the lump sum that the country could expect to receive by selling off, to the highest bidder, the unlimited right to mine all on-shore non-oil minerals.

In 2002 and 2003 Statistics New Zealand released estimates of this rental value of New Zealand's mineral estate (Statistics New Zealand, 2002, 2003, table 5.1, p.16), using essentially the same physical inventory of mineral deposits as the 2010 Ministry of Economic Development (MED) discussion document on schedule 4. The estimates showed very great sensitivity to commodity price movements (see Figure 1),<sup>4</sup> but the order of magnitude is clear: less than a \$2 billion lump-sum valuation for the entire mineral estate, which means resource rentals run below 1% of the MED's gross sales revenue figure.

The mineral reserves listed in the parts of schedule 4 covered by the MED's March 2010 stocktake were 10% of the New Zealand total, implying that in total

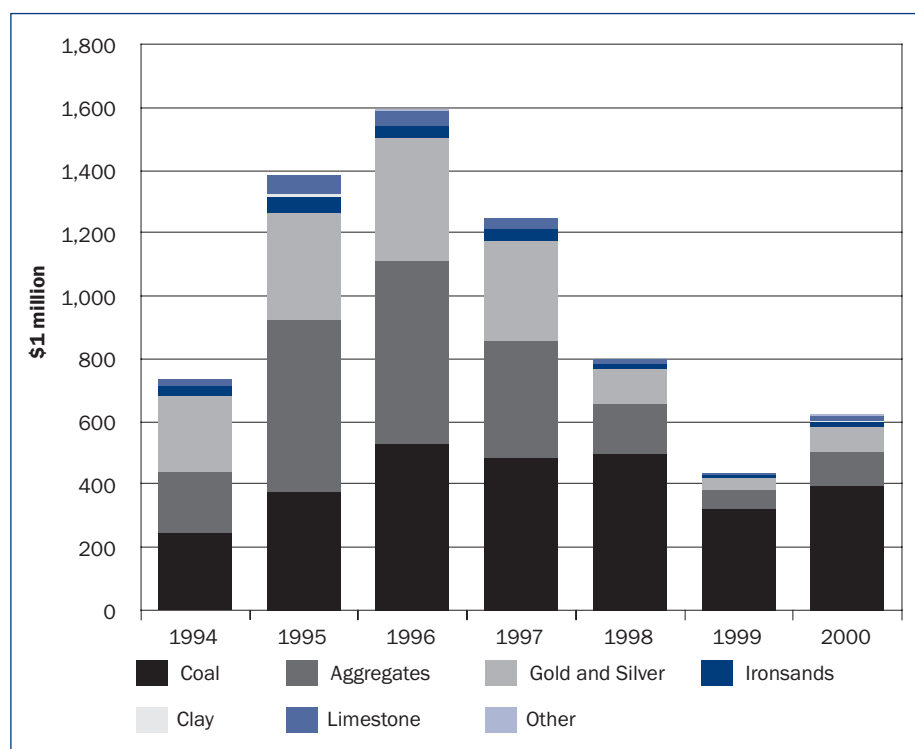
they would sell for substantially less than \$200 million. With 2.8 million voters, that converts to a price for sacrificing the highest-valued corners of the conservation estate consisting of a one-off payment of less than \$70 per voter. If the rough mid-point value in Figure 1 is used – \$1 billion – the price offered per voter would be \$35. If all of schedule 4 were opened up without restriction to mining, the mining rights to this 40% of New Zealand's total minerals endowment would fetch \$400 million, or \$143 per voter. The public's instinctive estimation of the balance of costs and benefits, and rejection of the March 2010 proposals, looks well-founded.

**Income distribution and employment vary widely by detailed sector**

One important piece of quantitative information that was missing from the official information during the 2010 debates is the extent to which different types of mining have different economic structures, and hence different impacts on the wider economy. The national accounts show only highly-aggregated figures for all mining lumped together, and Statistics New Zealand does not produce disaggregated figures on grounds of 'commercial confidentiality'. The effect of this secrecy is to conceal information that would be essential for proper public scrutiny of mining policy. Gold and silver mining, central to the 2010 debates, represents only 20% of the value of output in the mining and quarrying sector, even with oil and gas excluded. The dominant non-petroleum mine products are coal (40%) and quarry products such as gravel, rock and sand (35%). Quarrying and coal mining are predominantly New Zealand-owned, and quarrying includes a large number of small- and medium-scale operations accounting for much of the sector's employment. Hiding gold and silver behind those other activities in the statistics is a disservice to good policy making.

Fortunately, there is enough information scattered around the public arena to enable estimated accounts to be constructed for five mining subsectors: quarrying, coal, ironsands, gold and silver, and services to mining. (My accounts for

Figure 1: Monetary Value of New Zealand Mineral Stocks Excluding Petroleum





the last of these contain residual entries to reconcile with the aggregated national accounts, hence are particularly subject to errors and omissions and are excluded from Figures 2 and 3.)

Figures 2 and 3 set out the results of this exercise, showing the breakdowns of gross output and gross value added amongst the various distributional categories.<sup>5</sup> The bars are presented at successively greater levels of disaggregation. On the left of both charts is a bar for the New Zealand economy overall; then a bar for all mining combined (including oil and gas). Then the aggregate mining sector is divided between oil and gas and other mining. Finally, the disaggregation of other mining is carried through to ANSIC level 3.

The differences are significant. For both the New Zealand economy and mining as a whole, gross value added (the part of output not taken up by payments for intermediate purchases) was about 45% of output; lower for coal and quarrying, higher for oil and gas and gold and silver. Of the gross value added,

depreciation (really a form of intermediate purchase, since it represents consumption of fixed capital, not a return to capital) took 15% of gross value added for the economy as a whole compared with 26% for mining, but within mining there was a dramatic range, from 4% for ironsands to 45% for gold and silver. Net operating surplus (profit and rent going to the owners of the businesses) was one-third of gross value added for the economy as a whole compared with 48% for mining; within mining, the share ranged from 31% for gold and silver to 50% for oil and gas. These figures highlight the capital-intensive nature of mining in general and gold and silver mining in particular.

The very high depreciation share in gold and silver implies low company income tax, given the generous tax deductions provided to mining; sure enough, income taxes and royalties combined were only 4.4% of total output and 8.3% of value added for gold and silver mining in 2007, about 25% of net operating surplus. The only mining sector with lower tax payments than

precious metals was ironsands, where tax losses carried forward from previous years meant no company tax was paid at all, and royalties took a mere 0.1% of gross output value.

The high capital share of income and low effective tax rates translate to high rates of leakage of income from the New Zealand economy, given the almost complete offshore ownership of ironsands and gold and silver mining, and substantial overseas ownership in oil and gas. Figure 4 indicates that overseas ownership accounts for 35–40% of the mining sector's net capital stock (the remarkably high 2003 and 2004 figures are almost certainly an error by Statistics New Zealand).

The counterpart to high capital shares of income is a low wage and salary share in key mining sectors. Across the New Zealand economy as a whole, compensation of employees claims 47% of value added, whereas for mining as a whole the wage share is 21% – less than half. Again, there are wide variations. Ironsands in my estimated accounts has a

Figure 2: Distribution of Gross Output by Detailed Mining Sector, 2007

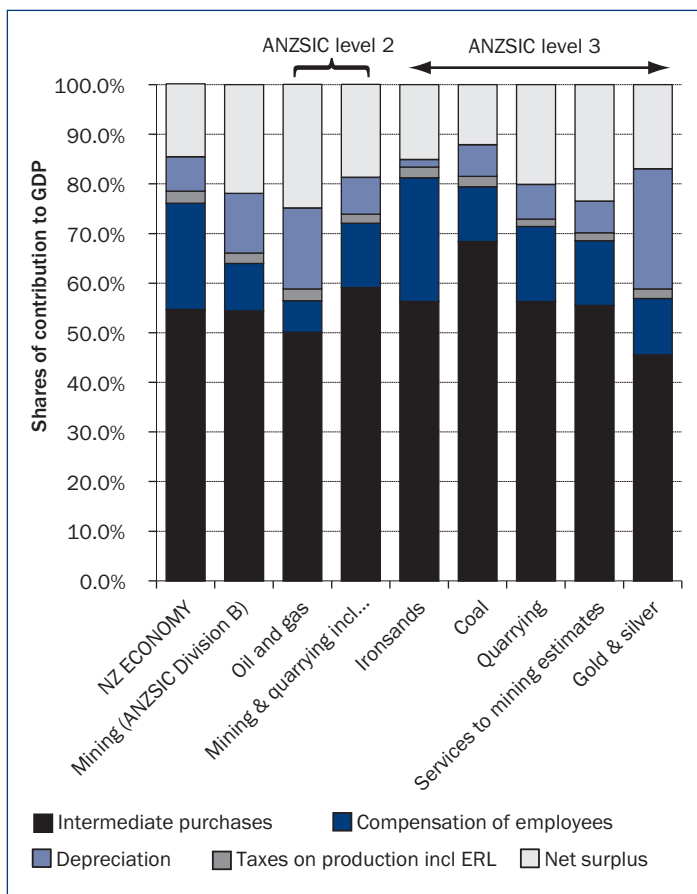
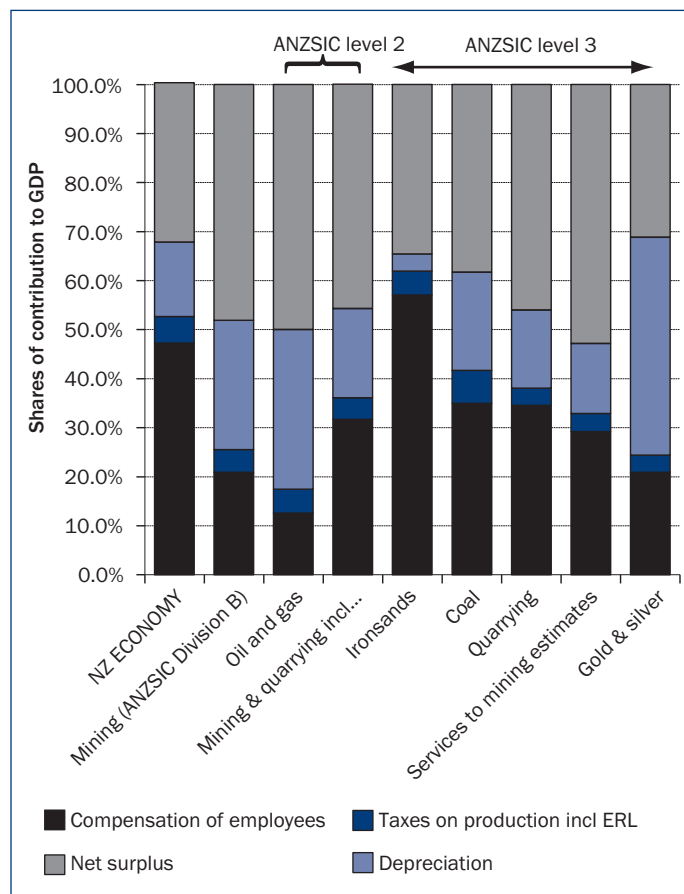


Figure 3: Distribution of Gross Value Added by Detailed Mining Sector, 2007



wage share of about 57%; quarrying and coal has 35%, gold and silver 21% and oil and gas 13%. The sector as a whole is not a strong employment or wage-income generator, and of the non-oil mining activities gold and silver are clearly the weakest on this score. This is consistent with the observation that mining as a whole accounts for roughly 1% of

GDP but only 0.3% of the economy's employment. Also unsurprising is that coal mining and quarrying between them account for over two-thirds of the mining sector's total employment.

**Foreign exchange contribution**

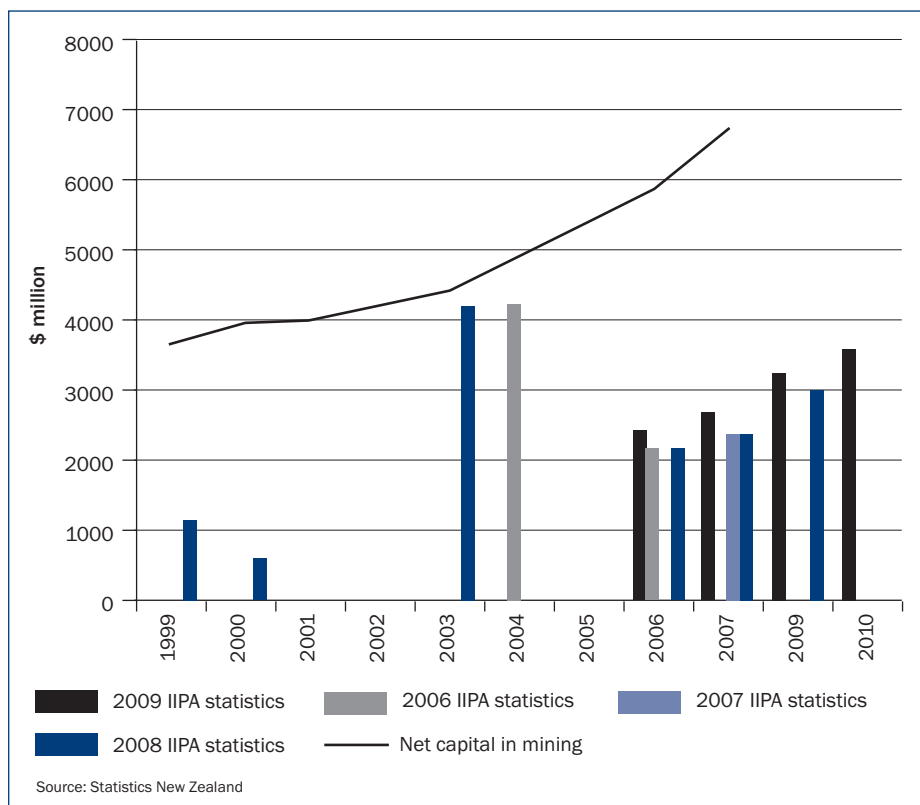
A question often asked when assessing the economic contribution a sector's

expansion could make is how much it contributes to the nation's balance of payments. There are two elements in this. First is the net foreign-exchange impact of direct receipts (from export earnings) and payments (for imported intermediates, depreciation of foreign-owned capital and profit accruing offshore). This calculation yields, for 2007, the grey bars in Figure 5. Second is the overall contribution, including import savings (the amount that would have had to be paid to import the mining products supplied to the local economy if the domestic mining sector were not here). This direct and indirect total impact is shown in the dark blue on the right in Figure 5. The outstanding contributor is quarrying, because of the very high transport costs per tonne that would have to be paid to import the gravel, stone and sand supplied to local construction, cement manufacture and roading. The least strong contributor is gold and silver, with a direct contribution of 49% of gross sales revenue and a direct and indirect combined impact of 55%.<sup>6</sup>

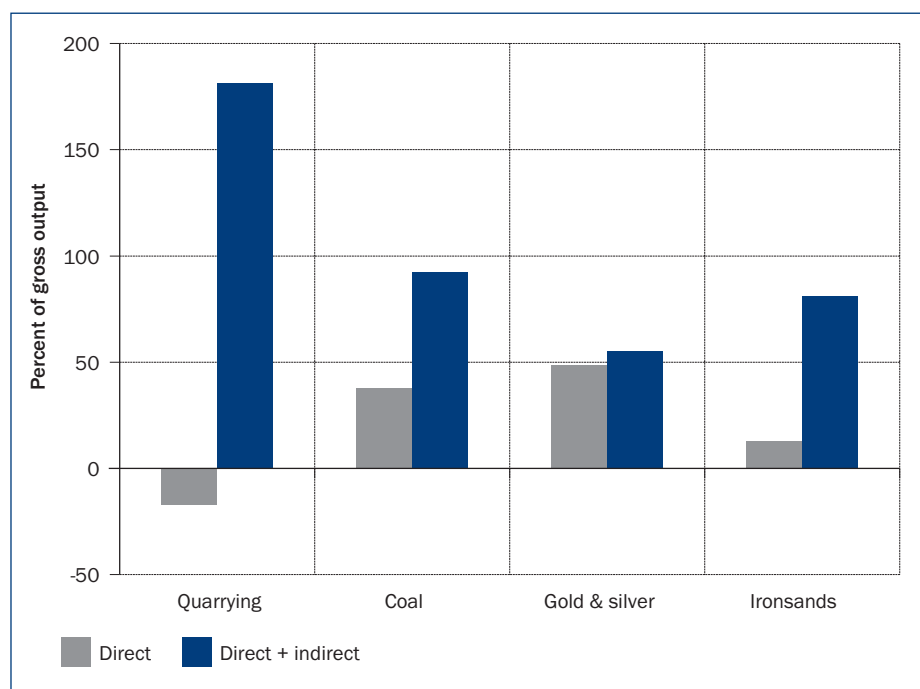
**Contingent liabilities**

The direct environmental damage caused by mining – especially via open-cut pits and large tailings dams – often has to be remedied by expensive engineering work after mining ceases, and it is only recently that these contingent liabilities have been taken seriously by New Zealand policy makers (prior to the 1991 mining legislation, mining companies could simply walk away, leaving their sites as orphans to be cleaned up at taxpayer expense). It is now customary for cash bonds to be required as part of the RMA process, but the amounts of the bonds remain insufficient to cover all contingent liabilities, which means heavy reliance is placed on the goodwill of companies to remedy major damage on their own account. Of four major mines in the Hauraki-Coromandel area since the 1960s, two (Tui and Golden Cross) have had tailings containment failures and one (Martha Hill) had subsidence, damaging properties in the township. The Tui clean-up will cost taxpayers over \$20 million. Golden Cross tailings-dam remediation cost the owners somewhere between \$30 and \$60 million. Non-compliance with RMA consent conditions, especially in

**Figure 4: Overseas Investment in Mining Compared with Mining Net Capital Stock**



**Figure 5: Direct and Indirect Foreign Exchange Contribution as % of Gross Output**



relation to waterways pollution, is still a recurrent feature of the industry, especially on the West Coast. Combined with the boom-and-bust cycle of world prices for mining outputs, this means that mining is a relatively high-risk activity and this needs to be factored in to any cost-benefit assessments of mining projects.

### Spillovers

Spillovers (externalities) from mining in the conservation estate come in two sets. The most obvious are the largely unquantifiable detriments to the existence values of landscapes and ecosystems, which impact negatively on non-consumptive uses such as recreation, tourism, photography and film, and the vicarious enjoyment of the New Zealand outdoor environment by people who may never visit the relevant places in person. Existence values are no less real than commercial values, and it is not helpful to dismiss them as 'emotion', since human welfare is ultimately experienced as happiness by individuals and it is this that economics seeks to maximise. Given the difficulties of quantification, the provisions of the Conservation Act discussed earlier and the existence of schedule 4 of the Crown Minerals Act provide a reasonably effective way of ensuring that these spillovers are

accounted for in policy decisions.

The second set of spillovers are more susceptible of quantification: negative impacts on other sectors of the economy due to factors such as damage to the nation's brand image as 'clean and green' or '100% pure'. Two major studies in the early 2000s analysed the economic impact of a major negative shock to New Zealand's brand image and estimated that environmental degradation, or policies perceived as anti-environment, could reduce overseas tourism by a large amount (over half in one study, rather less in the other) (PA Consulting Group, 2001; Sanderson et al., 2003). Because of tourism's large weight in GDP, the negative GDP impact of a loss of brand image could easily be 1–2%. This would be a big spillover effect.

Whether any particular mining project would have an impact of this sort on the national branding is highly uncertain. Some might, many probably would not. Recognition of the possibility, however, emphasises the need for policy on mining development to be framed, and suitable for presentation, in 'clean-green' brand-friendly terms. The body language of government ministers in early 2010, with muscular statements criticising the restrictions imposed by existing

environmental law, were ill-judged from this point of view.

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- 1 Notable examples were the National Development Act 1979 and the Clutha Development (Clyde Dam) Empowering Act 1982.
- 2 A good example of 'boosterism' by mining industry consultants is Layton et al. (2010), which traces the positive economy-wide effects of two hypothesised windfall mineral projects, both of which were simply assumed (with the assumptions left implicit, not explicit) to incur no environmental or other non-marketed costs, and to spring into being without any market incentives being required to trigger the required investments.
- 3 Proposals in Australia to impose a resource rental tax on large mining companies represent a step towards such a well-designed royalty regime, and recognition that the prevailing tax system in that country has failed effectively to capture mining resource rents. For the Henry Tax Review discussion of the issues see [http://taxreview.treasury.gov.au/content/Content.aspx?doc=html/pubs\\_reports.htm](http://taxreview.treasury.gov.au/content/Content.aspx?doc=html/pubs_reports.htm), part 2, volume 1, chapter C.
- 4 For each year in Figure 1 the asset value of the mineral estate at 31 March is estimated, using the mineral commodity prices prevailing at that time. Year-to-year changes in the valuation are driven almost entirely by price changes, with a very minor role for actual discoveries and depletion during the preceding year.
- 5 I am grateful to Forest & Bird, for whom the research was undertaken, for permission to reproduce these charts. For the full dataset and accounts see Bertram (2010).
- 6 The minister of energy, Gerry Brownlee, in July 2010 used on TV3 a figure of 91% for the balance-of-payments contribution of gold and silver mining. In response to a parliamentary question asking the minister for his source, his reply, on 11 August 2010, was that 'According to [www.anotherview.co.nz](http://www.anotherview.co.nz) Newmont Waihi Gold's mining operations in 2009 generated a total revenue of \$193.7M, 91% of which the website advises remained in New Zealand'. The news item cited on the website was Chris Rennie, 'Overseas firms spend big in New Zealand', *Press*, 26 May 2010. On inspection, it turned out that the article had (1) credited all intermediate purchases as local expenditure (overlooking the import content of intermediate purchases), (2) treated depreciation as a payment within New Zealand, and (3) treated all profits not immediately distributed as dividends as having been spent within New Zealand. The extent of repeated government reliance on unreliable figures from non-official sources has been probably the most alarming element in the 2010 public debates.

# Mining and Development

# Lessons from the United States

## Introduction

American history, and particularly that of the West where, during the 19th and early 20th centuries, mining for gold and silver flourished, and periodically continues to do so, is based on a frontier mentality. Indeed, we in the United States of America are still not far removed from that mentality, and have our roots in exploitation based on the idea, historically, of unlimited resources. We have created a variety of myths. Myths need not be bad, but ours have not served us well. We have started to learn slowly from our mistakes and to accept, in however belated a fashion, that we should avoid repeating them. Here I try briefly to sketch some of the outcomes from our history as it relates to mining, in the hope that New Zealand will not suffer some of the same consequences as mining communities and regions have in the US.

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## Minerals and mining in the development of the United States

Mining of natural resources was important in the historical development of the US, especially after the early European immigrants acquired, settled on, or stole, depending on your perspective, the land of the indigenous population. The industrial development of the US demanded resources such as minerals, precious metals or inorganic materials, many of which were in abundance (Wright, 1990; Rudzitis, 2010)

The demand for minerals resulted in the establishment of settlements built around these resources. It was a hard life, as most immigrants had only their own labour with which to extract them. Coal came from Appalachia, particularly from West Virginia and Pennsylvania, while states of the Midwest such as Michigan and Minnesota provided iron ore. The American West provided precious metals, such as gold from California and silver from Nevada and Idaho.

The mining of resources may have been important in the initial industrial development of the United States but there has been a structural change in their relative importance over time. Mining and minerals are no longer a significant part of the US economy. In part this is a result of other countries providing more of the world's supply, but, more importantly, the amount of raw material needed per unit of output has been dropping. Productivity increases also mean fewer workers, particularly blue-collar workers

who make up the majority in extractive industries such as mining (Drucker, 1986; Galston, 1992; Power, 1996).

#### **Mining and development theory: local to global**

Traditional regional development theory has consistently argued that the extractive and industrial sectors are the driving forces of economic development (Rudzitis, 1996). This logic was extended to include the importance of exporting extracted or manufactured goods. A major exponent of the export-driven model was economist Douglas North, who argued that the demand for exports drove development (North, 1955). Other economic activities were dependent on the export industry, for both growth and income levels.

In a famous exchange, economist Charles Tiebout (1956) responded to North's article, arguing that there was no reason to assume that exports are the most important factor in determining growth and income. Indeed, he argued, local non-exporting industries could be just as, or more, important in determining development of a place, region or country. North's manufacturing-export-driven model of development remains popular today, but an important alternative is offered by the experience of the American 'New West' with amenities-driven development (for a review see Rudzitis and Johnson, 2000).

This alternative approach to regional growth, more in line with Tiebout's logic, is a model based on the role of environmental amenities. Because of their tie to specific places, people usually have to migrate to attain the particular combination of amenities they desire (Harris, Tolley and Harrell, 1968; Tolley, 1974; Graves, 1979, 1983; Graves and Linneman, 1979; Diamond and Tolley, 1982; Power, 1988; Rudzitis and Streatfeild, 1993; Moss, 2006). According to this approach, sometimes called the quality of life model, people migrate and live where they do for non-economic reasons and that jobs follow people. Firms follow people to seek out high-amenity physical and sociocultural environments. Thus, amenities are

important in attracting and retaining businesses. Both entrepreneurs and businesses place great importance on amenity and environmental factors in their decisions to locate or stay where they are (Johnson and Rasker, 1995). If given a choice, people and firms live and locate where they do for reasons having to do with the social, cultural and physical environment. Consequently, maintaining a place's unique character can be an important economic strategy. It puts quality of life and environmental

does not contribute a significant amount to national income or employment.

#### **Impact of mining on communities, states and regions**

The past history of the American West is full of boom-and-bust towns. If you travel through or hike the public lands of the American West, the presence of ghost towns will be evident on the landscape (Francaviglia, 1987). Ghost towns, as well as communities that never recovered from the mining bust cycles, are part of

## **A study of some 100 rural communities between 1970 and 2000 that derived at least 20% of their labour income from mining found that they had done poorly compared with other rural counties ...**

quality at centre stage, instead of off-stage or in a peripheral and minor supporting role.

There has been increasing empirical evidence in the United States that amenities and quality of life play an important role in regional development (Von Reichert and Rudzitis, 1994; Mueser and Graves, 1995; Dearien, Rudzitis and Hintz, 2005; Schmidt and Courant, 2006; Wu and Gopinath, 2008). Partridge (2010) tested the ability of various models to explain regional growth dynamics in the US over the last 40–60 years. He found that amenity-led growth was the runaway winner in this test.

Tiebout was also prescient about the role of exports in the national US economy, which has been quite limited, ranging from just over 6% in the late 1800s to early 1900s, and dropping to about 4% up to the 1970s. Economist Thomas Power (1996) has shown how the mining industry, even during its peak output, comprised less than 4% of US income. Today it makes up 1% or less of national income or employment. Nonetheless, mining remains important in various states and regions although it

the country's regional geography, as is the poverty in former mining areas.

The Appalachian, the Ozark and the Four Corners regions remain today as high poverty areas. The American Midwest states of Minnesota or Michigan, the Mountain West states of Idaho, Montana or Wyoming, and the Southwest states of Arizona, Nevada or New Mexico all have communities struggling to get out of unemployment and the aftermath of mining activities. Some have been successful in making a transition. Most have not.

A study of some 100 rural communities between 1970 and 2000 that derived at least 20% of their labour income from mining found that they had done poorly compared with other rural counties (Power, 2002). Mining counties had a slower growth in aggregate income, ranging, depending on the decade, from 25% to 60% slower than the national average for rural counties. Per capita income also grew about 30% more slowly. Unemployment rates were also significantly higher, sometimes three times higher. The higher unemployment rates are a result of multiple factors which can interact with each other. The

boom-and-bust cycle and the short-term duration of many mines leaves behind unemployed workers, often with only basic skills which are not competitive in other job markets. Technological changes and increased productivity have also played a major role in mining and other extractive resource industries, such as forestry. Fewer people are needed to operate the equipment as industries become computerised and less labour-intensive.

People in resource industries are also

cascades through the local and regional economy, creating many more jobs. Such arguments may or may not be accurate.

Promoting a mining project does not mean it will happen, nor, if it does, that the prices that make such a project viable will remain high. Commodity prices vary, are subject to worldwide trends, and for precious metals like silver and gold are notoriously hard to model and predict into the future (Rudzitis, 1987).

The projections for the jobs created and income spent in local communities

With the boom phase of the operation come new challenges. Construction workers who do move to a mining community with young families present another host of problems. New schools to accommodate the influx of young children put a burden on the tax base. Roads, parks, libraries and the need for public services also put additional strains on the community. The money coming in from taxes often does not cover the additional costs of providing these services. Tax revenues need to keep pace with the costs of and the demand for public services (Power, 2007). This was a common problem during energy booms, especially in states such as Montana and Wyoming.

When the construction phase is over, the demand for public services diminishes as the workers leave. The smaller workforce of the mine has a diminished economic impact on the local community, especially if part of that workforce is commuting or not setting down roots in the community. The impact of any economic local multiplier effect is much diminished.

#### **What happens after mining activities end?**

The US Environmental Protection Agency has ranked the metal mining industry as the country's number one polluter (Ferrara, 2006). The big mining states of Arizona, Nevada, Montana and New Mexico are afflicted with a host of pollution problems, ranging from air and water pollution and waste disposal to high levels of arsenic and lead in people's homes. This comes about because many companies try to avoid the costs of clean-up and reclamation despite the laws in place requiring them to be responsible for it.

International mining companies may buy up smaller local mining companies, or create new subsidiaries before they commence mining. When mining operations cease they may declare bankruptcy. This leaves the state or federal government with huge environmental clean-up costs.

In order to try and stop such practices, the Clinton administration in 2000 put into effect a rule that required the companies to take out a bond equal to

## **When mining operations are finished they may declare bankruptcy. This leaves the state or federal government with huge environmental clean-up costs.**

less likely to migrate elsewhere when unemployed. Unemployed miners end up hoping that the mine will open again. Mining communities often consist of people who have strong attachments, a greater sense of place, much of which is manifested through their lifestyles. In former mining communities there is an excess supply of labour and persistent higher long-term unemployment than conventional economic models predict, since these models assume people will move to regions with lower unemployment rates and more perceived employment opportunities.

The slower economic growth, lower incomes and higher unemployment rates are accompanied by slower population growth. People are not moving to mining communities and counties (Power, 1996, 2007; Rudzitis, 1996). The exceptions are mining-based communities that have successfully transitioned or converted into skiing or other recreational amenity-based places which attract both tourists and new residents.

#### **Waiting and hoping mining will revive or bring prosperity**

Proponents of mining projects refer to the jobs that the industry will produce. In the early phase, it is argued that construction jobs will cause a multiplier effect which

assume that mining companies will hire local workers. Often this is not what actually happens. The companies may bring in their own workers, or recruit workers from within the larger region. If they hire workers within the region, it may be that, as has happened in the United States, workers don't move to the mining community. Rather, they commute to their jobs daily or find temporary rental housing during the week. Workers may own a house in their home community and be willing to commute long distances rather than sell their house and move to the mining site. They may realise from experience the risk of buying a house in a mining community: that when the mine shuts down, unemployment rises and the value of their house decreases.

If workers don't settle in a mining community, deciding instead to commute on either a daily or weekly basis, the money earned from working in the mine leaks out elsewhere. Given that most of the jobs associated with mining are during the limited construction phase, many of the workers will commute. If they stay in rental housing during the construction phase, the social costs of having a large group of young males in small towns results in an increase in drinking, violence, crime and other antisocial activities.

the estimated costs of cleaning up a site in case a company left and did not undertake the clean-up. The Bush administration later weakened this rule. Consequently, what bonds the federal government or the states have required have often been too small. It is not unusual to have an unsecured bond of several million dollars while the actual clean-up costs are larger by order of a magnitude of ten times or more.

Among the top ten offenders who have not paid for clean-up costs or who have declared bankruptcy are two mines in Nevada owned by Newmont Mining which cost taxpayers an estimated \$1 billion, while bringing in almost \$9 billion in revenues to Newmont. Other familiar international mining companies include ASARCO, BHP, Kennecot and Phelps-Dodge. These companies since 1970 made revenues of over \$48 billion, but cost taxpayers almost \$6 billion in estimated clean-up costs. The environmental damage includes surface and water contamination from acid mine drainage; lead and arsenic pollution; toxic dust from mine tailings; toxic tailing ponds; and high levels of mercury, uranium and other substances.

Efforts to make mining companies pay clean-up costs continue. Lawsuits have been filed in Western states such as Nevada, Idaho and New Mexico to close loopholes which allow mining companies to avoid clean-up by declaring bankruptcy. One estimate is that taxpayers in the 11 states with major mining operations could end up paying more than \$12 billion in clean-up costs if the companies either did not pay those costs or declared bankruptcy (Ferrara, 2006). The costs to taxpayers when clean-up is shifted to them represent a hidden form of subsidy to the mining companies.

#### **Can governments regulate mining adequately?**

One important lesson from the United States is that adequate funding to cover clean-up and reclamation when mines close is often not available, especially if companies abandon mines or declare bankruptcy, leaving the clean-up bill to taxpayers. The current banking crisis further highlights the problem, since in

such an environment it may prove more difficult in the foreseeable future to find companies that will post financial bonds. Allowing companies to issue corporate bonds or give guarantees, as some states in the United States do, only passes the risk of default to the taxpayer, since there is not an established market of insurance companies willing to bear the risk. The recent Gulf Coast oil spill further diminishes the likelihood of outside companies insuring or bearing the risk of companies defaulting on clean-up bonds, given the uncertain and often high costs of mine clean-ups.

Some of the international mining companies are Australian-based companies, such as Newmont Mining.

### **One important lesson from the United States is that adequate funding to cover clean-up and reclamation when mines close is often not available, especially if companies abandon mines or declare bankruptcy, leaving the clean-up bill to taxpayers.**

If New Zealand develops its mining further, whether in national parks or other conservation lands, it is likely to be dependent on these companies. This raises the question of whether similar practices would be common in New Zealand. If companies legally challenge governmental agency clean-up costs or declare bankruptcy of their subsidiaries in the US, would they not do the same in New Zealand, especially since environmental regulation in the United States is stricter?

In the US there are almost 100 mines or smelters listed as Superfund sites. Some of these will require hundreds of millions of taxpayer dollars for remediation. The Silver Valley just north of where I live in Idaho has a Superfund site that alone will cost almost \$1 billion dollars to clean up. These are costs that must be factored in, since the so-called worst-case scenario of companies abdicating their clean-up responsibilities is one that continues up to the present.

#### **What road will New Zealand choose to take?**

Can New Zealand have both mining and amenity-driven development? The situation in the United States is different than what is proposed in New Zealand. In the US, after the boom-and-bust cycle some mining towns have been able to reconfigure themselves as recreation- or retirement-based communities. They have been able to do so because of the natural beauty of the surrounding areas, however despoiled they may have been by mining companies. The most prominent towns, especially in the American West, have turned to skiing or other activities centred on mountain living. However, this has been a long process, sometimes taking 30 years (Johansen, 2010).

These predominantly Western communities and states also attract a large number of tourists, as well as amenity migrants who have second homes in, retire to, or move to seek jobs and to live in these states. Theoretically, it should be possible to create communities where mining and other amenity-based activities serve as complementary means of fostering growth and development. Economist Ray Rasker has studied and assisted more Western communities than probably anyone else in the United States, and yet he has found no examples of places where this co-existence of extractive mining and amenity-based development has taken place (Rasker, 2010).

In the United States, with the recent surge in extractive mineral activity communities such as Superior, Arizona, which has over recent decades converted from a mining to an amenity-based community, now have to decide whether they want to be mining communities again. The general consensus in Superior

is that it does not: people argue that after the mining is over they will once again have to rebuild their community, reinforcing Rasker's insights about the inability to have both.

Some New Zealand communities in or near conservation lands have attracted people to move there, create businesses or establish second homes. The opening of mines in or near them would not be a compatible economic development strategy if the US experience serves as any sort of guide. Moreover, the mines generally being considered for development are open-pit, often gold, mines. The US experience with such mines, unlike with underground mining, is that such communities have little chance of maintaining or attracting residents who want to live there and create non-mining jobs. This raises the question: if mining on or near conservation lands takes place, what other development is precluded? How will these communities be affected when the mine closes?

New Zealand faces several choices. If it goes ahead with mining on conservation lands, it perhaps can provide an example to the world of how mining and amenity-based development can co-exist. It can perhaps avoid the host of environmental problems that have plagued state and federal governments after mining is over and taxpayers are stuck with the clean-up costs as well as the social and economic costs created by the bust cycle. However, if New Zealand is wrong about its ability to manage and cope with the myriad of problems the United States has faced from mining, then it too will have a more polluted country and have to bear all the associated costs for a long time.

If New Zealand does not allow mining on conservation lands, then it could lose some local jobs. However, the mining activities can crowd out jobs that might

have been created by people and firms who would have moved to a place because it did not have mining activities taking place there. This is a likely scenario if mining jobs and amenity-driven growth are not complementary.

There is a good case, therefore,

term profits for largely Australian mining corporations to drive the country's economic policies.

Open-pit mining for a precious metal such as gold raises the issue of who benefits from the production of gold, people in New Zealand or elsewhere? Is mining for

## **[New Zealand] can perhaps avoid the host of environmental problems that have plagued state and federal governments after mining is over and taxpayers are stuck with the clean-up costs as well as the social and economic costs created by the bust cycle.**

for deferring mining development on conservation lands while watching developments elsewhere. If examples from other parts of the world were to demonstrate that places and regions can have mining that is congruent with a high-quality environment that attracts a wide variety of diversified businesses, then by opting to wait New Zealand will at worst have lost some time and protected its environment. New Zealand will have gained time and the ability to learn from other places and countries how to successfully mine and create diversified communities. It can always commence mining at a later date.

Any decision whether or not to allow mining on conservation land carries the risk of being wrong. Policy makers and the citizens of New Zealand have a choice in what kind of risk they want to take with the '100% pure' image the country is working hard to project to the world. Another consideration is a more moral one, and concerns what New Zealanders are willing to do in order to allow short-

gold a necessary and vital component of our increasingly interdependent world? Approximately 60% of gold is used for jewellery (Ali, 2009). Another 30% or so is used for financial investment purposes. Only about 10% of gold is used for industrial purposes, made into products that have some useful purpose beyond conspicuous personal adornment or financial speculation.

Who benefits from jewellery and gold investment is an appropriate question to ask when New Zealand's environment and citizens will bear at least part of the costs. Economist Thorsten Veblen (1904), one of the most creative social thinkers America has produced, said that in terms of material serviceability, a fresh supply of precious metals is one of the least useful forms of wealth to which industrial effort can be put. Are the people of New Zealand and their representatives willing to sell or subsidise parts of their heritage for some pieces of coin? Time will tell.



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# A Mining Industry View

## Summary

Media coverage in the lead-up to and during the schedule 4 debate presented anti-mining advocacy with no analysis of their arguments, to the exasperation of the resource sector. Despite our attempts to set the record straight,<sup>1</sup> little notice was taken, by opponents or the media. The only conclusion to be drawn is that environmental non-governmental organisations shunned rational debate in order to pursue a harmful campaign.

I will be arguing in this article that mining in New Zealand today is a modern, 21st-century activity, and that it is a serious and legitimate activity. It benefits the economy, supports communities, manages effects on the environment and is committed to conservation. If this were not the case, mining could not, would not and should not be approved.

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Chris Baker is the chief executive of Straterra, which is an industry group representing the mining and resource sector in New Zealand.

A rational debate on mining is called for; the Institute of Policy Studies' initiative is welcome. For this, adequate information is needed, and this is costly to obtain. Only if the economics, including the costs of environmental and conservation management, stack up can the investment in information be made by a firm. It is at the local level that the debate should be, and indeed is, held. I am referring to Resource Management Act processes, and to future opportunities for public input into Crown Minerals Act processes.

I invite all New Zealanders to have open minds, and to work together to achieve sensible outcomes for the economy and the environment from mining.

## Should we let a few facts get in the way of a good protest?

A political debate can run to a conclusion with few or no facts; that's one lasting lesson of the schedule 4 debate. Emotion reigned; dialogue was absent. This should concern all New Zealanders.

The government has been borrowing \$250 million a week to keep the nation afloat,<sup>2</sup> a fact of which most New Zealanders are probably unaware. The public's aspirations for services, and for national parks, demand that we examine options for economic activity that allow us to afford those things. The economy is, therefore, a key issue for New Zealand.

Any transition to a new economy will take time,<sup>3</sup> and lies outside this discussion. For now New Zealand has a trading economy, a growing and ageing population in need of services, and debt to pay. For now economic growth is the paradigm. Within that, it is valid to find ways of generating wealth and jobs. The mining debate sits squarely within this context.

Many New Zealanders say the environment is the nation's key issue, and the resource sector agrees. Freshwater quality and quantity concerns are paramount, as is the future of threatened native biodiversity, as are the scenic beauty and recreation opportunities enjoyed by New Zealanders and overseas visitors.<sup>4</sup> Arguably, all of these

issues are also economic issues, taking a broad view of 'economy' – the stewardship of resources.

When economic issues intersect with environmental issues, as they did over schedule 4, it is important to debate them, and we had an outpouring of public opinion in recent months. Of the 37,552 submissions on the government's discussion document, there was an overwhelming call for schedule 4 land – in national parks, marine reserves, Great Barrier Island and the Coromandel – to remain off-limits to mining. An estimated 40,000 people protested on Queen Street in Auckland saying 'no to mining', and around 50,000 people signed a Green Party petition in the same vein. '2 precious 2 mine' ran a web campaign to encourage pro forma submissions, and the strategy worked. Some 30,000 of the written submissions were of this sort.<sup>5</sup>

Forest & Bird's arguments broadly represent the theme: 'plans to mine Schedule 4 land failed to recognise the intrinsic, scenic, recreation and conservation values loved by New

Zealanders'. Any economic benefits of mining from these areas would be more than eroded by the damage done to the nation's '100% pure' image.<sup>6</sup>

The media joined in. The commentators crowed that the government would be foolish to proceed: the public had spoken.<sup>7</sup> All of this was enough for the government to back down. This has been called a victory for the environment and New Zealanders. In the words of Forest & Bird blogger Nicola Vallance: 'They say Mine, we say OURS.'<sup>8</sup>

'In war, truth is the first casualty', wrote Aeschylus, a specialist in Greek tragedy, 2,500 years ago. It's still true today, as we observe with Forest & Bird's 20th-century, us-and-them positioning. It is a sobering lesson for the resource sector, and the 14,800 who work directly and indirectly in it – chiefly in oil and gas, coal, gold, ironsands and aggregates. (For the record, the resource sector does not say 'mine' – more on this later – and we and our families also enjoy, appreciate and use public conservation land.)

If the people of New Zealand were to believe, as a matter of informed principle, that schedule 4 land, and, perhaps, other public conservation land, should remain off-limits to prospecting, exploration and, potentially, mining, then fine. But it's not as simple as media, politicians and campaigners would have us believe. It is appropriate that New Zealand hold an informed policy debate, to supersede the emotionally-charged, fact-deprived hysteria presented to date.

#### Rebuttal of anti-mining advocacy

Let's first examine the problem as defined, as the opponents to mining see it, which is, in summary: schedule 4 (and possibly other) lands are too precious to be dug up; mining makes a mess; it doesn't deliver economic benefits to New Zealand; it is a one-off activity, so not sustainable; and the New Zealand public does not want it on schedule 4 land and, perhaps, not on any public conservation land. These are serious charges, and I will answer them at length.

**FACT 1**: New Zealand does not know exactly what the intrinsic, scenic, recreational and biodiversity values are on all schedule 4 land. Of course, we can point to many places of very high value: the Tongariro peaks, Aoraki/Mt Cook, the Whanganui River, Milford Track and others. But not all of this land is of high value, at least currently. For instance, parts of the Coromandel are cut-over scrub,<sup>9</sup> visited by few people, infested with pests and weeds and not actively managed for conservation. (Of course, that could all change in the future, and any new mining company in the area could help; more on this below.)

**VIEW 1**: Some places are more precious than others. An alternative approach is to look at places case by case. This happens now when considering mining on public conservation land, and when managing this land for their conservation values. Mining is very much a local issue.

**FACT 2**: We have a general idea of the minerals potential in some areas of schedule 4 land and elsewhere in New Zealand – enough to know we are a mineral-rich country. Much has been made of the \$140 billion of mineral wealth in our country.<sup>10</sup> A lot of that may stay in the ground for a long time, depending on the economics. On the other hand, there may be other resources we haven't yet found. In any event, much more work must be done, in stages, before any potential new mines are identified.

**VIEW 2**: Within the 7,068 hectares that were to come off schedule 4, one mine might have resulted, going on current form. An underground mine typically has a footprint of 5 hectares, a medium-sized open-cast mine 300 hectares. There is no question of mining companies digging up all of this land had it been available. A tiny fraction of that may have been affected.

**FACT 3**: Today every mining company needs community support, needs the consent of the landowner, and has to manage the effects on the environment, during the life of the mine and afterwards.<sup>11</sup> Resource consents for a mine run to many pages of conditions the miner must meet, covering discharges to air and water, earthworks, tailings and chemicals management, effects on native plants, animals and landscapes, noise and other issues.

**VIEW 3**: Mining *today* is green. It has to be or it wouldn't be approved. Yes, there is a footprint during the life of the mine and for some time afterwards. There are also compensatory activities: e.g. biodiversity conservation over a much larger surrounding or nearby area.<sup>12</sup> Done properly, the net environmental or conservation effect of mining can be and should be positive. The resource sector and the Department of Conservation (DOC) are working towards this.<sup>13</sup>

**FACT 4:** Conservation and mining are not incompatible. According to the Department of Conservation there are 85 mines on public conservation land (including the foreshore and seabed), including a small-scale gold mine on schedule 4 land in the Coromandel, authorised before schedule 4 was enacted.<sup>14</sup> Omitting the foreshore and seabed leaves 57 mines.<sup>15</sup> Access arrangements from the minister of conservation are often accompanied by payments to DOC for conservation projects. They include blue duck and kākā recovery work, pest control in conservation areas, and acquisition of high-value private land for conservation. This work is done over a much larger area than the area in mining and related infrastructure, such as roads and pipes. More than 90% of access arrangement applications to mine on public conservation land have been approved since the Crown Minerals Act was passed in 1991.<sup>16</sup>

**VIEW 4:** The goal of many mining companies is to produce a positive net effect on the New Zealand environment, on an annual and ongoing basis, anywhere in New Zealand, and particularly on public conservation land.

**FACT 5:** Most New Zealanders will never see a gold or coal mine. The Martha mine at Waihi will appear as a big hole in the ground to visitors on-site – and 40,000 do visit every year<sup>17</sup> – and to anyone who flies over it at low altitude. The closest most people get to Martha is a view of Waihi, which looks much like a township anywhere in New Zealand.

**VIEW 5:** Mines are elusive in the landscape because mining and quarrying on land cover 0.016% of our total land area.<sup>18</sup> This is a very small footprint on a national scale. The wine industry occupies seven times that footprint, the dairy industry 500 times. In terms of mines, most of what New Zealanders see are quarries, and most of the product is used for roads and construction. Even if mining tripled in New Zealand, most New Zealanders would never notice.

**FACT 6:** Turning to the real threats to national parks and other schedule 4 lands, and conservation land generally: animal pests and weeds have been rampaging through New Zealand since their introduction, causing local or total extinction of countless species of native animal and plant.<sup>19</sup> At some places DOC, councils, volunteers, landowners, iwi and others, including the resource sector, have reduced pests and weeds. But these are dots on the map where the kiwi is safe on the mainland.<sup>20</sup> The same is true for kākā, kōkako, the blue duck, robin, tomtit, whitehead, mōhua (yellowhead) and many other species of bird; invertebrates, including giant wētā; the four species of native frog; and the two species of bat.

**VIEW 6:** The real threat facing schedule 4 lands are pests and weeds, not mining.<sup>21</sup> A rational discussion on mining should include the contribution the industry makes to conservation. Done properly, a by-product of mining

could be much more conservation than can be afforded by government. It's already happening. Seen this way, mining is more likely to enhance the New Zealand brand than detract from it.

**FACT 7:** The economics are the most rigorous test for mining. Prospective areas must first be found, typically using remote sensing, mapping and other non-invasive methods. Areas with potential are explored more closely; some drilling may be done, using small rigs that can be transported by truck or helicopter. All going well, the drilling is repeated on a finer scale over a smaller area to hone in on a potential ore body. If one is found, the likely quantity of ore is modelled, and projections made on how it would be extracted. Then the costs of mining are calculated, including the costs of environmental management, consultation with communities, conservation projects, taxes, royalties, levies and insurance. Investment capital has to be found, at home or abroad. Only then would applications be lodged for a mining permit, access to land and resource consents. That whole process can take up to five years and cost \$30 million for a medium-sized gold mine.<sup>22</sup>

**VIEW 7:** Mining is difficult. The total footprint will always be small. But where mining does occur, the wealth created off that small footprint is significant.

**FACT 8:** The resource sector (oil, gas, coal, gold, aggregates and other minerals) contributed \$2.149 billion to GDP in 2008, compared to the wine industry, \$0.454 billion, and tourism \$6.66 billion. Resource exports in 2009 earned \$3.6 billion (8.2% of total goods exports), while dairy in that year earned \$10 billion, and overseas tourism \$9.3 billion. In 2009 there were 6,800 people employed directly in mining, and 8,000 indirectly (flowing from the economic activity of the former). The median wage for a mining employee was \$57,320 in 2008, compared to the New Zealand median of \$33,530.<sup>23</sup>

**VIEW 8:** Mining is a significant part of the economy. Sure, it is smaller than dairying and tourism, but then, so is the wine industry. Mining could make a bigger contribution if more activity in prospecting and exploration was encouraged. The government's plans to carry out surveys of Northland, the West Coast and other parts of the South Island will improve New Zealand's attractiveness for investment in mining. There is every reason to believe that mining output from New Zealand could triple over the next 20 years, even outside of schedule 4 land. Think of the extra contribution to conservation as a result.

**FACT 9:** Typically 50% or more of the total costs of extraction stay in New Zealand, paid in, for example, salaries, contracts with suppliers, taxes, royalties and levies, insurance, environmental compliance, conservation projects and community projects.

**VIEW 9:** This is not a case of revenue rushing offshore. In any event, mining is no different from other sectors, with a range of local and overseas ownership. Between May and July 2010 the Overseas Investment Office approved five applications related to the wine industry, from Australia, Thailand, Israel, the United States and other countries, to a value exceeding \$12 million.<sup>24</sup> Regardless of origin, investors deserve a return or they wouldn't invest.

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**FACT 10:** The assertion that mining could tarnish the New Zealand brand is a serious accusation. I have argued that mining could enhance our 'clean, green' image. There is a further consideration. Mining in New Zealand is done in a democratic country with rule of law, environmental regulations, labour laws, health and safety requirements, health and education systems, superannuation, protection of the rights of women, children and minorities, and so forth. These laws mean that the conditions under which mining is carried out in New Zealand ensure a higher standard of environmental impact than in most jurisdictions.

**VIEW 10:** Mining in New Zealand is green, in the New Zealand context, and compares very favourably with the rest of the world. It needs to be seen to be green, of course, to earn broad support from New Zealanders, and Straterra is committed to that end.

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**FACT 11:** In answer to the assertion that mining, unlike farming, is a one-off activity: yes. One day the well will run dry, the clay pit will be emptied, the lime for the cement factory will be quarried elsewhere. That is as

true for a mine in New Zealand as anywhere else on the planet. It's also true that chasselas and müeller-thurgau grapes, so common in the 1970s and 80s, are barely grown in New Zealand any more.<sup>25</sup> Economic activities are forever changing.

**VIEW 11:** There is a whole literature around societal transition in the face of increasing resource scarcity and changing demands, which I don't intend to go into here. In the meantime, we all need minerals: we use them every day in every aspect of our lives, from cradle to grave, regardless of where and how they are mined. The inference for New Zealand is that there will be many more years yet, possibly centuries, of environmentally-responsible mining.

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**FACT 12:** Early on in the schedule 4 debate an opinion poll showed that close to 50% of respondents were open to prospecting on schedule 4 land. While opposition was expressed on the street and in submissions, there are some 4.4 million people in New Zealand, 80% of whom are aged 15 years or over.<sup>26</sup>

**VIEW 12:** I question whether the real views of the public have been aired to a reasonable standard of accuracy. If it is true that the level of public sentiment greatly exceeded that shown for other high-profile issues in the recent past, it is also true that it is much easier to participate today, with the advent and popularisation of online tools. This is all to the good but requires careful interpretation.

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#### Discussion

So, where does this leave the schedule 4 debate, or the policy debate on the future of mining on public conservation land in New Zealand?

As Straterra sees it, the chief issues are about where to mine, and under what conditions. (It is taken as agreed that mining is a legal and legitimate activity in our country.)

The 'where' will depend on the economics, and on the environmental values. Only if the economics warrant – and that includes managing the environmental effects – would mining go ahead. Otherwise it would not. Places with outstanding values would remain off-limits to mining. There are criteria for identifying places with outstanding values, and for assessing proposed environmental management. No doubt further work could be done to refine these, drawing on our collective experience. The

government is leading such work and the resource sector is happy to participate.

But it is only when specific proposals are considered that the investment will be made (by the applicant) in detailed mineral and environmental information. It is in this theatre that an informed debate can be had, and indeed is had, under the Resource Management Act. This is world-leading environmental law (noting there is always room for improvement)<sup>27</sup> and the requirements on mining companies are strict, as they should be. In 2007 Toronto-based mining writer Stan Sudol wrote:

Past industry practices that were detrimental to the environment are still highlighted by the anti-mining crowd today ... yet, the reality of mining in the 21st century is quite the opposite. Strict environmental regulations are enforced on all new projects. Mining companies must

develop closure or decommissioning plans that require the restoration of all lands to their natural state when the operations are finished. Over the past 20 years the industry has made tremendous strides at reducing the environmental footprint of their operations.<sup>28</sup>

Sudol was thinking of mining in Ontario, Canada; however, his comments are equally valid for New Zealand. There is much activity in this area in our part of the world. In August 2010 AusIMM, the Australian Institute of Mining and Metallurgy, hosted a conference entitled 'Sustainable Mining 2010' in Kalgoorlie.<sup>29</sup> The Global Mining Initiative, which advances the mining industry's commitment to sustainable development worldwide, has been working in this area since 2001.<sup>30</sup> Newmont, the miner in Waihi, is a founding member.

Advancements are continuing in the way mining is done and managed. In 2008 Pike River Coal won an award from DOC for its environmentally-friendly mining and road infrastructure.<sup>31</sup> The state-owned coal miner Solid Energy is seeking to have a 'net positive impact on the environment' from its activities, and is working with DOC and international leaders in the field of 'biodiversity offsets'.<sup>32</sup> There is a long way to go but the commitment is there.

The 'condition' issue has an environmental aspect, as noted, and an economic aspect. Mining companies also have conditions. For example, New Zealand would have to be attractive to foreign investment for companies which need to access overseas capital. In this, improved certainty of process and improved knowledge of our mineral resources are important, as are economic stability and well-functioning capital and financial markets. Our government is working hard in these areas,<sup>33</sup> and this is appreciated by the resource sector.

### Conclusions

I started this discussion provocatively, with the question: 'should we let a few facts get in the way of a good protest?' I have provided more than a few facts, too many to wrap up in a swift sound bite. But here are some final reflections on the mining debate.

New Zealand, as a society, will make better decisions with all the facts on the table. This is difficult to achieve on a national scale. The point is underscored that the mining debate is best had on specific proposals, where the information is available. Mining is a local issue.

Mother nature, economics, the regulators (and NGOs) will guarantee there will be no rush to mine. If we as

a nation can agree that mining is a valid pursuit, in places where it is economic, and environmentally appropriate, then there is the basis for a rational debate. I invite all New Zealanders to have open minds, and to work together to achieve sensible outcomes for the economy and the environment from mining.

- 1 Straterra press releases, 'Natural resource industry brands Mt Aspiring speculation as scaremongering', 1 December 2009, [http://www.johnkey.co.nz/archives/956-Post-Budget-speech-to-Trans-Tasman-Business-Circle.html](http://www.straterra.co.nz/Natural+resource+industry+brands+Mt+Aspiring+speculation+as+%93scaremongering%94; 'Conservation groups attempting to spread panic', 15 March 2010, http://www.straterra.co.nz/Conservation+groups+attempting+to+spread+panic; 'Straterra calls for rational approach', 19 March 2010, http://www.straterra.co.nz/Straterra+calls+for+rational+approach; 'Greenpeace scaremongering criticised', 23 April 2010, http://www.straterra.co.nz/Greenpeace+%27scaremongering%27+criticised; 'Natural resource industry moves to dispel myths', 21 May 2010, http://www.straterra.co.nz/Natural+resources+industry+moves+to+dispel+%22myths%22.</a></li>
<li>2 John Key, post-Budget speech to the Trans-Tasman Business Circle, 21 May 2010, <a href=).
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# An Assessment of Proposed Changes to the CHILD SUPPORT Formula

Stuart Birks

## Introduction

It is important that children are raised free from poverty and with full support from their families/whānau. However, many children spend some or all of their childhood with their parents living apart. Policies aim to limit the harm this might do, with one important but controversial aspect being child support. As part of a review of the New Zealand child support scheme, a consultation document was released in September 2010 (Dunne, 2010), building in part on a paper by researchers in the Inland Revenue Department (IRD) on the costs of children (Claus et al., 2009). This assessment paper backgrounds the current child support situation and consultation. It then considers aspects of the consultation, namely: (1) the estimation of costs of children, (2) the resulting proposed child support formula, and (3) broader issues related to child support. General conclusions are then drawn.

## Background

The Child Support Act 1991 appears to have had fundamental flaws from the start. Section 4 of the act lists the objects of the legislation. It can be easily demonstrated that these objects are not reflected in the formula given in the act to compute child

support payments (Birks, 2000). Briefly, a major stated aim of the Act is to ensure 'fair' contributions by parents towards the costs of their children. However, among other concerns, the basic formula in the Act considers only the circumstances of the liable parent; there is no consideration

of or adjustment for any care provided directly by that parent up to 40% of nights; the receiving parent faces no constraints as to the use of the funds received, whether on the child or for other purposes; conversely, the paying parent has no say as to how the funds are used; and there is no accountability, *ex post*, for the use of child support received. No explanation has been given for the choice of formula,

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which could bear little relationship to the actual costs of the children.

Nevertheless, in 2001 it was stated on the IRD Child Support web page that: 'Child Support is governed by the objectives set out in the Child Support Act 1991' (Birks, 2001). By 2008 this had been changed to read:

The child support scheme operates under the Child Support Act 1991. This legislation aims to ensure that:

## The analysis in the review is based on a limited range of circumstances. Comparisons are between intact two-adult households, both adults 25 or over, with and without children.

- parents take financial responsibility for their children when marriages and relationships end
- financial contributions from paying parents help to offset the cost of benefits, like the Domestic Purposes Benefit, which support custodians and children. (Inland Revenue Department, 2008)

Even this demonstrates a contradiction if a custodian is on the DPB, in that liable parents' contributions are then diverted from the child via the government so as to support the custodian.

These problems have been signalled directly over many years by those affected by the legislation. Peter Dunne states, 'I note that over a quarter of the letters I receive as Minister of Revenue are from people who are unhappy with some aspect of the child support scheme' (Dunne, 2010, foreword). The consultation document attempts to address some of these issues. In particular, it focuses on (i) measuring the costs of children, (ii) broader provision to consider shared care, and (iii) consideration of the incomes of both parents. In addition to the consultation document, Claus et al. (2009) gave details of the calculations of costs of children. This is important because no explanation was given for the choice of percentages used in the formula

in the Act. The approach taken was based on that used in Australia (Percival and Harding, 2005). It is therefore an illustration of international transmission of methods of analysis. Given the similarity of proposed solutions, it is also an example of international transmission of policy.

### The proposed formula

Dunne (2010) discusses a range of issues

and proposals, drawing on the results from Claus et al. (2009) to present a possible alternative child support formula. Notable changes are the linking of formula assessments to estimated costs of children, consideration of the incomes of both parents, and extended adjustments for shared care. This section treats the cost estimates as if they are correct, considering the proposals on that basis. The following section discusses measurement problems.

Until now it had not been known how child support was intended to be used, or if it was intended to cover the full costs of a child. There had been occasional comments about the money being 'for the child', public claims that not enough is being given because many parents are assessed at the minimum obligation to the detriment of children, and criticism of the high levels of arrears and debt. A major observation by Dunne (2010, pp.50-1) is that the current child support formula is close to or, for households on low income or with one child under 13 in particular, in excess of the estimated cost of a child (net of government funding such as Working for Families). It is all paid by the liable parent, so the costs are not shared, tax benefits are not shared, generally all going solely to the main caregiver, and any voluntary payments or costs incurred directly by the liable parent are (with limited review provision)

additional to the child support obligation and ignored in the calculations.

There is no awareness of this apparent over-payment. Instead, political and media attention has promoted the view of fathers (rather than liable parents) shirking their responsibilities by paying the minimum or being in debt to Child Support (Keith, 2010). Additional information obtained under the Official Information Act challenges this view. According to these numbers, in 2010 (March year) there were 177,600 liable parents. Of these, 79,300 (44.7%) were assessed at the minimum rate. However, 73% of female liable parents were on the minimum rate, compared to 38% of male liable parents. About 18.6% of liable parents were female, and, despite the high prevalence of minimum assessment for them, 16.5% of liable parents with debt were female. 101,500 custodians were on a benefit, with liable parent contributions diverted from the child to the custodian. Of the liable parents on the minimum payment, 50,200 (63%) were associated with a custodian on a benefit. Hence, nearly two-thirds of liable parents on a minimum are linked to custodians on benefits, so their low payments would have little effect on the recipient household. Others may be minimally affected also. As noted by Dunne (2010, p.26), Working for Families tax credits exceed the 'estimated expenditure for raising children' for many on low income, especially if they qualify for the in-work tax credit, in which case net costs are negative up to an annual income of about \$35,000.

The reason for the review is given as changed circumstances, including the claim, 'The primary assumption under the current scheme is that the paying parent is the sole income earner and that the receiving parent is the main care provider' (Dunne, 2010, p.2). There was an earlier review headed by Judge Peter Trapski (Child Support Act Working Party, 1994; Trapski, 1994). This gave a different explanation of the disregard for the custodial parent's income, suggesting that the Act was designed to achieve labour market objectives not mentioned in the Act. On consideration of the custodial parent's income the 1994 consultative document states:



a strong disincentive to workforce participation could result if every dollar earned by the custodian over a given threshold resulted in a decrease in child support. As 84% of lone parents are women, structural gender based inequities in the labour market could be worsened. (Child Support Act Working Party, 1994, p.24)

Note that, for liable parents, extra income above the threshold and below the ceiling results in increased child support.

Child support is not the only area of law influenced by gender-political considerations. The above quote illustrates the possibility that, even when legislation is presented in gender neutral language, a classification highly correlated with gender may be used for gendered objectives. Child support may not have been intended purely for the support of children.

The analysis in the review is based on a limited range of circumstances. Comparisons are between intact two-adult households, both adults 25 or over, with and without children. It is assumed that:

- the child support obligation arises due to the separation of two parents (they had lived together)
- the parents continue to earn at the same rate as they did before (assessment is based on combined current incomes)
- there are no changes in level of family tax credits as a result of separation, although such credits can be substantial, especially for low-income households with several children
- repartnering and additional dependants have no effect on obligations
- the desirable objective is to maintain the living standard of the child as before separation
- this can best be achieved through the specified child support allocation.

An online survey conducted as part of the consultation asked whether child support should be a fixed sum or income related. The proposed formula was then based on income and the full cost of children. There was no partial cost option.

Given that the result is transfer of money from a liable parent to a recipient parent, child support determines not only financial contributions, but also the right to decide how the funds are used. Consequently, it is a redistribution of property rights, or power and decision-making authority, from the earner to the recipient. Currently, if a liable parent cares for a child for less than 40% of nights, then that parent has no say as to how the child support is used, and has to cover directly incurred costs over and above contributions already made.

Dunne makes clear that, in the proposed formula, expenditure for raising children should come from Working for Families tax credits plus contributions by both parents according to their income, some of this to be incurred directly and the rest to be transferred from one parent to the other as child support. Payment would still confer no say, each parent having full discretion as to the use of the money at their disposal.

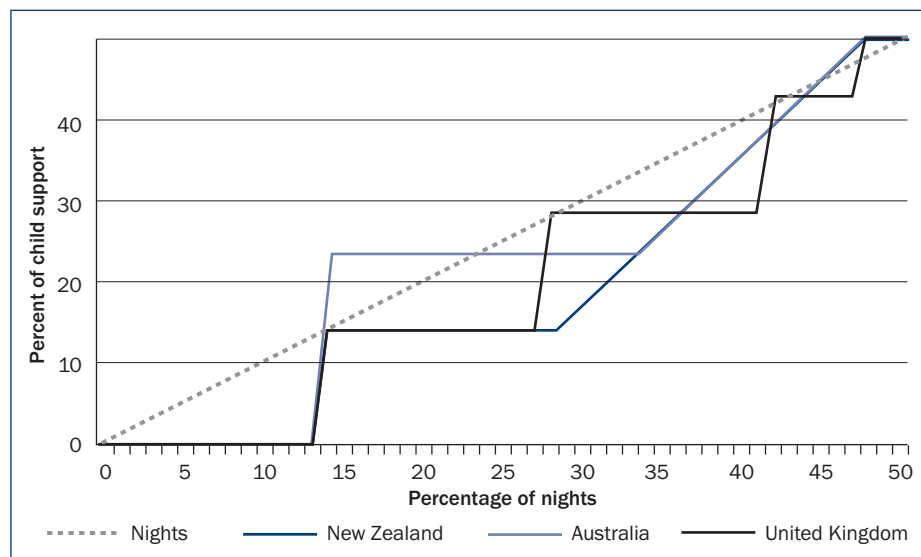
The issue of shared care received attention, with a proposed consideration of care less than 40% of nights. Dunne (2010, p.19) describes the additional costs arising from the care of children in two households. Referring to Australian findings, households with a modest living standard and 20% of the care are estimated to experience 38% of the costs of a sole parent with 100% of the care. This rises to 60% for a 'low-cost' household. Surprisingly, the other parent with 80% of care still incurs 99% of the

full-time costs. This is explained in terms of savings in costs such as food being balanced by higher travel costs incurred by the recipient parent due to shared care (Henman et al., 2007, pp.22-3), although this is minimal for parents living in close proximity. It is not mentioned, but there are also likely to be more activity costs at weekends than on weekdays, and number of nights may not reflect the amount of time spent with a child. The Australian result is obtained from an itemised cost approach. Taking a living standard measure as in Claus et al. (2009) and described in the next section, an improvement over full-time care would be recorded in the main carer household due to the smaller share of food costs in total expenditure.

Comparisons of shared care formulae between the existing Australian and UK systems and the proposed New Zealand scheme, described in Dunne (2010, pp.32-3), are presented in Figure 1.

The diagonal line indicates where share of child support equals share of nights, while points below the line indicate under-allocation. Except for near-equal sharing, the parent with less care has a less-than-proportionate share of child support for almost the entire range, but for a short range under the Australian formula. This is despite the more-than-proportionate costs incurred and the lack of eligibility for tax benefits. For most of the range, the New Zealand proposal is the least equal. As child support income is calculated after deduction of the

Figure 1: Percentage Share of Child Support by Percentage of Nights



living allowance, any percentage split in contribution is disproportionately drawn from the higher earner, increasingly so as the living allowance rises. The current New Zealand formula draws on only one income and follows the horizontal axis to 40, after which there is some adjustment based on relative incomes. It is perhaps understandable that liable parents may be resentful if they make substantial child support contributions and also share care. It is also understandable that some might find this unsustainable. It is telling that, in one court case concerning an application for recognition of substantial equal sharing, the judge ruled against recognition largely on the grounds that the liable parent, who was paying assessed child support and direct costs for substantial care, only grudgingly contributed even further funds (*Johns v CIR*, 1999).

comprised 57% of all households. That would give a total of 1,454 observations from the survey. Only 930 returns were considered usable, meaning that 36% were rejected. Some exclusions would have occurred as a result of both adults being aged 60 or over, but a large proportion must have been due to specified problems with data, namely: zero or negative expenditure; food expenditure greater than total expenditure; zero or negative income; or expenditure greater than twice income. These reasons suggest either problems in the rejected data or, for the latter two, annual data perhaps not identifying fluctuations in income or expenditure over time. In any event, the apparently high rejection rate suggests that much of the data would have been inaccurate. This raises the question: if there are clear inaccuracies in so much of the data, how much confidence can be placed in the data that were not rejected?

this latter equation for their subsequent analysis. The current discussion focuses on Equation 1, but similar points apply to both equations.

The choice of variables and specification of functional form are important determinants of the resulting outputs. This is common to all estimation, but its significance is often overlooked in econometrics, as when including ‘control variables’, or failing to recognise the importance of aggregation by time, with or without lags being considered.

Note that in this equation the only impact of household size is a fixed increase in expenditure per person, with the actual sum depending on the age category of the individual. In particular, the impact is independent of household income, and there are no differences between the impact of the first and the tenth person in any age group. The first and any additional child under 13 is estimated to increase household expenditure by \$19 per week. This can be viewed in relation to an estimated total weekly expenditure of \$958 for a couple-and-child household on \$1,365 income per week.

Nevertheless, a large amount of the expenditure depends solely on household composition (\$360 per week for a household with a young child, and \$405 with a child aged 13–18). This results in average changes in expenditure out of extra income of 45% for an income rise from \$0 to \$704, 43% for an income rise from \$704 to \$1,365, and 39% for an income rise from \$1,369 to \$2,838, all independent of household composition.

There is no constant in the equation, but most households in the sample will have two people in the Ages(4) category, which may therefore approximate a constant. Expenditure is based on current income, so there is no consideration of life-cycle spending patterns, for example. Given different possible behaviours by, say, intending first home buyers, childless career couples and retired couples, the assumption of the same underlying relationship for all may be unrealistic.

While this equation was estimated using the full selected sample, results were used only to estimate the

**There are marked differences if estimates are based on both adults being under 25, with the younger household spending \$120 per week less at all income levels. If the wrong relationship has been chosen, then resulting estimates will be misleading.**

**Estimating the costs of children**

This section considers the cost estimates derived in Claus et al. (2009) and applied in Dunne (2010). The process followed can be described in terms of (a) selecting the data, (b) estimating expenditure (equation 1), (c) calculating the expenditure–standard of living relationship (equation 2), and (d) using equation 2 to estimate costs of children as the extra expenditure required for a constant living standard.

**Selecting the data**

The data were taken from the Household Economic Survey for 2006–2007 and were restricted to two-adult and two-adult-with-children households. These

**Estimating expenditure**

Equation 1, the household expenditure equation, is as follows:

$$E_i = \alpha_1 Y_i + \alpha_2 (Y_i)^2 + \alpha_3 \text{Ages}(1)_i + \dots + \alpha_6 \text{Ages}(4)_i + \epsilon_i$$

E is expenditure and Y is income, both weekly, in thousands of dollars. Ages(1) to Ages(4) are the number of household members aged, respectively, 0–12, 13–18, 19–24 and 25 or over. A modified version of this equation, Equation 3, does not distinguish between Age(1) and Age(2), thus simplifying consideration of situations with more than one child, but preventing inclusion of variation in cost due to age of children. Claus et al. use

expenditure of couple households with one child under 19. The estimates are also restricted to couples both 25 or older. There are marked differences if estimates are based on both adults being under 25, with the younger household spending \$120 per week less at all income levels. If the wrong relationship has been chosen, then resulting estimates will be misleading.

#### Calculating the expenditure–standard of living relationship

The study requires the estimation of the following living standards equation, Equation 2, in which LS stands for living standard and F represents family size:

$$LS_i = \beta_1 \ln(E_i/F_i) + \beta_2 (\ln(E_i/F_i))^2 + \beta_3 \ln(F_i) + \beta_4 (\text{Ages}(1)_i/F_i) + \dots + \beta_7 (\text{Ages}(4)_i/F_i) + \mu_i$$

This is paired with Equation 1. Just as that equation has an alternative Equation 3, there is a corresponding Equation 4 for situations with more than one child.

The LS measure is central to the study. It is taken to be the percentage share of total expenditure comprised by a subset of categories (food at home, non-durable household supplies and services, communication equipment and services and personal care products and services), expressed as a natural log. Any two households with the same value for this measure are considered to have the same living standard, with lower values indicating higher living standards. It is questionable why such a measure is considered a satisfactory measure for comparison over household types and income levels. While, for any individual household, a fall in the share might reflect a rise in living standard, it may be wrong to assume that comparisons across households are equally meaningful. There may be many other determinants of lifestyle that have not been considered in this analysis. Some specific potential distortions can be imagined. In particular, there may be systematic differences in lifestyle according to size and age composition of households which affect both the level and composition of household expenditure. It is also not clear why the functional form for the equation

## The treatment of housing costs in expenditure can give misleading results. Interest is included in the expenditure measure, but capital repayments are not.

was chosen, and with an R2 of 0.1533 (Claus, et al., 2009, p.20) its explanatory power is weak.

Following the Australian methodology, Claus et al. (2009) have additional equations 3 and 4 to calculate costs for households with more than one child. They are slight variants of equations 1 and 2 and combine the two child age groups. Living standards by household composition and income as calculated by equations 3 and 4 are given in Table 1, with an additional row for no-child households. They are presented as percentages of household expenditure. Low income is \$704 per week, and middle and high incomes are \$1,365 and \$2,838 respectively. It can be seen that a middle-income childless household could almost halve its income to \$704 per week and still be on a higher living standard than a middle-income household with two children. A high-income no-child household could cut its income by 75% and still be on a higher living standard than a four-child household on the same income. In fact, using equation 1, a weekly income of \$485 and associated expenditure of \$563 would give an equivalent living standard to a four-child household on \$2,838 with expenditure of \$1,638 per week. It is on this basis that a weekly cost of children figure of \$1,075 is determined. It means that, according to the model, a four-child household on an annual income of nearly \$150,000 is on the same living standard as a couple on just over \$25,000.

The difference in these numbers going down the columns or across the rows is not very large. This suggests two things. First, living standards may not vary very much according to this measure, and second, large expenditure differences may be required to compensate for any measured LS difference due to the presence of children. Moreover, the estimates are not precise, so small differences may not be significant. It could also be imagined that data definition, lifestyle, wealth, stage of life or other differences could have a greater impact than changes in the included explanatory variables.

Additional problems with the measure can be identified. The treatment of housing costs in expenditure can give misleading results. Interest is included in the expenditure measure, but capital repayments are not. Consider a household with a fixed expenditure pattern, including mortgage payments (interest plus capital). Over time, the interest component declines and capital repayments increase. Consequently, total measured expenditure is declining. There is no change to the expenditure in the subset categories, so measured living standard would be declining (LS is rising) although there is no change to the actual living standard, and the household is becoming wealthier. The failure to recognise implicit rent to owner-occupiers is equally distorting. Consider one household that is a mortgage-free owner-occupier, and another that is renting, with non-rent expenditures

**Table 1: Living Standard (percentage of expenditure allocated to designated sub-basket of goods)**

	Low-income household	Middle-income household	High-income household	Average-income household
No child	21.22	18.56	14.63	17.92
1 child	22.57	20.61	17.23	20.10
2 children	23.57	22.15	19.28	21.74
3 children	24.31	23.32	20.91	23.00
4 children	24.87	24.23	22.24	23.98

equal. The household that is renting would be considered to have a higher standard of living due to the higher total expenditure.

*The costs of children*

The cost of children is estimated as the difference in estimated expenditures of a household with children compared to a two-adult household on the same living standard. Taking the living standard calculated as in Table 1, Equation 2 (or Equation 4) is solved for E assuming two adults only.

The choice of E/F in Equation 2 is puzzling. It suggests that living standard is a function of per capita expenditure, although an extensive literature on household equivalence measures suggests that there are economies of scale in households, and children cost less than adults. Hence, for example, the Jensen Equivalised Annual Household Income for a two-adult-plus-child household on an income of \$35,000 would be equivalent to a two-adult household on \$29,400 (Statistics New Zealand, undated). By this measure, a child increases required income by 19%. In contrast, a per capita measure, lacking economies of scale or differential adjustment for children, requires an expenditure increase of 50%. The significance of this is indicated with a truncated version of Equation

2 considering only the E/F terms. To equalise LS, it is then only necessary to equalise the expenditure variables. (The result is therefore independent of the sample or the estimation method.) With per capita expenditure, a fall in couple-plus-child expenditure of 33% would give the required couple-only expenditure. With the Jensen measure, a fall of 0.19/1.19, or 16%, would achieve the same result. In other words, for the truncated equation this change halves the estimated cost of a child. This suggests that, by ignoring economies of scale and shared consumption, the approach may overstate the costs of children in the full model, perhaps by a large margin.

Results may be sensitive to other aspects of the model. Taking adults under 25, rather than 25 or over, has been shown to affect expenditure estimates. It also affects estimated costs of children, as shown in Table 2, drawn from Equations 1 and 2. As can be seen, there is a marked difference in results, with under-25 results being surprisingly high.

Coefficient estimation can be confounded by multicollinearity, in which case the effects of changes in the value of a variable may not reflect precisely the response to that variable, rather than other, statistically-related influences. It should also be noted that coefficient estimates are not precise. The interpretation of

results and the use of significance testing in general has been challenged in several publications, some of which are widely known (McCloskey, 1998; Ziliak and McCloskey, 2008). Without rejecting the estimation method in its entirety, it is possible to consider the effects of slight changes in the values of the estimated coefficients. Table 3 presents cost-of-child figures from Equations 1 and 2 with adults over 24. The coefficients for Age(1) and Age(2) in Equation 2 are changed by plus and minus 0.2 standard errors, relatively small adjustments. It can be seen that these have a major effect on estimated costs of children. The +0.2SE figures are all more than a third of total household expenditure, suggesting diseconomies of scale!

In summary, the estimated costs of children are imprecise, and are highly sensitive to the assumptions and parameter values. Small changes in these can produce large changes in results. However, if the results are accepted, big changes in expenditure are required to produce small changes in LS. Rather than the quantitative analyses providing robust and strongly supported measures, they may serve more of a rhetorical purpose, lending authority to figures which, while only poorly supported, may appear convincing. This is likely in particular if the values presented appear, *a priori*, plausible. However, as is shown above, there are some results provided by the model that may be less widely acceptable.

An additional problem is the meaning of the figures. Despite the analysis, it is still not clear what the money is for. Consequently, it would be hard to hold a recipient parent accountable for its use. One explanation given for taking the living standards approach is that it is not possible to separate out expenditure on individuals within a household (Claus et al., 2009). Much is intermingled, so certain uses of the money will benefit others in the household. However, it cannot then be assumed that an allocation of the estimated sum to a particular household would give the desired living standard for the child(ren) in that household, regardless of the overall household income. In the extreme, it is hard to see how a child's

**Table 2: Costs of One Child under 13, by Age of Parents**

	Low-income household	Middle-income household	High-income household	Average-income household
Adults 25+	\$147	\$243	\$426	\$268
Adults <25	\$308	\$356	\$551	\$381

**Table 3: Cost of Child, Adjusting the Age Coefficient in the LS Equation**

	Low-income household	Middle-income household	High-income household	Average-income household
Child <13				
Age(1) + 0.2SE	\$246	\$339	\$533	\$365
Age(1)	\$147	\$243	\$426	\$268
Age(1) - 0.2SE	\$73	\$169	\$342	\$193
Child 13+				
Age(2) + 0.2SE	\$296	\$388	\$585	\$414
Age(2)	\$196	\$291	\$477	\$316
Age(2) - 0.2SE	\$90	\$183	\$355	\$207

living standard can be maintained with a high-earning liable parent and a recipient parent on the DPB.

#### **Broader issues and an alternative proposal**

The consultation and proposals are narrowly focused on the child support formula. Issues of context and unstated assumptions are important. Some of these are beyond the scope of this paper, such as the decision to have children and associated choice of roles, or whether one adult has raised or lowered the living standard of the other due to their relationship or due to entry into their relationship. A core assumption in the consultation is: 'if children are not to share in the decreased living standard that necessarily results from the costs of parents living apart, then child support payments should be based on previous expenditure on children in the intact family' (Claus et al., 2009, p.8). For a reframing of this point, Braver and O'Connell quote a judge: '[I]f we're really so concerned about the child's standard of living, why don't we just typically award custody, when it's in dispute, to the parent with the higher income?' (Braver and O'Connell, 1998, p.86). This is not the only unstated issue.

A potentially important aspect affecting co-operation and compliance is that of power and control. Implicit in the lack of controls on the use of funds is an assumption of full trust in recipient parents to use all the designated funds from all sources correctly. This is despite both the abnormal spending pattern required to maintain differential living standards within a household and the choice to take the DPB, thereby redirecting a large proportion of the dedicated funds away from the child. Conversely, there is no trust in liable parents, with the full estimated costs of children being assigned by the formula and no say being awarded to that parent in the use of the funds. Framing of issues is important, and it has been argued (Birks, 2008) that current representations are narrowly focused, in part due to the dominance of a women's rights discourse. An unbalanced child support regime can damage relations between parents and between parents and children.

Although there have been suggestions to the contrary, data suggest that children generally lose the parenting input of one parent when their parents live apart. Hence, '[a]s at 31 March 2009, 7,976 children and 6,950 parental relationships were covered by a qualifying shared care arrangement, representing 3.9% of children and 4.6% of relationships in the child support scheme' (Dunne, 2010, p.28, fn.25). Resentment under the current system may be understandable when it is viewed according to one extreme framing. The comparison has been suggested of liable parents and parents of the 'stolen generation' in Australia. According to this reasoning, not only are liable parents denied parenting relationships with their children, but they are also then required to pay for them.

**In summary, it is clear that costs may vary markedly across households according to circumstances and lifestyles. Any estimates of costs will be subject to large error.**

Despite the exclusion of the liable parent, the current rhetoric is that, 'One of the Government's key social policy objectives is to ensure that New Zealanders have an equal opportunity to participate in and contribute to society' (Dunne, 2010, p.6). The problem is denied, but it may be a factor in child support compliance, and in collection costs which have been estimated for New Zealand at nearly 19c per dollar (Shephard, 2006).

An alternative proposal could be built on a more balanced view of the roles and motivations of child support payer and payee. Consider, for example, the following middle-of-the road presumptions:

- both (biological) parents have an interest in the well-being of their children
- a recipient parent may not spend as assumed in the legislation, as this is based on an abnormal spending pattern with no guidelines or monitoring

- a paying parent would willingly make contributions to the cost of a child when allowed some control of the use of the funds.

On that basis, instead of attempting to include the full costs of children within the child support formula, a more moderate child support system could be designed so as to provide a 'safety net'. Under such a system, only part of the costs are covered by the legislation. This would equate to a redistribution of somewhat fewer property rights from the liable parent to the recipient, while leaving the remainder of the costs of the children to be covered through voluntary contributions by either or both parents. Consequently, there would be a more balanced power allocation between the parents, with each having

some discretion. This is likely to result in less resentment, more recognition of the contributions of the paying parent, and each parent having an incentive and a greater ability to maintain good relations with the other. A possible outcome would be improved co-operation and agreement between the parents.

Partial coverage of costs could also be justified on the basis of uncertainty about the true costs of children, along with other reasons for concern about the recipient parent's use of funds and the under-recognition of direct costs to liable parents. A simple modification to the formula proposed in Supporting Children would be to halve the assessed figures. This is likely to: (i) greatly reduce the existing need for an unattainably accurate estimate of costs of children, (ii) increase accountability in use of money for children by both parents, (iii) encourage greater communication and co-operation by parents on a more level

playing field, and (iv) reduce resentment by liable parents, increasing voluntary compliance and hence reducing collection costs.

### Conclusions

In summary, it is clear that costs may vary markedly across households according to circumstances and lifestyles. Any estimates of costs will be subject to large error. In addition, even in the proposed formula tax benefits are unrepresentatively

allocated and incurred costs incorrectly acknowledged. Perhaps the most significant findings are that: the intention is to operate a system that attempts to rule on the funding of these costs in their entirety; government funding can provide a substantial component of the amount going to the main caregiver; the total funding may be set according to an unrealistically high living standard for the children; costs incurred by the caregiver with less time are relatively under-

acknowledged; the payers (including government) have no rights over the use of the money paid; and the system results in a major power imbalance and potential source of conflict, with enforcement and penalty provision for child support payers but no constraints or even guidelines for payees. It should not be surprising if such a system results in conflict between child support payer and payee, and in administration problems.

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Maureen Baker

# The Political ECONOMY of Child Care Policy

## Contradictions in New Zealand and Canada

### Introduction

In countries like New Zealand and Canada, often classified as 'liberal' welfare regimes, child care was historically viewed as a private matter of little concern to governments or employers. Nevertheless, early in the 20th century governments supported maternal care at home by providing tax relief to male-breadwinner families, but also established care and protection programmes for disadvantaged children. In the 1940s, both countries developed universal child allowances to help parents with childrearing costs. By the 1970s they were providing subsidies for early childhood education and care while continuing to offer income support programmes for disadvantaged parents caring for children at home (Baker, 2006; Kedgley, 1996; May, 1997; McClure, 1998).

This article focuses on early childhood education and care (ECEC), which can include school- or centre-based education and care (public and private kindergartens, daycare centres, nurseries or crèches) as well as government-regulated group care in private homes. However, it does not include informal care by parents, relatives or sitters. Historically, the most prevalent support for ECEC in New Zealand and Canada has involved subsidising group care for children from low-income households and of sole parents, but subsidies can vary from a fraction of parental fees to covering all of them. If policy makers see ECEC mainly as education, they may subsidise only a few hours a week, but if they want to encourage maternal employment they may subsidise full-day and full-week child care. Of course, states support families in a number of other ways as well. For example, child tax benefits and child allowances provide invaluable assistance, but they are omitted from this article because they focus on parenthood rather than care

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work. In other words, these programmes are not targeted to the physical or hands-on care of children.

In the past decade, both New Zealand and Canada have improved work-related ECEC, which is the main concern of this article. Maternal employment rates and child care support in these 'liberal' states are compared to the OECD average and the 'social democratic' countries of Denmark and Sweden, where ECEC policy differences are most apparent (Bonoli and Reber, 2010). The main argument of this article is that ECEC reforms in New Zealand and Canada have improved service availability and enabled more mothers to retain paid work and

#### **Welfare regimes, political parties and models of family**

Some continuity is apparent in the design, delivery and funding of social benefits and services, even though welfare states were established and modified over many years with input from different political parties and interest groups (Esping-Andersen, 1990; Korpi, 2000). Researchers have noted patterns in the assumptions underpinning the development of social programmes based on why some people are in need, how the state should assist them and how services are best delivered. The assumptions and the services/benefits developed from them have been called 'welfare regimes'. Specific jurisdictions

1999; Baker, 2006), suggesting that they generally rely on employment earnings to ensure well-being while providing targeted benefits for needy households. However, this label has been disputed for New Zealand by researchers such as Castles and Shirley (1996), who preferred the 'wage-earner's welfare state'. They argued that New Zealand (and Australia) differed historically from the liberal states by focusing more on wages and employment benefits, but conceded that New Zealand especially has changed since the 1990s.

This article uses the 'liberal' label for both New Zealand and Canada, further arguing that similarities were always more apparent in family policies than in employment-related programmes (Baker, 2006). Different welfare regimes often incorporate varying assumptions about family composition, the expected division of labour by gender, and the appropriate role for the state in family life (Leira, 2002). These enduring assumptions suggest that social provision becomes institutionalised, with vested interests discouraging radical reform. However, new ideas from interest groups, international organisations or changes in family demography can lead to policy restructuring if those who introduce the ideas can justify them within the existing culture (Béland, 2005).

Both countries share similarities in recent governance and currently have centre-right governments. New Zealand had a Labour-led government from 1999 to 2008, while Canada had a centre-left Liberal government from 1993 to 2006. Political parties also tend to conceptualise family life in particular ways, offering more or less support for specific 'models of family'. Generally, conservative or right-of-centre parties have talked about 'parental choice' but actually based many policies around the male-breadwinner family, viewing wives primarily as care providers even when they are employed. Left-of-centre parties have typically offered more support to the 'parent-worker', mother-led households and nuclear family alternatives (Bonoli and Reber, 2010). However, all liberal governments now encourage able-bodied adults to become self-supporting

### **... all liberal governments now encourage able-bodied adults to become self-supporting through paid work, unless they have sole responsibility for young children or are supported by other family members.**

support their households. Reforms have also strengthened public discourse about the importance of parental employment, yet additional policy changes and social services are required to enable parents to manage earning and caring more effectively.

Comparative and historical analysis is valuable because it shows not only a range of policy options but also the demographic, economic and political conditions under which policies are conceptualised, debated and restructured. Comparisons also reveal that some governments give priority to children's care and education while protecting parental working conditions and employment equity. Other governments say they are 'strengthening families', while deregulating labour markets, tightening eligibility for income support, and expecting parents to cope with little assistance. In reality, most states have made significant policy trade-offs, reducing certain forms of family support while improving others (Baker, 2006; Beach et al., 2009; Hantrais, 2004).

have been found to favour one type of regime over the years, depending on the philosophy of governing parties, the power of various interest groups, political coalitions and prevalent sociocultural ideas.

Considerable controversy has existed about welfare regimes and how to classify specific countries. One classification, developed by Esping-Andersen (1990) and widely used in cross-national research, labelled regimes as 'liberal' if they assume that individuals should rely on household earnings and that the state should intervene mainly when families cannot cope. 'Corporatist' or 'conservative' regimes tended to preserve gender- and class-based status differentials by focusing on social insurance programmes that share the cost of social protection for long-term employees. 'Social democratic' regimes sought to reduce inequality based on gender and social class through universal programmes and progressive taxation (ibid.). Both New Zealand and Canada have been labelled 'liberal' states under this classification (O'Connor et al.,



through paid work, unless they have sole responsibility for young children or are supported by other family members.

#### Paid work as the 'solution' to poverty?

Affordable child care tends to raise maternal employment rates (Roy, 2006), which increased in both countries throughout the 1980s and 1990s. These rates still remain higher in Canada, but are especially high in Sweden and Denmark (OECD, 2007a). As Table 1 indicates, the younger the child and the more children per household, the lower are the maternal employment rates, especially in New Zealand.

Mothers often use part-time work to manage child care responsibilities, but few fathers work part-time as they are typically seen as major household earners (Ranson, 2009; Baker, 2010). As Table 2 shows, over one third of employed women in New Zealand worked part-time in 2007, which was above the Canadian rate of 26.1%, the OECD average of 25.6% and Sweden's rate of 19.7%, although there are some variations in the Swedish definition of part-time work<sup>1</sup> (OECD, 2009, p.93).

In both Canada and New Zealand, political discourse suggests that parental employment is the main route out of poverty (Lunt et al., 2008; Vosko, 2009), but child poverty rates<sup>2</sup> for employed parents vary cross-nationally. As Table 3 indicates, nearly one third of employed sole parents are 'poor' in Canada and New Zealand compared to 4% in Denmark and 6% in Sweden. This table shows that having a job reduces poverty rates but employment does not pull all households out of poverty, as low-wage work is widespread in the liberal states and mothers with young children often shorten their working hours to provide care. If sole parents are outside paid work, 48% are poor in New Zealand and 89% in Canada, compared to 20% or less in Sweden and Denmark (OECD, 2009, p.93). These comparisons indicate that it is possible to reduce family poverty and improve well-being whether parents are employed or receiving state income support.

Policy discourse in both countries emphasises the importance of responsible parenting (Baker, 2006), yet less public

support is offered for employed mothers than in the northern European countries (Korpi, 2000; OECD, 2007a). In addition, public discourse in New Zealand and Canada has blamed 'workless' parents for their poverty but continues to praise professional women 'choosing' to provide care work for preschoolers at home (Baker, 2008). Low-income mothers have been encouraged into employment by more affordable child care, social benefit cuts and public discourse elevating the value of earnings for the poor. However, providing ECEC for middle-income parents has been more controversial in both countries because it requires greater reallocation of public resources, moves away from the liberal focus on low-income households, and strengthens the value of maternal employment at the risk of downplaying care work.

#### Pre-2000 child care support

Early childhood education and care services enjoy a long history, but lobbying for state support has been contentious in many jurisdictions (Baker, 2006; Jenson and Sineau, 2001). Preschool or nursery school has been seen as a necessary and enriching part of early education in Europe since the 19th century, but many preschools in liberal and corporatist states were sponsored by private educational foundations rather than the state. Countries with a tradition of social democracy have long expected women to earn a living and contribute to national productivity. To enable mothers to remain in the workforce, these states provided public child care and family leave entitlements, which came to be seen as citizenship rights (Jenson and Sineau, 2001).

**Table 1: Maternal Employment Rates, Women 15-64 by Age Of Youngest Child, 2005**

Country	Age of youngest child				Two children under 15	Three children under 15
	0-16	Under 2 years	3-5 years	6-16		
Canada	70.5	58.7	68.1	71.1	73.2	66.3
Denmark	76.5	71.4	77.8	77.5	-	-
New Zealand	64.6	45.1	60.6	75.3	64.5	56.7
Sweden	82.5	71.9	81.3	76.1	84.7	75.6
OECD	61.5	51.9	61.3	66.3	57.0	44.0

Source: Extracted from OECD (2007a), Table 3.2

**Table 2: Part-time Employment as a Percentage of Female and Male Employment, 2007**

Country	2007	
	Women	Men
New Zealand	34.7	11.2
Canada	26.1	11.0
Denmark	23.9	12.4
Sweden	19.7	9.5
OECD average	25.6	7.2

Source: Extracted from OECD (2009), p.73

**Table 3: Poverty Rates For Children by Work Status Of their Parents**

Country	Poverty among children	Parent work status				
		Single parent not working	Single parent working	Two parents, no worker	Two parents, one worker	Two parents, two+ workers
New Zealand	15	48	30	47	21	3
Canada	15	89	32	81	22	4
Denmark	3	20	4	21	5	0
Sweden	4	18	6	36	14	1
OECD average	12	54	21	48	16	4

Source: Extracted from OECD (2009), p.93

Until the 1960s or later, both New Zealand and Canada expected mothers to care for their own children at home or find alternative care, but opposition to married women's employment was briefly challenged during the second world war when women's labour was needed in war industries (Baker and Tippin, 1999; Kedgley, 1996, p.132; May, 1997). For example, the Canadian government revised the Income Tax Act to allow husbands to claim their wives as dependants regardless of their earnings, and extended cost sharing to the provinces for daycare centres for mothers working

(Kedgley, 1996, p.303). However, when the National-led government returned, subsidies were reduced and the proposed funding increases were cancelled in 1991. A new programme called Parents as First Teachers was introduced to reinforce parental responsibility (ibid., p.304).

In 1991 the National-led government also cut the level of social benefits (including the DPB), and later strengthened work requirements for beneficiaries. By 1997, sole mothers were expected to find part-time work when their youngest child entered school and full-time work when the youngest

impoverished parents caring for infants and toddlers at home. In 1971, the federal government introduced an income tax deduction for employed parents using ECEC, especially reducing the tax payable for middle-income parents (ibid.). These latter three programmes were won after years of lobbying by organisations such as the Child Care Advocacy Association and the National Action Committee on the Status of Women (Baker and Tippin, 1999). Politicians were forced to listen because maternal employment rates had already increased and public opinion considered child care crucial for women's employment equity as well as for children's education and development.

From 1966 to 1996, the federal government matched provincial spending on social programmes (including ECEC) under the Canada Assistance Plan (CAP), designed to equalise provincial services (Baker, 2006). However, subsidised child care spaces continued to fall short of the demand as more mothers entered paid work, and employer-sponsored services were also encouraged through capital grants, operating subsidies and tax breaks. After considerable lobbying throughout the 1980s, two Canadian commissions studied child care concerns. In 1987 the Conservative (Mulroney) government introduced the National Strategy on Child Care, but only the tax reforms were implemented and the proposed national programme was delayed. As child care falls under provincial jurisdiction, the federal government was unable to persuade the provinces to accept national standards.

CAP was permitted to expire in 1996, largely because federal costs were growing and jurisdictional disputes continued. Instead, the Canadian government began transferring block grants to the provinces for health, social and educational services, permitting more variation in service delivery. Now that more households rely on maternal earnings, state support for child care has grown into a significant political issue in Canada.

#### **State child care support post-2000**

New Zealand and Canada continue to support low-income parental care as well as early childhood education and care (ECEC). Parental programmes

## **[The Canadian] Politicians were forced to listen because maternal employment rates had already increased and public opinion considered child care crucial for women's employment equity as well as for children's education and development.**

in war industries. However, these policies ended after the war (Pierson, 1977).

New Zealand governments continued to promote the male-breadwinner family, with support from the Plunket Society (Kedgley, 1996). Since 1973, sole parents have been provided with income support through the Domestic Purposes Benefit (DPB) if their income and assets are low, they have sole responsibility for the care of their children, and they have no male breadwinner in the household (Baker and Tippin, 1999). The Canadian provinces provide similar support, but their programmes always focused more on disadvantage and inability to work rather than sole mothering (ibid.).

In 1989, the New Zealand Labour-led government showed a greater acceptance of maternal employment along with children's education and cultural development, and also tightened regulations and provided new ECEC funding. This policy change followed the Meade Report (1988) from the Working Group on Early Childhood Education, as well as lobbying by the Campaign for Quality Early Childhood Education

child reached 14. Critics opposed these requirements by arguing that sole mothers were already working by caring for their children, but the changes went ahead. The National-led government continued to provide small subsidies for ECEC, but only for low-income households for 30 hours per week. Current policies were developed largely since the 1990s, when the rate of maternal employment accelerated, but Canadian policies were initiated in the 1960s. This suggests that higher male wages in New Zealand prior to the 1980s enabled more wives to care at home, child care services were less affordable or available, and lobbying focused more on payments for maternal care at home (Baker, 2009).

Canadian governments have offered four main forms of support for ECEC. Since the 1950s, some of the provincial governments and school boards have funded free public kindergarten for four- and five-year-olds as part of the school system. The provincial/local governments also subsidise ECEC spaces for sole parents and low-income households (Baker, 2006), as well as providing income support for

typically enable low-income and sole parents (mainly mothers) to care for their children at home, as New Zealand's Domestic Purposes Benefit (DPB) and provincial welfare programmes in Canada do (Baker, 2008). ECEC programmes share many similarities between the two countries, but there are also notable cross-national differences. In Canada, kindergarten teachers' qualifications and the educational programmes continue to be regulated by the provincial ministries of education, while daycare centres with less-qualified providers (who focus more on play and custodial care) are subsidised and regulated by provincial ministries of social development or community services. In New Zealand, early childhood education is regulated by government and the 20 hours of free care (discussed later in this article) is funded by the Ministry of Education. However, child care subsidies to low-income families are provided through Work and Income New Zealand (WINZ, 2010).

Increasingly, the liberal states provide more free preschool education, subsidise full-day and full-week care for low-income parents, and have extended subsidies to for-profit providers (although they don't subsidise care by parents or relatives). Both New Zealand and Canada regulate the ECEC physical site and facilities, as well as provider qualifications and pay rates, parental fees, staff/child ratios and quality of educational programmes, but Canadian regulations vary considerably by province (Beach et al., 2009). As we will see in the following sections, recent reforms have been controversial in both countries.

#### *Recent New Zealand reforms*

In 1999 the Labour-led government returned to power, and in 2002 it officially relaxed National's work requirements for the DPB. However, it still expected beneficiaries to negotiate a 'Personal Development and Employment Plan' with case managers, emphasising employment when their children enter school (Baker and Tippin, 2004; RPAC, 2007). Major family policy reforms were made in 2006 when the 'Working for Families' programme provided more income support to employed parents with moderate and low incomes living

with children. It also provided higher accommodation allowances, larger ECEC subsidies for up to 50 hours a week, and more out-of-school care (NZ Government, 2006; St John and Craig, 2004).

In 2007 the Labour-led government began subsidising 20 free hours of ECEC a week for three to four year olds in educational centres for a maximum of six hours per day, regardless of parental income (NZ Government, 2006). Bushouse (2009) argued that this was portrayed by Labour as a 'watershed' programme when it was introduced but had been controversial from the

### **... the [New Zealand] government announced that it would cut the early childhood education budget in 2011 in order 'to slow the unsustainable rate of growth' under the previous Labour-led government**

outset. In the initial proposal, private providers were excluded, but were later included after considerable lobbying by organisations such as the Early Childhood Council. Controversy continues about the exclusion of parent/whānau-led services and a restriction on 'top-up' fees. Bushouse (2009) demonstrated that this policy initiative has become the largest and most expensive early childhood programme in the country, and a major departure from funding targeted to low-income households. In addition, she notes that about 35% of early childhood education in 2007 was privately owned (ibid., p.63). Many ECEC providers continue to argue that the 20-hours programme fails to cover their operating costs, requires them to ask parents to pay optional charges or lose money, and is really a higher subsidy on services rather than free care (Hann and Thomas, 2007; Bushouse, 2009).

Since the National-led government returned to power in 2008 they have retained the 20 hours but reactivated some of their previous income support policies. DPB mothers are required to enter employment when their youngest

child enters school, and time limits have been placed on other programmes (WINZ website, 2010). Government subsidies for child care (beyond the 20 hours) remain partial: for the poorest parents<sup>3</sup> the maximum is \$3.77 per hour in 2010 (WINZ, 2010). However, the government announced that it would cut the early childhood education budget in 2011 in order 'to slow the unsustainable rate of growth' under the previous Labour-led government (Binning, 2010). Subsidies will be reduced to ECEC providers with 80% or more of their staff fully qualified, which could increase parental fees, reduce

maternal employment and/or encourage parents to use lower quality care (ibid.). A task force was also established by the National-led government in October 2010 to review ECEC subsidies and services. However, another government-appointed group (the Welfare Working Group) continues to discuss reforms to welfare funding, and is expected to focus on potential cuts.

Controversies continue about child care costs and service availability, and about the impact of day-long ECEC on children's development. However, research indicates that high-quality care improves school readiness and social skills while having little impact on maternal attachment or other behavioural indicators (Beach et al., 2009; Jenson and Sineau, 2001).

#### *Recent Canadian reforms*

Canadian controversies continue over the political feasibility of creating a national child care programme. The federal government funds a tax deduction for employment-related child care, now worth \$7,000 per preschool child, and ECEC spaces are subsidised by provincial/

local governments with federal grants. Consequently, costs vary considerably by province and community, and many centres have long waiting lists (Beach et al., 2009; Hoffman, 2010). Subsidised spaces are targeted to low-income and sole parents, but parents expected to pay the full cost may be eligible for the tax deduction.

Quebec heavily subsidises child care for all parents who need it, regardless of income or work status, at a cost to parents of \$7.00 Canadian<sup>4</sup> per day (Albanese, 2006). Inexpensive child care policies were initiated in 1997 by

any child under six. This was allegedly designed to expand 'parental choice', but likely also to appease voters favouring mothering at home. At the provincial level, Ontario increased publicly-operated programmes in 2009 by introducing full-day public kindergarten for four and five year olds, requiring new partnerships between kindergarten teachers and ECEC providers (Lewington, 2010).

In Canada, the for-profit sector is growing faster than any other form of ECEC. Furthermore, the mean income among child care workers was \$25,100 in 2006 (CCRRU, 2008), which is well

purchase care, but 'family' care is typically performed by mothers rather than fathers (Adkin and Abu-Laban, 2008). To create real choice, governments would have to pay benefits for home care approximating maternal earnings, which would be totally unaffordable and would require considerably higher income tax rates in Canada, but especially in New Zealand.<sup>5</sup>

Parents often require culturally sensitive child care, and Māori language preschools (kōhanga reo) have received international praise. However, like playcentres, the Māori preschools offer part-time education and care, and have relied largely on volunteers rather than qualified early childhood teachers. Immigrant mothers also need child care while working or taking language training. In addition, employees working non-standard hours need child care, but most centres operate during office hours. If parents work on different shifts they may be able to share care, but this could restrict family activities. Care by grandparents can save money, provide culturally sensitive care, and solidify the bond between generations, but increasingly both grandmothers as well as grandfathers are employed. Suitable child care is particularly difficult to find for children with disabilities or 'special needs'.

Some mothers care for preschoolers at home because they view it as their main pleasure and responsibility, while others find centre care unaffordable, low quality or unavailable in their community. Informal care by relatives and sitters remains a prevalent form of non-maternal child care but is seldom regulated by government. Furthermore, many of the controversies focus on ECEC. Affordable ECEC has been found to expand the labour supply, increase maternal employment and raise family income and national productivity (De Henau et al., 2006; Roy, 2006). In many European countries access to affordable ECEC is seen as an active labour market policy rather than a mechanism primarily to promote child development and education, or to reduce poverty.

#### *Funding and parental costs*

In 2004 (the most recent OECD data available, but before reforms in both countries), the average cost of child care

### **... rates have always been much higher in Canada than in New Zealand (OECD, 2009), influenced by eligibility for income support, male wages relative to living costs, and prevalent ideologies about 'good mothering' ...**

the centre-left Parti Québécois, which attempted to create a universal system. Through popular support, these policies were largely retained when the (Charest) Liberal government took over, using them to maximise maternal employment and provincial productivity (Adkin and Abu-Laban, 2008). Since those policies were introduced, full-time maternal employment rates increased in Quebec and are higher than in the rest of Canada (Statistics Canada, 2010). These rates have always been much higher in Canada than in New Zealand (OECD, 2009), influenced by eligibility for income support, male wages relative to living costs, and prevalent ideologies about 'good mothering' (Baker, 2009).

In 2004, Canada's Liberal (Martin) minority government attempted to create a national child care programme, promising to spend \$5 billion Canadian over five years (Adkin and Abu-Laban, 2008). However, when the current Conservative (Harper minority) government came into power in 2006 they cancelled these plans and introduced a child care benefit of \$1,200 per year for the parents of

below average earnings, suggesting that this is often low-paid work. However, kindergarten teachers are paid at a much higher level. Advocacy groups continue to pressure governments to view the accessibility and affordability of child care as a policy issue influencing women's employment equity as well as children's education.

#### **Continuing child care controversies**

Public debates continue about whether the state should subsidise commercial operators and/or privilege non-family over family care (Bonoli and Reber, 2010). Conservatives typically support for-profit subsidies because they increase child care availability and affordability, but they could also compromise educational standards among providers who cut corners to maximise profits. Opponents of commercial subsidies have been particularly strong in Australia since the ABC Learning controversy and bankruptcy (Brennan, 2007b; Kruger et al., 2008). Conservatives also argue that families should be given a choice to care for their own children at home or to

relative to household earnings was higher in New Zealand than in Canada, but both exceeded the OECD average, as Table 4 indicates. Child care for sole parents with average earnings would have cost 27% of earnings in Canada but 42% in New Zealand (OECD, 2007, p.59). For two-parent households with one average earner, one low earner and two preschool children, child care would have cost about 20% of earnings in Canada and 26% in New Zealand. In Sweden and Denmark, however, these costs were 10% or less for all household types.

In 2005 (most recent data), public spending on ECEC was above the OECD average in New Zealand and higher than in Canada: 0.7% of the gross domestic product in New Zealand but less than 0.2% in Canada<sup>6</sup> (OECD, 2010, p.19). Furthermore, Canada's services seem to focus more on employment-related care, while New Zealand's emphasise early childhood education. The 20 hours introduced by the Labour-led government made a notable difference to those parents able to use it, although it is only for educational care for three to four year olds and insufficient spaces are available in many centres. A Ministry of Education report noted that parental child care fees fell by 30.3% since 2007, while the average household income increased by 12.4% (Binning, 2010). While some Auckland parents<sup>7</sup> were previously paying over \$1,000 per month for full-week care, they paid closer to \$480 per month in 2010. However, some ECEC providers view their services as educational and do not always accommodate parental employment hours. In addition, many parents who use the 20 hours must pay for additional care each week. Furthermore, children cannot use centre care when they are sick and many employed parents are ineligible for paid sick leave because they have not worked for the same employer for six months (Baker, 2008).

Canadian child care costs have also been reduced, with the expansion of heavily subsidised child care in Quebec and free all-day kindergarten in Ontario. Hoffman (2010) found that most of his respondents outside Quebec paid between \$600 and \$800 Canadian per month for full-time non-subsidised

**Table 4: Child Care Costs as Percentage of Net Household Income for Working Couples and Lone Parents, 2004**

Country	Two-earner families (both with average wages and 2 children)	Two-earner families (1 with average wage, 1 with low wage and 2 children)	Lone parent (1 average wage and 2 children)
New Zealand	21	26	42
Canada	18	20	27
Denmark	9	10	9
Sweden	6	7	5
OECD average	15	17	17

Source: OECD (2007b), p.59

centre-based child care. However, the cost of non-subsidised care for preschoolers varies considerably: from \$399 a week for full-day care in Manitoba to \$814 in Ontario, with higher fees for toddler and infant care (ibid.). One quarter of Canadian child care spaces are for-profit, and these providers now receive government subsidies in all provinces except Saskatchewan (Beach et al., 2009; CCRRU, 2008).

#### *Cross-national comparisons*

Despite years of research and knowledge about what constitutes quality care, broad cross-national variation exists in ECEC policies and programmes (Bonoli and Reber, 2010). Countries such as France have provided half-day preschool for children aged three to five as part of the education system, with about 99% of children attending (Leira, 2002, p.62). In the Nordic countries, left-of-centre political parties have supported public ECEC to promote gender equity, while parties in the political centre and right have promoted equal subsidies to all families with young children, regardless of their use of ECEC.

Of all OECD countries, Belgium, Denmark, France, Iceland and Sweden have provided more extensive ECEC services for preschool children at a lower cost to parents (Bonoli and Reber, 2010; Jenson and Sineau, 2001). As a percentage of net national income, Finland, Iceland and Denmark also spend significantly more on child care than pre-primary education (OECD, 2009, p.77). In the mid-2000s, total spending on ECEC in two-earner families as a percentage of the average wage was 6% in Sweden and

Denmark, but it was 22% in Canada and 28% in New Zealand (OECD, 2010, p.21).

The social democratic countries also provide longer sick leave for employees. Sweden offers 14 days of paid leave per year (Eurofound, 2010), while New Zealand requires employers to provide only five days (Department of Labour, 2010). In Canada short-term employment leave falls under provincial jurisdiction, but Ontario (the largest province) does not require employers to provide any paid sick leave, although employees may negotiate this through collective agreements. The minimum wage as a percentage of the average wage also varies by country: 38% in Canada and 48% in New Zealand (OECD, 2007c, p.185). These discussions indicate the complexities of cross-national research, but also the extent of political trade-offs involved in policy development and implementation.

#### **Conclusion: mixed messages**

For decades Canada has had a strong employment-related child care lobby, a child care research and resource centre, and numerous researchers focusing on the topic, but jurisdictional disputes have prevented a national child care programme. In contrast, the New Zealand lobby has been dominated by ECEC providers and child poverty activists, who are more focused on early childhood education than maternal employment. Nevertheless, in both countries ECEC subsidies have been strengthened for moderate- and low-income parents who are studying, training or working for pay, and some free early education has been provided. Yet certain other family-related programmes have been eroded, especially by conservative governments. This

includes income support for low-income mothers, although New Zealand policies remain considerably more generous than those in all Canadian provinces (Baker, 2008).

In addition, labour markets have been deregulated in both countries and a growing percentage of employees now work for low wages or in part-time positions with fewer work-related benefits (Lunt et al., 2008; Vosko, 2009). More mothers work full-time in Canada than in New Zealand, but the gender wage gap, the gap between minimum wages and average wages, and child poverty rates also remain higher in Canada (OECD, 2007b).

Liberal governments operating within global market conditions frequently promote mixed messages about the importance of family and paid work to

the nation. They publicly reinforce the notion of parental responsibilities and talk about children as a future national resource, but increasingly emphasise the importance of paid work in the labour market more than caring work at home. Both New Zealand and Canada have elevated the importance of employment to family well-being but have not always ensured affordable or culturally-relevant services, ECEC hours suitable for employed parents, emergency child care, sufficient sick leave to cover child illnesses, or adequate wages.

High-quality ECEC is essential for employed parents and gender equity, but working long hours or for low wages can easily undermine the time and effort required to create a healthy family life. The fact that both maternal employment and child poverty rates are

higher in Canada suggests that parental employment is not a panacea for family well-being. Policy makers need to acknowledge that many parents struggle to combine earning and caring, and could benefit from the expansion of ECEC that is affordable, high-quality and considers their employment requirements as well as their children's education.

- 1 Part-time work is defined as 35 hours a week in Sweden and 30 hours in Canada and New Zealand.
- 2 Defined as households with children with less than 50% of household median income (after taxes and government transfers), adjusted for family size.
- 3 i.e. with household incomes of less than \$1,200 per week.
- 4 One NZ dollar was worth about 76 CND cents on 9 December 2010.
- 5 In 2010 the highest marginal income tax rate in New Zealand was 33% (Inland Revenue website), compared to between 39% and 53% in Canada (29% federal tax plus from between 10% and 24% provincial income tax) (Canada Revenue Agency website, 2010).
- 6 This figure seems to rely only on federal expenditures and I am not convinced that provincial day care subsidies are included.
- 7 An example of parents living in the moderate-income suburb of Mt Albert was provided.

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Elizabeth Eppel, Anna Matheson and Mat Walton

# Applying Complexity Theory to New Zealand Public Policy Principles for Practice

## Introduction

Interest in the development of complexity theory and its application to policy and social sciences has been accelerating over the last decade.

Growing out of developments within natural sciences since the 1960s, including chaos theory, complexity theory is increasingly being applied in organisational studies (Caldwell, 2006; Richardson, 2005; Stacey, 2003); public health (Durie and Wyatt, 2007); education studies (Zellermayer and Margolin, 2005); and policy studies (Banks, 2002; Callaghan, 2008; Dennard, Richardson and Morçöl, 2008; Klijn, 2008; Morçöl, 2002, 2010; Sanderson, 2006, 2009).

Drawing on three pieces of recent New Zealand research, this article aims to provide an introduction to complexity theory for policy practitioners and researchers, highlighting principles of

complexity theory relevant to improving policy practice and the positive impact of interventions. The studies have used complexity theory to understand and explain policy processes and the factors within those processes which shape the design, implementation and outcome of policy interventions. Eppel (2010) examined the contribution of complexity theory to understanding and explaining policy processes, using tertiary education policy processes 2000–2008 as the empirical case. Walton (2010) sought to identify policy options to support the promotion of healthy nutrition within primary school settings. Matheson (2008) investigated the implementation of two community-based health interventions carried out in different New Zealand communities. The findings of these three projects are described in turn. The paper concludes by identifying some of the implications of these research findings for practice. We also highlight areas of policy

practice where continued development of both theory and methods is required.

## Key concepts in complexity theory

Complex(ity) has become a much-used word in contemporary public policy discussion but the meaning and implications of complexity have been less commonly elucidated, and rarely tested through empirical study. Reference to complexity has become synonymous with intractable policy problems and little progress in achieving outcomes. However, complexity means much more than something that is complicated because it has lots of components. Yes, a complex system does have many parts, but these parts are not independent. In social systems which public policy seeks to influence, the parts of a system might be individual people, or they could be formal aggregates of people (such as organisations) or less formal groupings (such as lobby groups, user groups, ethnic groups) (Byrne, 1998). Complex systems are self-organising and interdependent – each individual (re)acts to their own interpretation of events as they unfold, and to what they think will happen next, while also adapting to the actions of others around them (Kauffman, 1995; Waldrop, 1992). The capacity of complex systems to self-organise suggests that

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action by individuals and organisations are important considerations in analysis 'of policy' and 'for policy' (Hill, 1997). However, the action of individuals will also be influenced by individuals' understandings of context, available resources, system history and interacting systems.

Complex systems can be conceptualised at different levels of aggregation. For example, the economy as a whole can be considered a complex system, but so too could financial markets, groups of firms making up an industry sector and labour markets within the economy. In these examples, the complex systems at a lower level of aggregation than the whole economy should not be thought of as hierarchically subordinate, but rather nested within and interacting as parts of the whole (Byrne, 1998). To understand a complex system, the location of the system of interest in respect to other complex systems is required (Walby, 2007). In the research examples presented below, primary schools, geographic communities and policy communities are all considered complex systems, which interact with other complex systems.

Complex phenomena of interest to policy makers, such as employment trends, chronic disease or educational achievement, can be thought of as emerging from the interactions of parts within a complex system as a whole (Morçöl, 2002). This means that 'of' and 'for' policy methods which focus on parts of the system in isolation are unlikely to be useful for understanding the existence and implications of complexity. In the research examples described below, tertiary education policy processes, interventions aimed at reducing health inequality, and the design of policies to encourage healthy nutrition in children are examples of complex systems which give rise to emergent phenomena.

Thinking about policy, and how it is designed and implemented, requires an understanding of change in complex systems. There are patterns of interdependent influence between the components of a complex system which are called feedback loops. Sometimes a desired change might not occur, because the feedback loops between the action

of one component and the reaction of others in response cancel each other out (a negative feedback loop). The resulting overall macro appearance is one of stability. At other times an action by one component can prompt a response which magnifies the effect of the initial action (a positive feedback loop) and a pattern of escalating or growing change is seen.

Positive feedback loops are a necessary part of change, but the problem for

patterns or new groupings as a result of changes in feedback loops (Kauffman, 1995). Thus change in complex systems is not necessarily related to any external stimulus at all, or to the size of the stimulus for change. So-called unintended consequences are 'normal' in complex systems and should be expected.

Feedback loops can keep a system in a stable pattern, called an attractor. However, it would be wrong to think of

## **Complex systems actually operate on the edge of chaos – 'far from equilibrium' – and can be easily disturbed to operate around a new attractor when feedback loops are disturbed.**

policy designers and implementers is that the patterns of influence and interaction between the parts do not follow predictable rules: they are nonlinear. That is, outcomes are not proportional to inputs, nor can they be predicted from the parts of a system or their initial actions. A simple example is that when an individual speaks, the response of listeners cannot be predicted with any certainty, much less the direction a following conversation might take (Watzlawick, 1984).

The boundaries of complex systems are fluid and difficult to define. In human social systems, boundaries are constructed by the human 'components' that make up the system. Therefore, understanding the boundaries requires sense-making (Kurtz and Snowden, 2003; Weick, 1995; Weick and Sutcliffe, 2007) and boundary critique (Midgley, 2000). Another feature of complex systems is that they have a history, and this history continues to influence what happens in the future. Thus, social systems will continue to change, long after a stimulus has ceased, because the stimulus has affected the feedback loops and therefore the trajectory of change in the system.

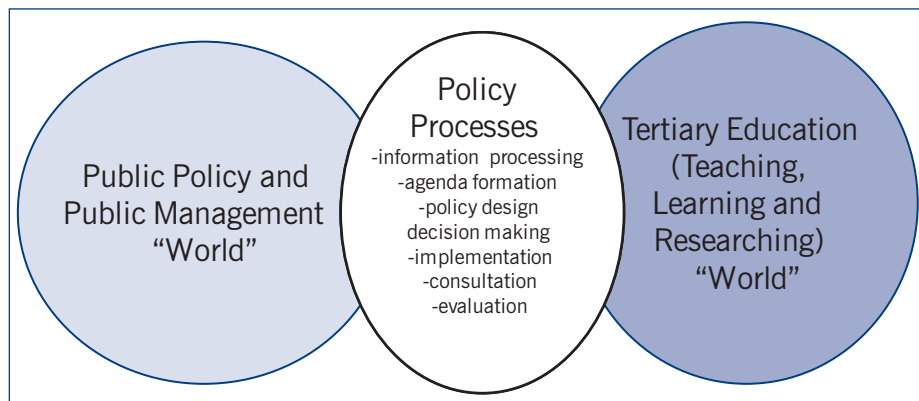
As the parts of a complex system adapt to each other, self-organise and co-evolve over time, these processes of self-organisation can lead to the emergence of entirely new phenomena – new

a system displaying a stable pattern as in equilibrium (Byrne, 1998). Complex systems actually operate on the edge of chaos – 'far from equilibrium' – and can be easily disturbed to operate around a new attractor when feedback loops are disturbed (Kauffman, 1995). When there are a lot of attractor patterns operating, the system appears more chaotic. Change in complex systems, such as organisations, or public sector domains, including education and health, is brought about by changing the feedback loops and the attractor patterns they make (Caldwell, 2006; Mitleton-Kelly, 2003; Stacey, 2003). Doing this in a manageable way involves monitoring both positive and negative feedback loops and attractor patterns, looking for small indicators of change to the patterns operating and remembering that small changes can have large effects (both desired and undesired). Therefore, achieving desirable change means allowing some small changes to continue to grow because they are taking the system in the desired direction, and undesired change needs to be counteracted or disrupted (Weick and Sutcliffe, 2007).

### **Application of complexity theory**

Not all public policy problems or public management sectors are complex; however, failure to allow for complexity when appropriate can have dire effects,

Figure 1: Interacting Systems in Tertiary Education Policy Process



resulting in not only unintended but also unwanted policy outcomes. As a general rule, the more components (people, organisations, groups), and the more diversity between those components (e.g. ethnicities, cultures, locations), the greater the complexity. Complexity theory is best used when the phenomenon or problem being studied is multidimensional and its causes are difficult to identify (Richardson, 2005; Westley, Zimmerman, and Patton, 2006). In current policy literature these types of problems are often referred to as ‘wicked problems’ (Ritter and Webber, 1973; Scott and Baehler, 2010). The three studies described here provide examples of the notion of complexity and wicked problems in public policy. Space does not allow a detailed description of these three studies. Full references to the sources are provided at the end of this paper.

*Study one: Using complexity theory to understand policy processes*

The Labour government in 2000 initiated a series of policy changes in tertiary education. Interviews with 65 participants involved in the policy processes were used to build an understanding of how these occurred. Complexity theory provided a holistic lens for understanding and explaining these policy processes and how they continued to be influenced by policy changes that preceded the change of government.

Firstly, there is more than one complex system at work in policy processes. Tertiary education, consisting of many individuals (e.g. students, teachers, researchers, governors) able to make decisions, and many organisations (e.g. polytechnics, universities, wānanga, private providers and industry training

organisations) is a complex system because all these parts interact with each other in nonlinear ways that keep changing over time. Furthermore, these systems are undergoing continuing changes in response to extant policies and in anticipation of future policy change.

Government and its public management organisations are also a complex system, in which ministers, members of Parliament, public sector agencies such as the Ministry of Education and the Tertiary Education Commission, agencies involved in other policy domains, and political and parliamentary processes interact. Policy processes bring these two sets of complex systems together into a third complex system, as issues are identified, agendas set, solutions decided, and policies implemented and evaluated (see Figure 1). The language and concepts drawn from complexity theory help to create a holistic picture of the dynamics which exist within these systems and the interactions between them in policy processes which is helpful to our understanding of these.

The nonlinear dynamics of tertiary education policy processes are understood through the concepts of feedback loops, attractors, co-evolution self-organisation, emergence and the history of system changes. Examples of these include:

- non-linear effects of changes in funding policies
- co-evolution between different parts of tertiary education, such as industry training organisations and polytechnics
- self-organisation and emergence of new courses, new patterns of student recruitments and enrolments

- the continuing influence of policy decisions made by previous governments, even when a new government has instituted its own policy changes.

*Study two: Promoting healthy nutrition*

*through primary schools: a complex analysis*

This study identified a ‘portfolio’ of interventions across school, home and community settings which, taken together, might support primary schools to effectively promote healthy nutrition. The primary schools themselves were considered complex systems, nested within and partly defined by other complex settings – households and communities, and also the national policy context.

The food environments of five case-study primary schools within the Wellington region were mapped using interview, documentary and observational data. Each school food environment was considered a complex system made up of local- and national-level elements. Intervention options to improve the school food environment were identified across case studies, with support for interventions gathered from school principals as local-level decision makers. Interviews with 16 policy makers considered the national-level context of the interventions.

Eleven interventions were identified for inclusion in the portfolio. Figure 2 shows this portfolio mapped on a generic primary school system. Each of the five primary school systems varied in their composition and local context, meaning that interventions are unlikely to have an equal impact across schools, supporting a diversified portfolio approach. The number of system elements potentially affected by at least one of the portfolio interventions is seen to increase the likelihood that the school systems will change in the desired direction and positively influence children’s diet (the emergent outcome).

To inform implementation, identified interventions were prioritised based on (1) the level of support from case-study school principals and policy makers, (2) evidence of effectiveness from international literature, and (3) theoretical likelihood of them having

an impact on the complex system of childhood nutrition. These criteria acknowledge that agency of actors within the system is important for implementing policies and system change. Also, while the impacts of interventions in nonlinear systems are somewhat unpredictable, research evidence can still be used to guide action.

The influences on children's diets are viewed as multiple and diverse across the nested systems, with dietary practices viewed as emergent. Therefore, policy options to support the role of primary schools in promoting healthy nutrition need to consider the interaction between the nested systems involved.

**Study three: Treating communities for health inequalities: complexity matters**

This study examined two cases of interventions aimed at reducing inequalities using the concepts of complexity theory as an analytical lens. The framing of the context for this study included the measurable evidence of health and social inequalities, in particular the associations shown between socio-economic status (SES), ethnicity and

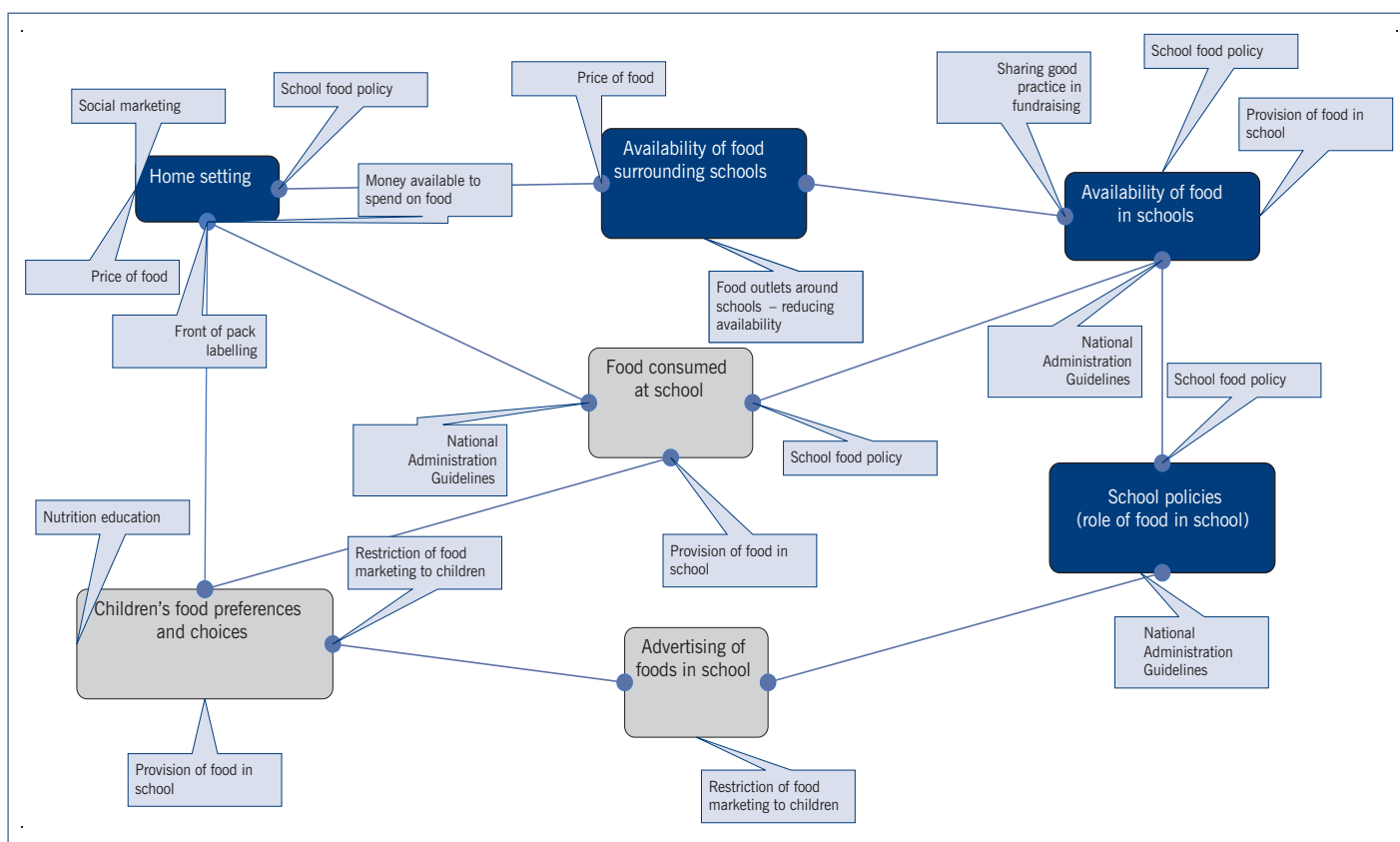
geographic area. The current evidence, however, is not overwhelming on how to effectively intervene to reduce these observed differences in outcomes between social groups (Oglivie et al., 2005; Petticrew et al., 2009). The transfer of knowledge – from understanding more about population-level social patterns to informing intervention approaches – has been slow.

This study involved a comparative case study of two community-based interventions and their implementation. The first, implemented in 2000, was the Housing, Insulation and Health Study (HIHS) carried out by a university-based research team. The HIHS was a community-based randomised controlled trial of the health effects of insulating houses. The second case, implemented in 2005, was the Intersectoral Community Action for Health (ICAH) intervention, funded and monitored by a government agency. The ICAHs were community-based initiatives aimed at the co-ordination and facilitation of community relationships and action around local health issues. The data sources for the study were primarily documentation

relating to the interventions and in-depth interviews with key informants from varied organisations. The participant organisations included government agencies and local organisations within six New Zealand geographic and socio-economic communities: Otara, Nuhaka, Mahia, Kapiti, Porirua and Christchurch. Information on the health status of each of the areas was also gathered and used in the analytical process.

The study found that complexity theory offered useful concepts for illuminating the influences of these two interventions. These concepts included weak and strong emergence, system trajectories, system bifurcation, feedback, sensitivity to initial conditions, and attractor states. Through these concepts it was shown that the two interventions operated within a context of feedback between elements within the communities involved, and this context may reinforce the circumstances of disadvantaged communities, undermining the intentions of the policy aims. Feedback mechanisms included the relationship between the community's social organisation (particularly its ethnic and social diversity), the activities of

**Figure 2: Primary School Setting Map with Identified Interventions**



government policy organisations and the geographic structuring of opportunities for social action (for example, the workings of local government and the existence of advocacy and lobby groups). This has significant implications for the design and practice of interventions to reduce health inequalities, shifting the focus to the way in which interventions themselves may interrelate with the local context.

The study showed that complexity theory provided a systematic way to explore and understand relationships between social levels, suggesting that instances of feedback, between 'communities' and the 'whole system', may in practice be more subtle, relationship-focused and context-specific than traditional thinking allows.

#### **Implications of complexity theory for policy practice**

The policy focus differs across the three studies, which include analysis both of and for policy, and across policy design and implementation. Study one investigated the policy process as a whole, while study two focused on the use of complexity theory for policy design, and study three sought to understand implementation and its relationship to policy outcomes. The studies also come from different social policy areas (education and public health) and are not comparable at the level of detail. However, looking across the three studies it is possible to identify some common insights that the complexity lens provides which might be of use for public policy and management practitioners.

We have identified the following implications of complexity theory for policy practice from the three research projects described and the complexity literature more generally. While the implications have been split into ten points, in reality the implications are closely related to one another.

#### **1. Complex systems self-organise: whether you plan for it or not, surprises will happen**

Complexity theory views all but the most simple policy problems as emerging from a dynamic interaction between cultural, economic and political systems which make up New Zealand and go beyond New Zealand, such as the current financial crisis

and its effects. Emergence has its origin in the capacity of these systems to self-organise and take on systemic properties that cannot be reduced to solely economic, psychological or cultural factors (Morçöl, 2002). Any policy intervention requiring the action of people is likely to be complex in its nature because of the self-organising capacity of individuals, informal (families, whānau, neighbourhoods) and formal groupings of people. This is particularly so for achieving long-term goals, where the numbers of components (people, communities or organisations) and their interactions increase over time. While surprises will happen, complexity theory provides an understanding of how social systems change over time. Such an understanding allows for policy action that over time should move systems in the desired direction of change, although highly prescribed targets are unlikely to be met.

#### **2. Boundaries are open, fluid and socially constructed**

To enable policy work and public management to be done, politicians, public managers and policy analysts create boundaries and define limits of social systems. However, if we are not aware of the artificiality of these boundaries then we risk missing factors that could trigger large responses in a particular policy area, due to their exclusion from the policy frame of reference. Boundary critique from multiple perspectives and fluid boundaries can help avoid problems (Midgley, 2000). Boundary critique involves exploration of the boundaries between individuals, groups and organisations from multiple perspectives. Working with and across boundaries requires knowledge of how the boundaries that exist have been created and are maintained by social processes. In practice, collaborative interagency processes may be required to enable the problem and its solutions to be viewed from multiple perspectives and to sense a way forward (Eppel, Gill, Lips and Ryan 2008).

#### **3. What can be known about complex systems is limited**

Public managers also need to be aware that when dealing with complex systems

there are limits to what can be known and predicted. Systems will go on self-organising, adapting and changing over time, which means that attempts at purely rational approaches to policy design and analysis are problematic (Lindblom, 1979). Sanderson (2006, 2009) calls for an ongoing, reflective and incremental policy process to manage the unpredictability of complex systems. Sense-making techniques are one approach to dealing with the uncertainty of complex systems (Kurtz and Snowden, 2003).

#### **4. Policy processes are continuous and design and implementation go hand in hand**

Research cannot prospectively tell us what will work, and for whom, in all contexts (Sanderson, 2006; Byrne, 2005). The conclusions from our three complexity-informed research projects support the idea of policy as an ongoing process with no definitive beginning or end. The policy domain concerned will be influenced by events that happened in the past in ongoing ways that are difficult to detect. For example, the tertiary system continued to be affected by policy changes made during the early 1990s well into the next decade. Therefore, we need to think of policy design and implementation as more continuous and iterative processes that go hand in hand. This does not preclude first-principles re-design of policy to reflect changing societal expectations or values, but the history of previous changes and their ongoing effects need to be considered. In fact, ongoing participatory processes (see point 9) and iterative design-implementation cycles may reduce the need for periodic first-principles reviews, as societal changes are more regularly included in incremental change.

#### **5. Ongoing, reflexive 'real time' evaluation practice is necessary**

As mentioned above, complex systems will continue to adapt and there will be co-evolution between the policy and the system involved. Moreover, there will be continuing uncertainty and emergence of new phenomena as a result of complexity. Therefore, complexity requires an understanding of policy processes as ongoing and evaluation needs to be real-time and reflexive to feed into an

ongoing policy process (Matheson, Dew and Cumming, 2009). The role of evaluation should be to support this implementation–learning–development process (Sanderson, 2009). The other nine implications listed here also impact on evaluation practice. For example, how can evaluations meaningfully capture local variation and context while providing information for national-level policy development? Should evaluation be conducted by external researchers, or integrated within policy development/implementation teams? Possible answers to these questions may be gleaned from sympathetic evaluation methodologies, such as developmental evaluation (Patton, 2010) and realistic evaluation (Pawson and Tilley, 1997).

#### **6. Local flexibility in intervention design**

Differences in conditions, such as geographical and social context, are likely to have significant and unexpected influences on policy interventions over time. No two communities will be identical and small differences matter. Nationally-directed policy action is likely to have limited ability to respond to local contexts, including subtle differences in the initial conditions and the specific people and organisations involved. For example, Matheson (2008) found that communities experienced differences in access to policy processes, and that different communities are likely to require different policy designs, implementation and expectations of outcome. Locally-directed policy action may be more successful in responding to local contexts, but provides for a national approach to policy and resource allocation.

#### **7. Information in complex systems is highly distributed and fragmented**

Information exists in the consciousness of individuals and the collective memories of organisations within policy processes. Interactions between individuals and organisations help to reveal the partial information held by individuals. Interactions between individuals can be turned into participatory processes of constructive sense-making and learning (Kurtz and Snowden, 2003; Weick and Sutcliffe, 2007). In the three research

examples discussed we saw the benefits of collaborative approaches to gathering information, such as sense-making and learning as an ingredient of an ongoing sense-make, learn, plan, do, re-evaluate cycle. But, as Matheson (2008) also found, opportunities for feedback that allowed the exchange of information between individuals and organisations were often different for different communities.

#### **8. Complexity implies that there is no one solution to any problem**

Complex problems have multiple causes and it is unlikely that there is one best intervention to solve a complex problem (Dennard, Richardson and Morçöl, 2008). It is more likely that there are a range of possible interrelated actions, and the role of the public manager is to facilitate a process that gives rise to a coherent, self-reinforcing web of reactions that move the overall system in the desired direction. For example, Walton (2010) identified a portfolio of interventions to promote healthy childhood nutrition within a primary school setting. A portfolio approach was important for two reasons. First, because the influences on children's diets are varied and wide a range of interventions are also required. Second, because the configuration of influences operating within a school varies between schools, a portfolio increases the likelihood that interventions will have an impact within a wide range of schools. So, while not all interventions will be relevant for all schools, it is likely that across the portfolio interventions will be relevant for a large majority of schools.

#### **9. Participatory policy practices go with complexity**

In relation to the way information is gathered and responded to, complexity provides a further argument for participatory policy practices in which different perspectives and kinds of expertise (technical, practice and experience) from across the system are brought together and acted on. No one person or organisation is likely to have sufficient information or resources to understand a complex system. This is a common factor in the findings of all three of the research projects.

#### **10. Simple complex systems can be modelled, but the benefits of modelling are limited**

Computer models can aid understanding of the ways in which a complex system might evolve over time, and are one way in which complexity theory can be used predictively. However, such models are limited in the extent to which they can fully replicate the complexity of real-world situations (Byrne, 2005). While agent-based modelling of scenarios may be a useful advance over other types of modelling, it should only be considered as one piece in the sense-making puzzle and perhaps best used to stimulate deliberation (Richardson, 2008).

#### **Taking complexity thinking in policy processes forward**

There has been a trend in the policy literature over the last 30 years towards greater recognition of the social processes involved in policy design, implementation and means by which policies achieve outcomes. Others have proposed different approaches to take this dynamism into account: for example, incremental analysis over comprehensive rational analysis of problems (Lindblom, 1979); multiple streams for viewing policy agendas (Kingdon, 1995); deliberative policy analysis (Fischer, 2003; Hajer and Wagenaar, 2003); and the recognition of horizontal networks (Kickert, Klijn and Koppenjan, 1997). To date, others have used concepts from complexity theory selectively, but a complexity-based theory of policy processes has yet to be fully articulated (e.g. Butler and Allen, 2008; Gerrits, 2010; Teisman, 2008). Eppel (2010) has argued that complexity theory can provide a holistic lens for explaining and understanding policy processes, one which complements existing theories that have sought to understand the implications of social complexity and interdependency in policy processes. Walton (2010) and Matheson (2008) demonstrate the usefulness of complexity concepts for policy research, providing a method that works with multiple complex social systems and policy domains to understand and guide policy action.

Much existing thinking about policy processes and methods of policy analysis

does not take sufficient account of dynamism, self-organisation, adaptation and emergence. As we come to understand human society as interacting complex systems, there is a need for rigorous evaluation of the compatibility of existing methods of policy analysis with this view. At the very least the existing methods lack the language and the concepts to explain phenomena that are likely to be encountered in complex systems, and pay too little attention to these aspects. At worst, they ignore the dynamism which gives rise to unexpected changes and leads to unintended and unwanted outcomes. A complexity perspective does not mean that all existing analysis methods need to be abandoned. It does, however, call for careful selection of multiple methods, diverse perspectives and an iterative approach to policy design and implementation. We would recommend that practitioners carefully assess the methods they are using for their sensitivity to ongoing, endogenous changes in systems.

Acknowledgement of uncertainty, ambiguity and paradox in many social policy problems presents challenges in terms of the current structures and processes of government. In particular, while accountability and funding appropriations continue to be largely in organisational silos, the management of uncertainty and emergence of new and unexpected outcomes will remain problems. These issues are not new

(State Services Commission, 2002), but complexity theory offers new insights into how we might design and deliver public policies more effectively. Involving the appropriate technical, practice and experiential expertise in policy design and implementation is likely to go beyond the boundaries of any one agency and their accountabilities, and also extend into organisations and individuals outside government. New ways of configuring leadership, performance and financial accountability are needed to match the complexity of the problems being solved and the information and other resources needed for their solution.

If we take complexity into account and policy processes are undertaken in ways that reflect this, then timelines are likely to look different. Initial phases might take much longer; the process might seem back to front in that some 'implementation' activities might precede policy design; more participants in policy processes might extend timelines, but might also promise more deeply entrenched and enduring solutions.

The three research examples presented here illustrate the utility of a complexity approach for understanding policy design. The implications of complexity are far-reaching in challenging policy/implementation/evaluation barriers, promoting participatory policy frameworks and accepting uncertainty from policy action. Our findings on the implications of complexity for

policy analysis and public management echo many of the implications arising from network (e.g. Kickert, Klijn and Koppenjan, 1997) and responsive government arguments (e.g. Fischer, 2003). Complexity thinking adds new and useful tools for a more holistic understanding of public management.

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# Biophysical Limits and their Policy Implications



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