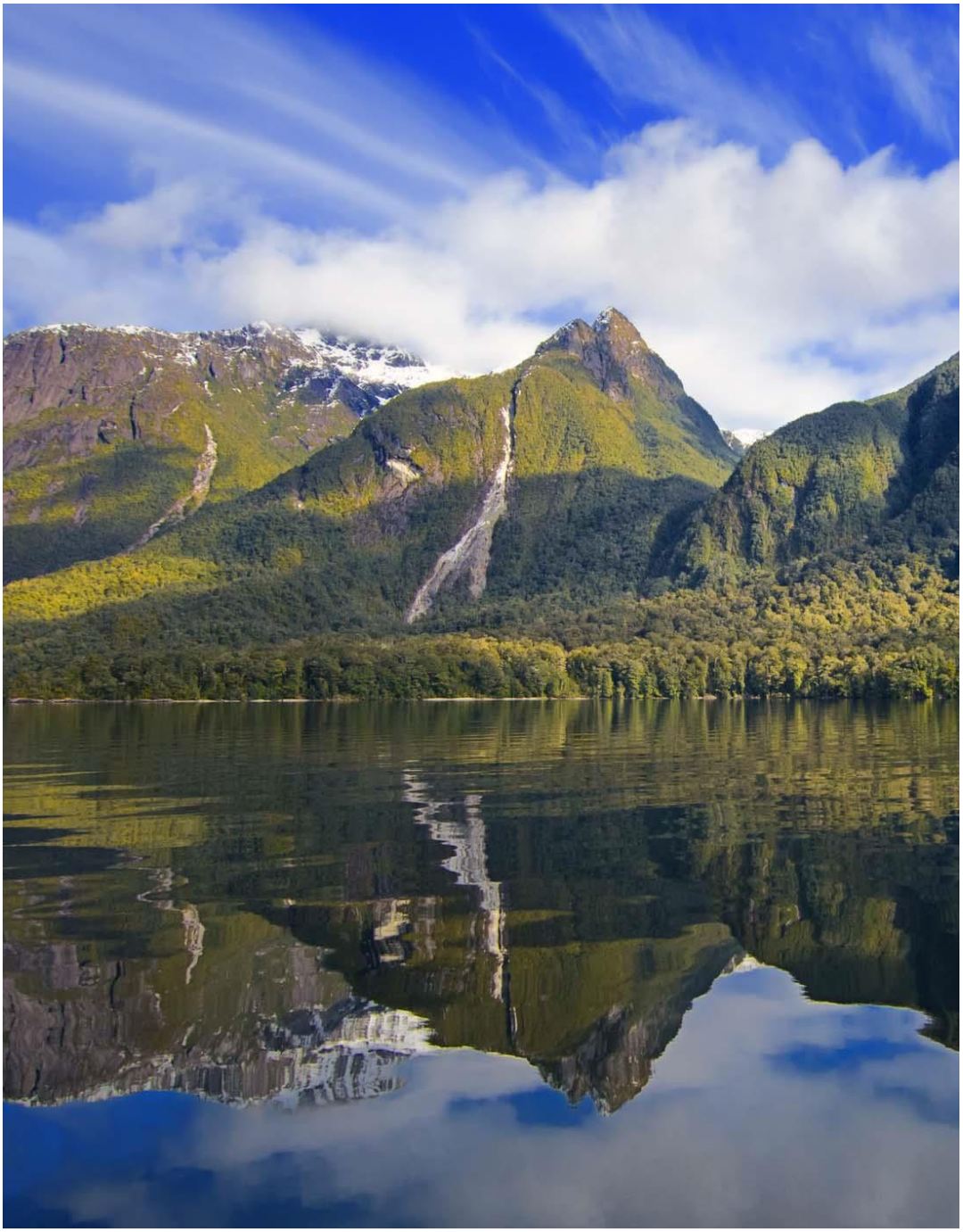
Green Border Control

Issues at the Environment/Economy Border



Simon Terry Associates

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Prepared for

Royal Forest and Bird Protection Society of New Zealand Inc

by

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Cover Image: Lake Manapouri, an early environmental border issue for New Zealand

Contents

Overview

Concepts

- This paper engages with the issues that arise when the monetary values of the market come up against the non-marketed, non-monetary values which the natural world provides to human society. The contests, negotiations, and striking of deals at the boundary between the market and the environment that make up the arena of "resource management" are echoed in a wide range of what we describe as "border issues" that arise in the vicinity of the boundaries that divide human social life into multiple realms or "spheres", each with its own distinctive practices and sets of values. The first three sections of this paper review some of the literature on this aspect of social structure as background to the institutional and procedural issues that arise when conflicting values from competing spheres have to be balanced against one another.

- Each individual within a society inhabits multiple spheres – market, family, political community, professional, aesthetic/spiritual, sporting and recreational activities, and so on. Each is continually engaged in the process of balancing the often-conflicting demands and values of these different spheres, playing simultaneous roles as consumer, citizen, family member, inhabitant of the natural world, and many others. At the society-wide level, these spheres of existence are reflected in institutional structures and processes that have evolved to promote human well-being in a multidimensional sense. The monetary values of the market sphere comprise only one part of a complex social whole, and the reduction of all human life to the single metric of money turns out to be impossible without losing essential elements of what it means to be human. Another way of putting this is that the separation of spheres, the identification and honouring of each sphere's particular values and practices, and the effective maintenance and policing of the borders that maintain separation, all seem central to the effective functioning of human society and the pursuit of "the good" for its members.

- Because many of the things that contribute positively to human well-being are not secured through the market, and are inherently incapable of being correctly priced, the legitimate sphere of the market is, and has to be, bounded. The market must interface at arms-length with other spheres of human life, whose values and aims are often incommensurable in the sense that they cannot all be measured and compared in terms of a single metric such as money. "There are things that money can't buy", and confronting this issue of incommensurability is at the heart of the statutory and institutional arrangements that each society erects along its internal borders. Incommensurability produces "hard cases" for

tribunals, courts, local councils, central government – indeed, for anyone charged with adjudicating between conflicting sets of values that are not reducible one to the other.

- Two issues frame the discussion in the paper: first, what institutional arrangements best meet the need to accommodate competing values from different spheres of social life, when those values cannot all be reduced to a single measuring-rod such as money; and second, how those values can most effectively be articulated and taken into account, given that many of them are incommensurable with one another.

- Many writers in philosophy and law have addressed these issues in relation to the interaction between the market sphere and spheres such as justice, morality, family values, and human rights. The focus in this paper is on the conflicts that arise at the boundary between the market sphere and that of the environment, and on the institutions that mediate between those two spheres in the New Zealand context.

- In a world of incommensurability, decision-makers must cope with the irreducible multiplicity of values. Some strategies are therefore required to support their public deliberations and practical reasoning - the essential processes by which legitimate actual decisions are reached. The paper focuses on two sets of such strategies at the general level and in the particular field of resource management.

    - The first is a diagnostic or forensic process of sorting hard cases out into three general categories, to each of which a particular type of solution is suited.

    - The second is the full but not exclusive use of all available quantitative information on the respective values at stake (qualitative considerations also form part of the information set). This is not to be confused with cost-benefit analysis, because cost-benefit is a technique designed specifically to work with monetary values, and is therefore useful only in the quantification of market-related values. Quantification of non-market values must unavoidably use other metrics that are meaningful in the non-market context.

Diagnostics

- When incommensurable values have to be weighed up by a court, tribunal, local authority, government agency, or Parliament, a helpful first step is to assign the issue being considered into one of three adjudication situations (taken from the philosopher James Griffin):

    - In some cases, one of the contending value sets "**trumps**" the others. The appropriate institutional response is then one of "blocked exchange", with

the dominant value protected from competing values by the erection or confirmation of a non-negotiable barrier. Examples of such blocked-exchange barriers in New Zealand resource management include Schedule 4 of the Crown Minerals Act, the exclusion of commercial logging from the conservation estate, the status of marine reserves and national parks, and the ban on nuclear ships and power stations.

- A second situation is that of "**discontinuity**". Here a key value (such as water quality, species survival, or landscape character) can be secured by setting bottom-line physical or behavioural limits or standards, or by imposing "specific performance" conditions on operators. Other values such as commercial profit and recreational activity can then be pursued freely, subject to the constraint that the standard or limit must not be breached. One interpretation of the Resource Management Act 1990 is that it is designed to operate in this way, enabling physical limits and standards to be set and enforced, to limit the free play of market forces and thereby secure the protection of non-market values. A recent example would be Horizon Council's "One Plan" to protect water quality in Manawatu-Horowhenua. Historically, a key example of discontinuity in an environmental contest was the development of Lake Manapouri for hydroelectric power; in that case the development was acceptable to the New Zealand public only if the level of the lake was not raised, despite the additional electrical generation that raising the lake would have made possible. Once a constraint on the lake level had been imposed, however, development was free to proceed. Similar limits on lake levels (e.g. Taupo), and on minimum flows in rivers that are utilised for hydroelectricity and irrigation, are now commonplace. An issue that is likely shortly to come before the Environment Court is whether or not to impose specific performance requirements on the owners and insurers of the wrecked container vessel *Rena*; a possible specific performance requirement in that case would be complete removal of the physical wreckage from the Astrolabe reef.

- A third situation is "**trade-off**" where a balance must be struck in the absence of clear, well-defined break-points. Here the judgment of the adjudicator and the weight of public opinion, working through public deliberation and practical reasoning, have to strike a balance, with the legitimacy of the resulting decision resting on the extent to which the procedures followed have been, and are generally considered to be, transparent and fair.[1] Trade-off decisions are the most common sort in New

[1] Advocates for particular sets of values may argue for changes to the law - for example, Resource Management Act amendments - to increase their likelihood of securing trade-off decisions in their favour from the adjudicator. But if the resulting institutional and legal changes encroach

Zealand resource management. Resource consents are frequently granted with attached conditions set in general, more or less flexible, terms; and published district plans and national park plans contain detailed provisions that seek to strike appropriate balances between development and conservation values. The restriction of commercial development in the Mackenzie High Country under the relevant district plan, which was the subject of a 2011 Environment Court decision, epitomises this category of cases.

Quantification

- There are limits to the extent to which cost benefit analysis can be credibly and usefully applied to issues involving environmental exploitation (and, indeed to the application of such analysis in other spheres such as justice, morality, and sporting contests). The reason for this is that the market, its culture, values, and practices, do not have universal authority or legitimacy in human affairs. Many fundamental human values are not able to be expressed in money terms and must be asserted and defended in their own terms.

- Quantitative information is nevertheless important to effective adjudication. Where two competing sets of values are to be weighed in the balance, each set must (so far as possible) be quantified in terms, and using metrics, that accurately capture what is at stake.

- Economists have devoted a great deal of research to an attempt to extend money-price measurement to capture values of natural systems lying outside the market domain – in other words, to overcome the problem of incommensurability by reducing all values to money terms. That this research has been unsuccessful in producing any authoritative results is a central conclusion of the 2009 Stiglitz-Sen-Fitoussi commission's exhaustive review of attempts to extend monetary measures to environmental issues. Without the automatic, impersonal feedback that the price mechanism provides within the market domain, monetary valuation exercises for non-market values have resulted in wildly varying numbers that do not command general acceptance and have no methodologically-solid authority.

- Without the ability to convert non-monetary values to money in an authoritative way, cost-benefit analysis is unable to provide a satisfactory decision-making approach in resource management matters. As the New Zealand High Court has noted in *Meridian Energy Limited v Central Otago District Council and Ors* (2010) "it is simply not possible to express some benefits or costs in dollar or economic

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too far across the border, the likely longer-term outcome is a loss of legitimacy for the existing procedures, and the emergence of alternative arenas in which the underlying value conflicts can be worked through.

terms…. Parliament … does [not] disparage, as a lesser means of decision making, the need for duly authorised decision makers to reach decisions which are ultimately an evaluation of the merits of the proposal against relevant provisions of policy statements and plans and the criteria arrayed in Part 2 [of the RMA]. That process cannot be criticised as "subjective". It is not inferior to a cost benefit analysis."

- Equally, given the problem of incommensurability, the various programmes to develop "green national accounts", and to value natural capital in monetary terms, have accomplished only limited gains. Some useful information is generated by these exercises, and they certainly help to move issues such as environmental and resource degradation up the policy agenda, but the numbers produced do not enjoy the solid methodological foundations of orthodox national-income accounting, are found to vary widely rather than to converge on agreed results, and so do not command the same legitimacy as quantities such as GDP.

- There is a need therefore for much improved statistical measurement and reporting on the state of the environment in terms of physical quantities and biologically-relevant indicators. The Stiglitz Commission strongly recommended the development of comprehensive and continually-updated "dashboard statistics" to inform decision-making. New Zealand practice in reporting the state of the environment has been patchy, uncoordinated, unsystematic, and relegated to low priority in the official statistical system.

Extended Summary

Spheres and Boundaries

- The existence of distinct spheres of social life, within each of which particular values are pursued and realised, has been a recurrent theme in both economic theory and ethical philosophy. In economics, Adam Smith wrote on "moral sentiments" and emphasised the importance of keeping politics free of corruption by money and the market; Alfred Marshall emphasised the limits of economic analysis and its separation from religious, artistic and military affairs; Amartya Sen insists on the coexistence of "pluralities of values" and the need for choices to be made amongst competing goods whose values cannot be reduced to a single metric such as money. Ronald Coase argued that the firm as an organisation is to be understood as a sphere of entrepreneurial activity directed by non-market principles and insulated from market forces. Along the same lines Elinor Ostrom has demonstrated the possibility of collective action to solve the "tragedy of the

commons" and other problems of environmental management, provided there are effective boundaries around the collective enterprise, to keep wider market forces at bay.

- In the words of philosopher Michael Walzer, "good fences make just societies". Institutional boundaries provide the framework for the rule of law, the definition of property rights, the efficient operation of markets to provide those human needs that are best served by commodity production and exchange, and the protection of non-market activities and values from the encroachment of market forces and commodification where such encroachment is subversive of key human values.

- Ethical philosophers have been attracted to the question of "what money cannot buy". Michael Walzer, Michael Sandel, Russell Keat, Judith Andre and Glenn Cohen are among those who have analysed the phenomenon of "blocked exchanges" – institutionally-embedded prohibitions on the extension of the market into spheres of human life where it undermines and corrupts core human values and where human well-being is best advanced by rejecting the proposition that everything can be reduced to a money value.

- If not all values can be expressed in (or reduced to) money, or any other single universal metric, there are two important implications. First, market mechanisms cannot be called in to solve all problems of decision and choice. Second, the issue arises of whether "incommensurability" prevents the making of rational choices; here the general philosophers' answer is no, and economist-philosopher Amartya Sen notes that choice among incommensurables is ever-present and is a central reason for maintaining the institutions of democratic politics, in order to resolve choices amongst incommensurables through processes of public reasoning and deliberation.

- An important implication of incommensurability is that "specific performance" will often be preferable to the payment of monetary damages when, for example, environmental damage is caused by a commercial operator in the market sphere. The requirement that courts and governments ought to impose on polluters, Cass Sunstein argues in an important paper, is physical restoration of the natural ecosystem rather than estimation of money damages, whether these are set to make good those people directly affected, or to compensate for the monetised value of the natural assets lost. This points to an important class of cases in which direct regulatory requirements are superior to price instruments as the means of securing environmental compliance.

- Mark Sagoff applies these high-level economic and philosophical debates to the particular issues that arise in management and protection of the natural

environment, where decision-makers must balance the market value of commercial, profit-driven use of resources against competing values such as stewardship, sustainability, respect, and aesthetic appreciation of nature for its own sake. He concludes that monetary measures such as "willingness to pay" (WTP) are not effective in capturing the values that underpin legislated boundaries blocking the encroachment of markets into highly-valued parts of the natural realm, and that consequently techniques such as cost-benefit analysis have strictly limited application in environmental decision-making.

Diagnostics: A Hierarchy of Situations

- When incommensurable values confront one another, the strongest situation arises when one value, by common consent, "trumps" its rivals. The image of trumping originates with the legal philosopher Ronald Dworkin in his book *Taking Rights Seriously*, where he argued that "rights are trumps". A trumping situation results in blocked exchange: the rival values are foreclosed and the trump value prevails. The role of an adjudicator encountering this situation is simply to enforce the blocked exchange outcome.

- The philosopher James Griffin identifies two other possible cases: discontinuity, and trade-off. A discontinuity situation is one in which conflict among incommensurable values can be resolved by imposing a threshold level of protection for one of the values, leaving other contending values to be maximised subject to the threshold constraint. In resource management terms, this amounts to the imposition of physical limits/standards, or to the enforcement of specific performance requirements such as strict liability.

- A trade-off situation is one where the adjudicator cannot apply the rules of thumb that apply in the other two; here a dispassionate weighing-up of competing values must be undertaken, and some balance struck, by the exercise of judgment. The legitimacy of the resulting outcomes depends in large part upon the transparency and fairness of the procedures followed.

Diagnostics: the Production Possibility Frontier

- The "production frontier" or "production possibility locus" found in introductory economics texts is a conceptual boundary between what is feasible and what is not feasible, given limited resources and a given production technology. The shape of this frontier determines the nature of the choices confronting a decision-maker faced with a tradeoff between two competing claims on a given resource. Conventionally this diagram is constructed for two commodities, which exchange in the market at well-defined prices – in other words, the two are commensurable in money terms if money is the market medium of exchange. Conventionally also

the frontier is assumed to be convex outward which means that the tradeoff steepens as more and more of the scarce resource is devoted to specialisation in one of the two goods. These two assumptions underpin standard economic theories of how competitive market prices are determined.

- The concept of the possibility locus can, however, be applied to situations where either or both of those two key assumptions of standard economics do not hold. Where two goods are non-commensurable – for example where a commercial development competes with the non-market values yielded by some area of land such as part of the conservation estate – the allocation decision lies outside the reach of the market and has to be made administratively, by a planner or tribunal weighing up the market and non-market values. In this situation the issue can still be framed in terms of the production-frontier diagram, but with the provisos that
    - it is no longer possible to interpret the slope of the locus in terms of relative market prices, since only one of the goods trades in the market, and
    - the shape of the frontier may not be the orthodox textbook one.
- The diagram can be constructed for the case of "non-convexity of the production set", where there are strong negative externalities from one of the goods to the other. A classic paper on this in the economic literature, by Baumol and Bradford, concludes that activities with very strong negative environmental interactions need to be geographically separated, and notes the problem of possible irreversibility of industrial location if later developments prove an initial zoning decision to have been the wrong one.
- The non-convexity case in its most extreme form captures the **blocked exchanges** discussed by philosophers because of the outright incompatibility of, for example, slavery and human dignity, or bribe-taking and good government. The tradeoff between release of genetically-modified organisms and maintenance of GE-free agricultural status of a territorial unit is equally extreme: the possibility frontier coincides with the axes of the diagram, and the choice is a stark either-or one with very high stakes.
- Non-convexity is the economist's way of representing high-stakes choices where competing claims cannot be balanced at some optimal mid-point. A review of recent Environmental Court decisions reveals a number that seem to indicate non-convexity: examples are the 2012 refusal of consent for mussel farming at Port Gore in the Marlborough Sounds, and the 2008 decision halting a proposed Hilton Hotel development on the Wellington waterfront.
- Many other Environment Court decisions, however, involve a convex production frontier with incommensurable competing values; here the typical outcome

involves imposing some threshold standard ("discontinuity") or striking some sort of balance ("tradeoff"). Examples are the limiting of jetboat access to the Wilkin River and of helicopter use at Arthurs Point; the 2011 decision upholding and strengthening District Plan limitations on commercial development of the Mackenzie Basin; and the 2012 decision in favour of the Manawatu-Wanganui Regional Council's Proposed One Plan to limit nutrient runoff from farms in order to protect the region's rivers and lakes.

- Analysis of the last of these decisions in terms of the production-frontier diagram shows the way on which an enforceable specific-performance requirement of the sort advocated by Sunstein can provide an incentive for pro-environment technological progress, as commercial producers must innovate to raise their output and profitability within the constraint imposed by the nutrient limit. As a general principle, when confronting a tradeoff between incommensurables, there is a strong case for applying specific-performance requirements to protect the non-market value, while leaving producers of the marketable good free to devise the most efficient response; this is the case often made for cap-and-trade schemes, but rests critically on the clarity and effectiveness of the cap. Simply leaving market forces free to operate without a well-defined limit protecting the relevant non-market values leads not to efficient outcomes but to environmental degradation.

- These examples of **discontinuity** are compatible with either convexity or non-convexity of the production frontier, so long as absolute priority is assigned to non-monetary values up to a threshold stated quantitatively in terms of a metric that accurately captures those non-monetary values. So long as that threshold is secured, market development is left free to operate in the remaining resource space. Technical progress then provides the only way to expand the scale of market production, given the constraint on resource depletion.

- The more common **tradeoff** situation in resource management decisions corresponds to the economist's standard case of convexity in the production possibility set, with resource allocation decisions revealing an implicit relative price between the monetary and non-monetary values at stake. A "shadow price" of the resource in monetary terms can be inferred once the decision is taken, but cannot be calculated prior to the decision and so cannot be a central input into the adjudication process. Once limits are set, the degree to which the market domain can safely be relied upon to improve the efficiency of resource allocation depends in part on the extent to which there is confidence that the ecosystems and other systems impacted are understood, and that the effects of interventions can be appropriately predicted. The more there is uncertainty or ignorance, the more inappropriate will it be to allow property rights (the basic requirement for

markets to function effectively) to be devolved from the commons or the state to private individuals or corporates. This is in recognition of the precautionary principle at the outset, especially given the frequent unwillingness of governments to meet the cost of purchasing back allocations that later prove unsustainable.

Cost-benefit Analysis and Contingent Valuation

- Cost-benefit techniques are not readily extended to situations requiring choice between incommensurable values. When the two competing values in a tradeoff are incommensurable – as is the case in many decisions involving profit-driven appropriation of natural systems with non-marketed value – the main use of cost-benefit analysis is to weed out projects that are non-viable in money terms irrespective of how they impinge on non-market values.

- Where a commercial project is viable in monetary terms but requires the sacrifice of non-marketed environmental values, there is a temptation (and often a tendency) to push out the boundaries of cost-benefit thinking by seeking to monetise (express in monetary terms) part or all of the non-market values at stake. Techniques such as Contingent Valuation (CV) purport to achieve this by eliciting from the general public statements of "willingness to pay" (WTP) or "willingness to accept payment" (WTA) in relation to the protection of non-marketed values, and treating the resulting numbers as if they have the same probative status as hard commercial data on the project itself. This process amounts to a denial of incommensurability – a claim that all relevant values can validly be converted to the single metric of money so that all decisions can be reduced to selecting the "highest valued" alternative.

- In New Zealand, the Environment Court for several years encouraged parties appearing before it to engage in such pushing-out of the boundaries of monetisation. However the High Court, in a 2010 decision on the Project Hayes windfarm in Central Otago, rejected the placing of undue weight on cost-benefit conclusions based on inappropriate monetisation, and insisted instead on the proper weighing and balancing of incommensurable values stated in their own terms.

- Subsequently the Environment Court decisions on the MacKenzie (2011) and the Manawatu-Wanganui Regional Council's "Proposed One Plan" (2012) have stepped back from monetary calculation to application of specific-performance requirements to embody and protect non-market values.

- Contingent Valuation has been the subject of an extensive debate among economists in the past two decades, since attempts to estimate the monetary cost

of the 1989 Exxon-Valdez oil spill in Alaska produced figures ranging from $3.8 million (the direct loss of recreational value to fishers) to $4.9 billion (the US population's passive contingent valuation of the natural ecosystem, estimated using survey techniques). A major report by an expert panel appointed by the US National Oceanic and Atmospheric Administration (NOAA) concluded that contingent valuation studies could be informative if rigorously conducted to strict methodological guidelines, but that their results could be no more than "the starting point of a judicial process of damage assessment".

- Three major shortcomings of CV have been highlighted in the literature. First, the assumption that individuals have fully-developed preferences over the complete range of values, including all non-marketed values, flies in the face of both experimental evidence and the most basic principles of democratic decisions-making, which rests on the notion that preferences regarding many collectively-enjoyed goods are formed through the process of public deliberation in the course of which individuals are expected to form their views on the basis of arguments heard. Second, asking survey respondents to state a monetary WTP or WTA, with respect to goods whose values are incommensurable with money, produces responses that do not obey the economist's axioms of rational choice and which will often be entirely arbitrary, given that morally-meaningful money values cannot be stated. Third, behavioural economists have identified empirically a wide gap between WTP and WTA which is not predicted by neoclassical economic theory but clearly reflects a real-world psychological aversion to loss. CV studies using WTP (the most common measure) in situations involving choice between marketed and non-marketed values are therefore likely to exhibit strong pro-market bias.

- The shortcomings of techniques available to date for assigning monetary values to non-marketed goods and services point strongly towards the importance of specific-performance regulatory measures which can both ensure physical protection of the non-market values and allow market forces to search out technologically-creative ways to operate within the resulting physical constraints. Environmental regulatory limits are in this sense an incentive to accelerate technical progress in the economy.

Green National Accounting

- The shortcomings at the microeconomic level of contingent valuation, and of other similarly-motivated techniques of monetisation of non-monetary values, carry over to the numerous attempts to value nature at macroeconomic level, where again the boundaries of what can be valued in market terms have been pushed by many researchers. The tendency for national governments to give dominant status to monetary measures such as GDP when making policy decisions

has led naturally to a quest to bring important non-market goods and services within the ambit of national accounts and to assign them monetary valuations that policymakers will respect.

- While understandable, the attempt to produce "green national accounts" is fraught with methodological and theoretical difficulties. Most successful have been programmes that limit themselves to the restricted goal of constructing "satellite accounts" for environmental services that lie close to the borders of real-world markets, an exercise for which the United Nations has produced an official methodology: the SEEA (System of Environmental-Economic Accounting), following the precedent set by the inclusion in existing national accounts of the imputed rental value of owner-occupied housing; but the difficulty of further extending the boundaries of national accounting is highlighted by the activities that remain excluded, such as unpaid housework, subsistence agriculture, and voluntary activities.

- A crucial unresolved issue for green accounting is whether and how to measure, in monetary terms, resources appropriated from nature. These are generally unpriced in the hands of the original appropriator, so that the market values realised from their exploitation accrue as a rental component in the profit stream of the enterprises involved. Those market values, however, in no way correspond to the unmonetised opportunity cost of the resources if retained in their natural state. Even more problematic are services rendered by nature which do not pass through markets, which are appropriated by human society collectively rather than individually, and which consequently are unrecorded and unvalued. Examples are the atmosphere's role in sustaining life and climate; the waste-disposal services of natural ecosystems; and the aesthetic services provided by natural landscapes.

- Attempts to assign monetary values to these services highlight the difficulty of integrating them with conventional accounting. One example, the 1997 Costanza *et al* monetary valuation of the world's total ecosystem services to humanity, produced a figure of $33 trillion per year, nearly double the global Gross National Product of $18 trillion. Notionally passing these services through the market and charging them as a cost to the human economy would make the latter unsustainable in its present form – a conclusion which the authors intended their readers to draw. Another way of expressing this is that services which are freely provided and unvalued would be extremely costly to replicate if this were even possible, such that allowing these to deplete would clearly be a route to economic collapse as well as environmental crisis.

- A further difficulty with macroeconomic valuations of nature is the importance of natural services that do not and should not pass through markets at all, because

they lie in non-market spheres of social experience and have to be valued according to non-monetary criteria.

- Statistical excursions beyond the boundaries of existing national accounts have been most successful when their goals have been strictly limited and their reach has involved only very marginal pushing of the boundaries. In the New Zealand context one example is the estimation of the economic cost of pests, which has produced estimates of the order of 1-2% of GDP. Another was the initial development by Statistics New Zealand around 2000-2002 of satellite accounts for environmental protection expenditure, minerals stock valuation, valuation of freshwater flows, and energy inputs to the New Zealand economy – all one-off statistical initiatives that were quickly abandoned in the face of subsequent government cost-cutting.

- The major review of national accounting by the 2009 Stiglitz Commission (set up by French President Sarkozy to consider the limitations of national accounts in capturing actual human happiness and welfare) highlighted the fact that human well-being is multidimensional and that many of the key dimensions are incommensurable and not reducible to monetary values, or indeed to any single quantitative metric. Assessing quality-of-life therefore requires a plurality of indicators; summary measures including GDP, the Human Development Index, average life-satisfaction, and a wide range of environmental indices, all fall short in key dimensions, and cannot be reconciled into any overarching quantitative indicator.

- The Commission report focused heavily on attempts to measure environmental performance in ways that could be incorporated into monetary aggregate indicators of economic performance, and reviewed a large number of proposed measures including the Index of Well-being, the Green Human Development Index, the Environmental Sustainability Index (ESI), the Environmental Performance Index (EPI), the Sustainable Measure of Economic Welfare (SMEW), the Indicator of Sustainability of Economic Welfare (ISEW), the Genuine Progress Indicator, the System of Eco-Environmental Accounting (SEEA) with its concepts of green GDP and green NNP; Adjusted Net Savings (ANS); and the ecological footprint (EF). When plotted against one another these “green” accounting magnitudes failed to exhibit any significant correlation, reflecting the fact that the further measurement strays away from things that are traded in markets, or whose economic contribution can be estimated from the market prices of goods in which they are embodied, the more the resulting monetary measures become arbitrary and/or normatively loaded, and hence unlikely to command consensus respect in the way that “objective” measures such as GDP can do.

- The Commission's key conclusion was that rather than seeking a single unifying statistic, a better approach is the production of a "dashboard" of key statistics which a policymaker can observe in real time, and thus evaluate simultaneously a whole range of incommensurable but important matters, including the state of the environment measured in physical rather than monetary terms.

- New Zealand environmental statistics have fallen far short of providing a full dashboard of this sort, notwithstanding Statistics New Zealand's production of a set of indicators supposedly linked to sustainable development that are presented on the department's website in a rough dashboard form. The more systematic *State of the Environment* reports have been produced only twice in the past two decades and have now been officially abandoned, despite OECD criticism of the poor quality of NZ environmental accounting. A 2011 Government discussion document, *Measuring Up*, admitted the lack of a statistical base that could underpin the country's "clean green" branding, and foreshadowed a new Environmental Reporting Act, but this has not been proceeded with.

Applying the Theory to Current Issues

Proposals for Reform of the RMA

- The Resource Management Act is a crucial statute governing the procedures and content of adjudication at the economy/environment boundary. Its legitimacy in this role rests heavily upon the way it directs the relevant authorities to "recognise and provide for", "take account of" or "have regard to" a wide range of values from spheres other than the market. Those values are not generally reducible to the measuring rod of money, but many can be quantified, understood, and respected in their own terms, drawn from the relevant spheres of human activity and well-being.

- The strongest language in this context is that of section 6 dealing with "matters of national importance" - many of which involve non-market values - and is significant in a statute that generally opens matters up to tradeoffs (for economic gain). By requiring authorities to "recognise and provide for" these matters, the section points the way to the possibility of discontinuity thresholds and even blocked exchange as appropriate responses to market-based demands for access to key resources.

- The Government has put forward a proposal to amend section 6 by effectively merging its matters of national importance with "other matters" to be considered in section 7. The proposal is to then have a "single section that lists the matters that decision-makers would be required to 'recognise and provide for'".

- The government argues that: "There is concern that the predominance of environmental matters in section 6, and the hierarchy between sections 6 and 7, may result in an under-weighting of the positive effects (or net benefits) of certain economic and social activities." The clear effect of its proposal however is that exchanges that were previously blocked or restricted (as a result of environmental matters in section 6 having to be valued ahead of economic matters) would not be in future. In addition, the list would remove matters material to boundary adjudication, including: 7(aa) the ethic of stewardship and 7(d) intrinsic values of ecosystems.

- The government argues that removing the current hierarchy between sections 6 and 7 would "support more balanced decision-making" and would "ensure the list of matters contained in the Act better reflect today's values". The balance proposed here is to allow tradeoffs where blocking and thresholds would otherwise capture and protect the non-market interests and values that are to be adversely affected by an activity. However, no evidence has been provided by the government to date that the removal of the block to such exchanges would "better reflect today's values".

- The government has argued that such value judgements are the role of "publicly-accountable, elected representatives". But local government's elected representatives would have a more circumscribed role than at present. Central government would make decisions that are "nationally important", or involve "nationally-significant values", or simply "where consistency outweighs the value of local specificity". Thus the proposal seems set to reduce to an unknown degree the scope of the current rights under the RMA for communities to block exchanges at the district and regional level. This has constitutional implications and will also be important to the extent it involves decisions that pass risk to the community.

- The important result from this study in relation to RMA reform is that there will be many cases in which the tradeoff approach is not appropriate and where it will be better to draw "lines in the sand" marking the boundary within which market forces are to be restricted. Insofar as RMA reform seeks to shift the market/environment boundary without good reason, it runs the risk of draining legitimacy from the established channels of adjudication, opening space for the contest of incommensurable values to shift to other arenas.

- In order to inform a discussion on the proposed amendments, it will be helpful to represent the RMA as it stands in terms of where boundaries have been drawn and show the effect of proposed boundary shifts that open new areas to tradeoffs. The matters currently included in the less negotiable "matters of

national importance" block in section 6 should remain there (and others might be added).

Oceans – EEZ Legislation Test Case

- Law governing the EEZ was passed last year in the face of widespread criticism of the process to be used to assess applications for ocean activities outside the 12 mile limit. A key issue is the lack of certain definitions (e.g. what constitutes an economic benefit to New Zealand, and hence what is to be counted in any cost benefit assessment produced as quantitative evidence in favor of a project), and the absence of clear principles to guide decision-making, reflected in the general use of the expression "take into account" without any process specified for how to undertake that task, or what weight to place on competing incommensurable values.

- These are among the pointers strongly suggesting that the first successful application to the EPA under the EEZ law will trigger an important court challenge. Any challenge is restricted to considering points of law, meaning that definitions and process issues will be important.

- The wording of, and Parliamentary debates on, the legislation therefore require careful scrutiny to determine whether, and to what extent, it leaves open the way to decisions matching the blocking and discontinuity categories discussed in this paper.

- A second step would be to look at what limits UNCLOS and other international marine treaties place on New Zealand's sovereign right to undertake activities within the EEZ. If the treaties can be deemed to apply for EPA purposes, irrespective of the EEZ legislation, or if section 11 is found to give force to them (it is somewhat ambiguous), then a series of boundaries can be established that would be beyond the reach of the EPA to make tradeoffs. They would have the effect of setting a ceiling on the environmental costs that could be incurred in certain respects, or simply barring particular environmental impacts. An application violating these requirements should then fail to gain approval as a matter of process.

- As the EEZ legislation simply sets out a list of matters to take into account (and some scant information sufficiency principles), there is considerable room for work on boundary setting that takes the international treaty matters and certain other matters of importance and looks at how to set boundaries that the law could reasonably be expected to defend. In particular, such work would look at which matters would be best treated outside the cost/benefit framework that the EPA often uses, and should thus not be monetized.

- The legislation provides for bonds to be set so as to ensure conditions are performed. However, unless the bonds are set to a high enough level, then their economic effect can amount to simply a fine, as once the cost of performance exceeds that of the bond, the commercial incentive is to simply forfeit the bond. This underlines the importance of ensuring that other sections of the Act are also utilised: that security is sought from the company itself and more importantly that an appropriate third party guarantee is obtained (sections 65 2(d) and (e)).

Mining Applications Under the RMA

- Schedule 4 of the Conservation Act provides a direct example of how areas containing mineral resources can be excluded from mining, and the reaction to proposals to remove this protection demonstrated there was widespread public support for holding that boundary.

- The proposal to establish an opencast coal mine at Denniston has already represented a major test of the RMA, with the outcome of the Supreme Court appeal on whether climate change is to be taken into account still unknown at the time of writing. The substantive case on the mining consent application will presumably be heard under the existing version of the Act so that the existing versions of sections 6 and 7 will apply.

- The case highlights the question of how climate-change impacts are to be brought into the resource management procedures. They were legislated out of the RMA's scope of consideration on the basis that an effective national economic instrument would separately internalize that particular set of costs. As the envisaged level of pricing never eventuated, and with the ETS most recently having been put into in a comatose state at a time when carbon prices have dropped to 20c/tonne, it is clear that the argument for the exclusion of climate change externalities on the grounds of duplication is void. With such a conspicuous market failure in an area where the market was supposed to operate, there would seem to be a strong case for at least allowing a dual responsibility to be set between the ETS and the RMA. In other words, payments made under the ETS with respect to the activity could be counted in the RMA assessment, but this would not limit an RMA hearing from assessing the full climate change impacts.

Limits to Tourism

- The tourism sector presents some of the most difficult resource management issues confronting New Zealand. The sector's contribution to the balance of payments and Gross Domestic Product are sufficient to make it a central player in the market sphere, but its impacts on the environment have been growing rapidly

to the point where several issues that could previously be resolved by tradeoff decisions seem likely to shift into the discontinuity space, requiring absolute limits to be imposed on some tourism operations, with consequent rationing of access.

- The economic importance of tourism means that there will be strong lobbying pressures and more aggressive resource consent applications, both pointing towards progressively more pro-market tradeoffs. These pressures are likely to be increasingly serious as the funding constraints on the Department of Conservation make that agency more dependent on corporate goodwill and financial contributions.

- Pro-actively identifying defensible boundary limits on expansion of the tourism sector is therefore likely to be a worthwhile exercise. It would involve measures such as tightening-up provisions in national park plans and district plans, and arguing forcefully the case for thresholds and occasionally blocked exchange before the RMA hearings.

1. Introduction

The Royal Forest and Bird Protection Society of New Zealand Inc (Forest & Bird) has asked Simon Terry Associates Research Ltd (STA) to prepare a paper providing theoretical underpinning for future Forest & Bird campaigns around the theme of protecting nature in a green economy. In framing the research, we have focused on what can perhaps best be described as 'border issues' because of the recurring theme of having to negotiate at, or define and protect, the boundaries between distinct entities and spheres of social existence: between human activity and nature; between things that can be quantified and valued in money terms and those that cannot; between protected and unprotected territories and species; between competing conceptions of 'the good'.

The Shorter Oxford Dictionary defines a "boundary" as "that which serves to delineate the limits of anything; the limit itself". The definition of "border" is less precise, indicating a zone around the limit – not necessarily a clear-cut line: "a side, edge, brink or margin; a limit or boundary; the part lying along the boundary or outline…. The marches, the border districts…" Borders, in other words, include zones of negotiation and overlap on either side of the strict boundary; they allow for shifting balances between the entities separated by the boundary, and for occasional shifts in the boundary itself. In the world of resource management, where the monetary values of the market sphere come up against the non-monetary values of natural ecosystems, treasured landscapes, endangered species, collectively-valued common spaces, and all the other attributes that make "the environment" important for human society, the zone of negotiation and conflict between the values of the market and those of the environment is defined, policed, and adjudicated by a set of laws and institutions designed and installed for that purpose. In the New Zealand case the central statute governing this particular border is the Resource Management Act, but a wide range of other laws and agencies also contribute to the task.

At the outset we take for granted the existence of a market economy, as the dominant mechanism by which production and exchange are organised to meet the material needs of human society. This implies that the price mechanism operates across a wide sphere of human interactions, as described in standard economic theory, to guide the allocation of resources in such a way as to match supply and demand for all those goods and services that can appropriately be classed as commodities. This "market sphere"[2] of society encompasses those areas of social life in which "the measuring rod of money"[3] applies as the legitimate and accepted standard of value. As discussed in

[2] Use of the term "sphere" to mark off different arenas of social interaction follows the title of Michael Walzer, *Spheres of justice : a defense of pluralism and equality* New York: Basic Books, 1983.

[3] The expression is from A.C. Pigou, *The Economics of* Welfare, London: Macmillan, 4th ed 1932 (first published 1920), p.11: "…the range of our inquiry becomes restricted to that part of social

Part 2 below, the limit of what can clearly and meaningfully be measured in money terms has often been identified as marking the boundary within which the discipline of economics can operate, while those things that cannot be bought with money, or meaningfully measured in terms of money, are appropriately analysed and governed in terms that are meaningful to their separate spheres or realms. The proposition that the efficient pursuit of human well-being requires imposition of, and respect for, the boundaries of the market and the limits of the measuring rod of money, is central to the discussion that follows.

Markets are a highly efficient means of solving an important class of problems, namely the allocation of scarce resources amongst competing activities producing commodities for human consumption. In a market setting, individuals are assumed to be motivated essentially by self-interest and so act in ways that maximise their payoffs, subject to externally-imposed constraints. In this process of "constrained optimisation" it is the constraints that really matter (self-interest generally looks after itself). Attention therefore needs to focus on those constraints. Some of them are physical, imposed directly by general scarcity of resources, but many are socially-constructed arrangements, designed to secure socially-beneficial outcomes not only from markets but equally from other spheres of social action and behaviour; the effects of these social arrangements is to remove some resources from the reach of the market in order that they may be dedicated to serving other human needs located within non-market spheres.

For markets to function efficiently in the service of human welfare they have to be regulated (that is, subject to constraints) on several fronts. Within the market sphere these include exclusive property rights (without which markets cannot operate in the first place) and enforceable sanctity of contract; restraint of anti-competitive conduct; and institutional arrangements to correct for market failures such as externalities and under-provision of public goods. In addition (a central topic of this paper) the market must be limited to its legitimate sphere of operation, and not allowed to colonise or overwhelm other spheres of social life that are appropriately governed by non-market principles, and/or are engaged in the pursuit of non-market ends.

Some economic reductionists claim that all human life can be encompassed by economic theories of market interactions[4], but this is an extreme position that does not command general acceptance. In the mainstream academic literature in social science (including economics), philosophy, and law, the market sphere is recognised to be only one of several coexisting spheres of human social life, within each of which a

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welfare that can be brought directly or indirectly into relation with the measuring rod of money. This part of welfare may be called economic welfare."

[4] Epitomised by the work of Gary Becker and the early work of Jon Elster; for the latter's subsequent critique see *Explaining Social Behaviour – More Nuts and Bolts for the Social Sciences* Cambridge University Press, 2007, and *Reason and Rationality* Princeton University Press, 2009.

particular set of cultural practices and ethical norms prevails and a distinctive set of values is recognised and maximised. In the sphere of family life, relevant values are love, intimacy, shared experience, mutual support, the cherishing and rearing of children. In the public/political sphere the objectives are the collective pursuit of the common good; key values are access to, and participation in, the procedures and the fruits of collective enterprise. In the sphere of spiritual life, religious values and practices prevail. The medical sphere has its own professional practices and code of ethics, as do education and the law. In the sphere of human interaction with nature and the natural environment there arise some of the most difficult and strongly-contested issues, as discussed in this paper.

The existence of these multiple spheres of social action and experience, each with its own relevant standards of value and established practices and institutions, is recognised not only in philosophy, sociology and law (discussed in Part 3 of this paper) but also in the economics literature, some of which is reviewed in Part 2.

While the price mechanism is fundamental to the efficient operation of the market sphere, it does not provide the most efficient organising principle for action and decision-making in those other spheres. Because different practices, rules and understandings are appropriate for different sorts of activities, the efficient pursuit of human goals - in the broad sense of overall well-being - requires the establishment of boundaries to protect each sphere's integrity against contamination from others. With each of these boundaries comes a corresponding border zone across which conflicts, adjudication, the balancing of contending interests, and the striking of long-term deals and treaties, are to be encountered. Around the limits of the market sphere, these boundaries serve to block the tendency for commodity transactions to spread into arenas where "commodification" subverts rather than promotes the pursuit of "the good", and where even an increased tendency to think about non-market relationships in market terms raises serious issues both ethically and in terms of the efficient pursuit of human ends.[5]

In common with all developed societies, New Zealand has an array of institutional boundaries that have been drawn up in legislation and planning law to hold market forces at bay while actively promoting values such as sustainability, biodiversity, and conservation. "Green" advocacy in this context involves strengthening the defences of those boundaries, making the case for shifting them in areas where - from a green perspective - rolling-back the market offers the potential for gains to important non-market values, identifying areas where new boundaries need to be drawn and protected, and engaging in the continual striking of balances over the grey contestable and negotiable areas that comprise the border zones.

[5] Some key references relating to commodification of nature are reviewed in Appendix III.

In this paper the issue of striking the right balances between market and non-market values with respect to the natural environment is approached from various angles. The aim is to identify the fundamental conceptual building blocks that underpin institutional arrangements such as social covenants over national parks, the procedures of the Resource Management Act, the protection of key elements of the biosphere to maintain biodiversity, and in general the issue of how to proceed in adjudicating between market and non-market claims on nature.

Two recent examples in New Zealand may serve to set the scene. The first is the strong public reaction to a Government proposal to open up protected conservation land for mining. The second is the question of how to deal with the wreck of the container ship *Rena*.

Mining and Schedule 4

On 1 May 2010 more than 40,000 people marched up Queen Street in Auckland, in protest against New Zealand Government plans to allow mining on land protected by Schedule 4 of the Crown Minerals Act. Around the country, opinion polls indicated a widespread sense of public outrage. The Government responded by withdrawing its proposal. The intensity of public reaction to the possible incursion of mining activity into the nation's most highly-protected category of wild and scenic landscapes outside of national parks amounted to defence of a 'line drawn in the sand' under a social compact legislated in the New Zealand Parliament in 1996[6]. That compact effectively stated that the forces of the market – in this case, minerals prospecting and extraction - were barred from encroaching over the physical boundary of the areas of land listed in Schedule 4. Access to Schedule 4 land was not a commodity which could be secured upon payment of some monetary price; it was something that had been removed from the reach of market calculation and money transactions, and which could be obtained (if at all) only via a process of explicit, public, reasoned argument and debate followed by legislative action. This was an example of what philosopher Michael Walzer calls "blocked exchange".

This was not the first time the New Zealand public had mounted a collective, political campaign to establish physical and institutional boundaries limiting the expansion of commercial development activity. Previous examples include the establishment of the system of national parks over the course of the twentieth century, the halting of plans to raise the level of Lake Manapouri for purposes of hydroelectric development in the early 1970s, and opposition in the late 1970s and early 1980s to the former New

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6 Geoff Bertram, *Conservation Land and the Social Covenant*, report for Forest and Bird, May 2010, reproduced as Chapter 3 in Geoff Bertram *Mining and the Conservation Estate*, report for Forest and Bird September 2010, http://www.geoffbertram.com/fileadmin/Mining%20Economics%20and%20the%20Conservation%20Estate%20main%20text.pdf

Zealand Forest Service's ongoing exploitation of indigenous forests for the large-scale production of native timbers. In the last case the eventual outcome was abolition of the NZFS itself and transfer of the indigenous forest estate into the new conservation estate set up by the Conservation Act 1987. All of these policy decisions in response to public sentiment represent blocked exchanges agreed upon in democratic fashion, after a process of public deliberation over how to resolve conflicting and mutually-incompatible claims upon physical and natural resources.

The literature on blocked exchange is reviewed in Part 3 of this paper.

The Rena

On 5 October 2011 the *Rena* struck the Astrolabe reef off Tauranga, and after a few months of being pounded by the sea, the wreck broke in two in January 2012 and the rear section sank. Immediate consequences were an oil spill and widespread floating-ashore of containers and their contents. In the longer term, the issue arose of whether the wreck should be completely removed from the reef, or left there. By early 2013, salvage crews employed by the ship's insurers had removed much of the bow section and a proportion of the cargo, at a cost of $275 million (one of the most expensive maritime salvage operations ever)[7]. At that point the insurers decided to apply for resource consent to leave the remainder of the wreck where it lay, arguing that the cost of completing the clean-up of the site was unreasonably great.

The central objection to this came from local iwi who view the wreckage as an unwanted and unwarranted intrusion on an environmental asset, and insist that the entire ship be removed from the reef. The resulting conflict is likely to come before the Environment Court in due course. The iwi perpective was summed up by a spokesperson, Buddy Mikaere of Ngati Pukenga, on Radio New Zealand Morning Report 1 March 2013 as follows:

> It's an affront to cultural values to have that wreck sitting on a taonga…. We didn't ask for the wreck to come, we didn't ask for them to leave it. They should take it away.

As in the case of the 1989 *Exxon Valdez* oil spill in Alaska, the pending court case is likely to turn on the issue of which values are to prevail – specifically, how incommensurable conflicting values are to be ranked by a court: the monetary cost of complete removal of the wreck versus the non-monetary value of the natural ecosystems and the *mauri* of the reef environment.

This is not a new problem for the courts; judges have frequently been placed in the position of having to weigh up values from different spheres, when some of these values can be expressed in money terms but others cannot – that is, when the values

[7] "Push to let Rena rest", *New Zealand Herald* 19 February 2013.

at stake are "incommensurable". There is an extensive legal literature on how "practical reason" can be brought to bear to ensure that money values drawn from the market sphere re not allowed to overwhelm equally-vital non-monetary values from other spheres.[8] There is equally an extensive, and rapidly growing, literature (and body of case law) in the area of determining what can and what cannot be translated into money valuations in situations where major market-related impacts on natural systems impose costs and losses that are not commensurable with market prices and must be evaluated on their own terms – an issue arising not only in the case of the *Rena* wreck (and in previous cases of major maritime disasters such as the *Exxon Valdez* oil spill in Alaska in 1989 and the Deepwater Horizon oil-well blowout in 2010) but equally in day-to-day resource management decisions on matters such as how many daily jet-boat trips to allow on a wild river and how much development activity to allow in the MacKenzie Basin landscape.

The central conundrum of incommensurable values is explored in part 4 of this paper. Part 5 then shows how the economic notion of the production possibility frontier can be analytically helpful in situations where no market price signal is available and when, therefore, the selection of a point on the frontier (that is, a decision on the appropriate allocation of scarce resources) has to rely upon a process of deliberation by a duly-constituted authority of some sort. Some examples of the weighing-up of incommensurable values in New Zealand resource management decisions are surveyed in Part 5.

Part 6 turns to the question of how far market-based valuations and policy instruments can reach in the pursuit of environmental protection objectives, and to the related issue of the use of price instruments to control externalities, and the application of market-based valuation techniques to place monetary values on nature. That discussion emphasises that the limits to the market sphere presented by blocked exchange and incommensurability cannot be overcome by any techniques of monetisation developed to date, but notes that there is a substantial "grey zone" between the market and the environment within which overlapping monetary and non-monetary values are negotiable and price instruments may deliver defensible outcomes.

Part 7 then turns to some specific issues in New Zealand environmental policy and law where lessons from this study may be applicable.

[8] For extensive references to this literature see, e.g., Brett G Scharffs, "Adjudication and the Problems of Incommensurability", *William and Mary Law Review* 42(4):1367-1435, 2001.

2. Spheres of Social Activity

2.1 Introduction

That there is more to human experience and social life than simply market transactions, and that the market sphere coexists with other social and cultural spheres in which different institutions and rules of the game apply, has been generally acknowledged by economic theorists. The literature on comparative economic systems, for example, has analysed the way in which different social systems have allowed greater or lesser scope for the free play of market forces and the price mechanism.

An example from that literature is Karl Polanyi[9], who described as "the Great Transformation" the process by which, from a long-run historical point of view, the economic sphere (within which market forces dominate culture and practice) has expanded in importance relative to the other spheres of human society over recent centuries. In earlier epochs of history, in Polanyi's account, markets were simply an auxiliary tool for exchange of goods, but in modern market societies the market and the price mechanism have become the paramount institutions for exchange. As a necessary reaction to the dehumanising and objectifying character of pure commodified market transactions, Polanyi argued, the separation between the political and the economic sphere had to become more pronounced, with the former providing an arena for resisting and counteracting the otherwise corrosive effects of commodification of a large part of human life. Polanyi's ideas are echoed the recent literature criticising the "commodification of nature" and "enclosure of the commons", the central theme of which has been the need for new, or stronger, boundaries to slow or halt these trends.

The founder of modern economics, Adam Smith, devoted extensive sections of his writings to comparative analysis of different social and economic systems and to the appropriate limits to markets, alongside his arguments for allowing market forces to operate as freely as possible within those limits.

2.2 Smith's Spheres of Justice and Morality

Smith's book *The Wealth of Nations* provides the classic examination of the market economy and the price mechanism, but Smith wrote also a separate detailed treatment of the sphere of justice and morality, *The Theory of Moral Sentiments*, which opens with the observation that[10]

9 Karl Polanyi, *The Great Transformation,* New York: Rinehart, 1944.

10 Adam Smith, *The Theory of Moral Sentiments*, Penguin classic edition 2009, p.13.

> [h]ow selfish soever man may be supposed, there are evidently some principles in his nature, which interest him in the fortunes of others, and render their happiness necessary to him, though he derives nothing from it except the pleasure of seeing it….

From this Smith proceeded to explore the role of moral precepts, and "sympathy" for others, as determinants of a wide range of human behaviour which lies outside the market and is not (and should not be) primarily responsive to price incentives. One important implication, followed up by Smith in *The Wealth of Nations*[11], is the need to have government institutions which are devoted to "the exact administration of justice", and the recognition that in order to accomplish their task those institutions must be immunised against the price mechanism, since the buying and selling of "justice" would corrupt the whole purpose of the exercise. Policing the boundary between the spheres of justice and the market, to protect the former against the latter, is a central task of good government in Smith, and remains a central theme of constitutional design in modern societies.

2.3 Marshall's Limits to the Reach of Economic Science

Alfred Marshall in his *Principles of Economics* acknowledged in the opening pages the existence of multiple spheres of human life, and the limited reach of "economic science":

> [T]the two great forming agencies of the world's history have been the religious and the economic. Here and there the ardour of the military or the artistic spirit has been for a while predominant: but religious and economic influences have…nearly always been more important than all others… [I]n religion, in the family affections and in friendship, even the poor may find scope for many of those faculties which are the source of the highest happiness… [T]he question whether it is really impossible that all should start in the world with a fair chance of leading a cultured life … cannot be fully answered by economic science. For the answer depends partly on the moral and political capabilities of human nature, and on these matters the economist has no special means of information.[12]

2.4 Sen's Pluralities of Values

Recently, the economist-philosopher Amartya Sen has written extensively on the importance of justice, freedom and human capabilities as central components of the good life, emphasising the centrality of "public reasoning" and well-designed institutions as mechanisms for promoting key human values. Sen is strongly critical of

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11 Adam Smith, *The Wealth of Nations*, Book IV Chapter ix paragraph 51

12 Marshall, A., *Principles of Economics* Macmillan and Co, London: Macmillan, 8th ed 1920 (first published 1890), p.1.

economic reductionism that seeks to measure all valuable things by a single yardstick (such as money) and emphasises the multiplicity of standards of value:

> Functionings and capabilities are diverse, as indeed they must be since they deal with different features of our life and our freedom…. [T]here is a long tradition in parts of economics and political philosophy of treating one allegedly homogeneous feature (such as income or utility) as the sole 'good thing' that could be effortlessly maximised… [and so] there is some nervousness in facing a problem of valuation involving heterogeneous objects…. [but] any serious problem of social judgment can hardly escape accommodating pluralities of values… We cannot reduce all the things we have reason to value into one homogeneous magnitude… Proposals for weaning economic evaluators away from excusive reliance on the GNP have tended to generate the worry that with diverse objects to judge we shall not have the sense of ease that goes with just checking whether the GNP is higher or lower. But serious exercises of social evaluation cannot avoid dealing, in one way or another, with the valuation of diverse objects.[13]

Sen goes on to consider how these observations apply to environmental issues and sustainable development. The value of the environment, he argues, "cannot be just a matter of what there is, but must also consist of the opportunities it offers to people."[14] Eradicating smallpox is not viewed as an impoverishment of nature in the same way as, say, the destruction of ecologically important forests, because the standpoint from which each of these is evaluated is the quality of human life; just as the Brundtland Report's definition of sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" rests on the view that the value of the environment cannot be divorced from human judgment. But Brundtland's focus on material living standards secured through the market production of commodities is too narrow, in Sen's view:

> Certainly, people do have needs, but they also have values and, in particular, cherish their ability to reason, appraise, choose, participate, and act. Seeing people only in terms of their needs may give us a rather meagre view of humanity…. [S]ustaining living standards is not the same thing as sustaining people's freedom and capability to have – and safeguard – what they value and have reason to attach importance to. Our reason for valuing particular opportunities need not always lie in their contributions to our living standards, or more generally to our own interests…. We may attach importance to the preservation of species not merely because … the presence of those species enhances our own living standards… We can have many reasons for our conservational efforts – not all of which are parasitic on our own living standards (or need fulfilment) and some of which turn precisely on our sense of

[13] Amartya Sen, *the Idea of Justice*, Harvard University Press 2009, pp. 239-241.

[14] Sen p.248.

> values and on our acknowledgment of our fiduciary responsibility… The significance of our lives cannot be put into the little box of our own living standards, or our need-fulfilment.[15]

2.5 Coase and Theory of the Firm

A longstanding stream of economic theory – epitomised by the work of Ronald Coase on theory of the firm[16] - focuses on the issue of how human activity is, and should be, organised in circumstances where the market mechanism is less efficient than other arrangements and institutions. This opens the way for analysis of the nature of those more efficient alternative practices even in settings where the aim of human activity is still the production of commodities. The sphere analysed by Coase is the firm in capitalist society – an institution devoted to supplying commodities for sale in the market, but organised internally as a planned entity directed by the entrepreneur and using non-price allocative procedures:

> Outside the firm, price movements direct production, which is coordinated through a series of exchange transactions on the market. Within a firm, these market transactions are eliminated and in place of the complicated market structure with exchange transactions is substituted the entrepreneur-coordinator, who directs production…. This coordination of the various factors of production is … normally carried out without the intervention of the price mechanism.[17]

The reason, Coase argued, was simply cost minimisation:

> The main reason why it is profitable to establish a firm would seem to be that there is a cost of using the price mechanism.[18]

The empirically-observable boundaries of the firm therefore mark out a limit to the sphere of the market dictated by productive efficiency; within the sphere of the firm, entrepreneurial organisation beats market transactions as the means of achieving the desired ends, and exchanges inconsistent with the entrepreneur's plan are blocked.

2.6 Ostrom and Governance of the Commons

Elinor Ostrom received the 2009 Nobel Prize in economics for her work on collective solutions to the problem of managing common-property natural resources[19]. A central

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15 Sen, pp.250-252.

16 Coase, Ronald H. "The Nature of the Firm". *Economica* **4** (16): 386-405, November 1937.

17 Coase 1937 p.388.

18 Coase 1937 p.390.

19 Elinor Ostrom, *Governing the Commons: the Evolution of Institutions for Collective Action* Cambridge University press, 1990; Amy R. Potete, Marco A. Janssen, and Elinor Ostrom (eds)

prediction of neoclassical economic theory has been that unrestrained pursuit of self-interest in a market setting where a scarce natural resource is open to all must lead to over-exploitation, and hence environmental degradation – the "tragedy of the commons"[20].

Ostrom's empirical and theoretical work started from a simple proposition: in a society with open-access common property, rational individuals with full information always have the option of establishing a collectively-designed and collectively-enforced set of non-market arrangements for managing the commons to the benefit of all. Her work demonstrated that this option is very frequently taken up in practice, with the market mechanism set aside in favour of more efficient and socially-beneficial management rules and practices. This process establishes a sphere of collective governance bearing an obvious resemblance to Coase's view of the firm[21], and illustrating the benefits of establishing and defending a social space within which a logic can rule other than that of the pure competitive market.

Successful systems for managing common-property resources arise by the deliberate choice of human agents, exercising their agency to set up boundaries that limit the reach of the market, and thereby opening up opportunities to achieve human ends more efficiently than the market would do. Often the appropriate organisational form for such collective action is government – but central to Ostrom's theory is her denial that boundaries and management systems must necessarily be imposed by the state, and her demonstration of the power of bottom-up organisation by "self-organized and self-governing enterprises"[22] (generally, though, at local level within particular regions or localities).

While there is, Ostrom argues, no single *sufficient* condition for the success of a bottom-up self-governance arrangement to manage natural resources at local level, a *necessary* condition is "clearly defined boundaries" which appear at the top of her list of "design principles illustrated by long-enduring common-property-resource institutions"[23].

Working Together: Collective Action, the Commons and Multiple Methods in Practice, Princeton University Press 2010.

[20] Scott Gordon, "The Economic Theory of a Common-Property Resource: the Fishery", *Journal of Political Economy* 62: 124-42, 1954; Garret Hardin, "The Tragedy of the Commons", *Science* 162: 1243-1248, 1968; Mancur Olson, *The Logic of Collective Action: Public Goods and the Theory of Groups,* Cambridge Mass.: Harvard University Press, 1965 .

[21] Ostrom 1990 p.40 acknowledges the parallel: "the theory of the firm and the theory of the state can each provide an explanation for one way in which collective action can be achieved. Each involves the creation of a new institutional arrangement in which the rules in use are fundamentally different from those that structure independent action [in the market sphere]"

[22] Ostrom 1990 p.25. Appendix 1 discusses one example of such bottom-up management in New Zealand – the QE II Trust.

[23] Ostrom 1990 p.90 Table 3.1.

Ostrom's first major study was into the management of groundwater resources in California and the gradual emergence of a coalition of local authorities committed to restraint on their utilisation of the resource. The New Zealand Land and Water Forum was consciously built on Ostrom's ideas, but it is not clear that the participants in that collaborative planning exercise were fully aware of the pitfalls found by Ostrom. One crucial difference between the California case and that of New Zealand water policy is that the California resource was limited by the inescapable physical reality of depletion, which meant the incentives on the players to reach agreement and cooperate were extremely strong – far stronger than simply the popular desire for cleaner rivers in the New Zealand setting. Failure in the California setting would have meant the end of a key source of municipal water supply, whereas agricultural and industrial interests in the New Zealand forum case were confronted only with reputational damage if they continued to put their self-interest ahead of the common good.

Because Ostrom starts from the neoclassical economist's methodological-individualist position, assuming that all social phenomena are aggregates of self-interested individual behaviour, she would probably not have predicted success for the Land and Water Forum exercise, in the absence of some hard constraint imposed by, for example, central government policy. Other social-science disciplines such as anthropology start might offer more optimistic perspectives. Bardhan and Ray, for example, comment that the individual as the locus of 'given' preferences is not a recognisable object of anthropological inquiry because in practice individuals' goals in life emerge from social processes of interaction, reciprocity, and socialisation in general. As they put it[24]

> Individuals do have agency, say anthropologists, but they are situated, embedded beings rather than autonomous beings who view life as a series of constrained optimization problems. Autonomy in a social vacuum is not meaningful; rather … individual selves are 'inherently part of social and political relationships'. This ontological position implies that the central common property analysis may not be why individuals cooperate to provide or protect a resource. Why they would not cooperate to protect a critical resource is just as much in need of explanation…. Why free-riding should be one's first instinct is … open to question.

This points to the need to move outside the mainstream economics literature, having established the basic point that separate spheres of social action are well recognised in that literature. While statements about "what money can't buy" [25] can be cast in the

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[24] Pranab Bardhan and Isha Ray (eds) *The Contested Commons: Conversations Between Economists and Anthropologists*, Oxford: Blackwell, 2008, pp.6-7.

[25] Michael J. Sandel, *What Money Can't Buy: the Moral Limits of Markets*, London: Allen Lane, 2012, originally given as the Tanner Lectures at the University of Oxford in 1998 and online at http://www.scribd.com/doc/57371783/Michael-Sandel-the-Moral-Limits-of-Markets.

economist's language of Coase's brand of transaction-cost economics[26] (that is, in terms of the efficient pursuit of human ends), other scholarly disciplines, in particular philosophy, use different – often richer and more accessible – language to address the same issues on a broader canvas.

[26] Subsequent writers on the transaction-cost approach in economics include Oliver E. Williamson, "The Economics of organization: the Transaction Cost Approach", *American Journal of Sociology* 87(3): 548- 577, November 1981. For related theorising on why alternative forms of organisation are more efficient than the market see John Kenneth Galbraith *The New Industrial State* 1967 and Mancur Olson, Jr., *The Logic of Collective Action: Public Goods and the Theory of Groups*, Harvard University Press, 1965.

3. Blocked Exchange

3.1 Walzer

The delineation of separate social spheres, and hence of the limits to the market sphere, is the basis for Michael Walzer's philosophical writing on justice. As he puts it[27]:

> There has never been a universal medium of exchange. Since the decline of the barter economy, money has been the most common medium. But the old maxim according to which there are some things that money can't buy is not only normatively but factually true. What should and should not be up for sale is something men and women always have to decide and have decided in many different ways. Throughout history, the market has been one of the most important mechanisms for the distribution of social goods, but it has never been, it nowhere is today, a complete distributive system.

In Walzer's account the reason the market cannot be the universal organising principle of society is basically that the values things possess for people are not all of the same kind[28]:

> [O]ften enough money fails to represent value; … we can buy and sell universally only if we disregard real values; while if we attend to values, there are things that cannot be bought and sold. … [T]he abstract universality of money is undercut and circumscribed by the creation of values that can't easily be priced or that we don't want priced. Though these values are often in dispute we can investigate what they are. It is an empirical matter. What monetary exchanges are blocked, banned, resented, conventionally deplored?

Walzer coined the term "blocked exchanges" to cover all those things that cannot be bought or sold – areas of social life that lie, or have been placed, outside the reach of the market and its money values. In his 1983 book, Walzer presents a list of fourteen blocked exchanges[29], mainly matters relating to democratic political life in the USA. He refers approvingly to Okun's view of the US Bill of Rights as a series of blocked exchanges – areas from which the power of money is barred[30]. One cannot (and should not) be able to buy human beings (as in slavery), political influence or office, criminal justice, freedom of speech and assembly, basic welfare services collectively provided, exemptions from citizen obligations such as military services or jury duty. In other spheres, things that cannot and should not be bought include love and friendship, divine grace, prizes and honours for achievement or service. Within the

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27 Walzer (1983) p.4.

28 Walzer 1983 p.97.

29 Walzer 1983 pp.100-103.

30 The reference is to Arthur Okun, *Equality and Efficiency: the Big Tradeoff*, Washington DC: Brookings Institution, 1975.

market sphere itself, blocked exchanges include criminal transactions and the sale of unsafe products.[31]

"Money", Walzer acknowledges, "seeps across all boundaries … and where one ought to try to stop it is a question of expediency as well as of principle. Failure to stop it at some reasonable point has consequences throughout the range of distributions"[32]. There is, he argues, no absolute, universally-valid stopping point (1983 p.151):

> We can always change the distributive system simply by redrawing its boundaries. There is no single set of just boundaries.

And (1983 p.319)

> Good fences make just societies. We never know exactly where to put the fences; they have no natural location. The goods they distinguish are artefacts; as they were made, so they can be remade. Boundaries, then, are vulnerable to shifts in social meaning, and we have no choice but to live with the continual probes and incursions through which these shifts are worked out.

In Walzer's view, the identification of which exchanges are blocked is contingent on historical circumstances and particular societies[33]:

> In a world of particular cultures, competing conceptions of the good, scarce resources, elusive and expansive needs, there isn't going to be a single formula, universally applicable. There isn't going to be a single, universally approved path that carries us from a notion like, say, 'fair shares' to a comprehensive list of the goods to which that notion applies. Fair shares of what?

Walzer does not discuss environmental protection; indeed, this is the most obvious omission from his list. As noted earlier, environmental protection often involves straightforward blocked exchange such as that established by Schedule 4 of the Crown Minerals Act in New Zealand. Schedule 4 clearly corresponds to Walzer's notion of how a particular society establishes and maintains "fences" by the processes of public debate and reasoning – processes which are integral to a functioning democracy.

3.2 Anderson and the Ethical Limits to the Market

Elizabeth Anderson, a University of Michigan philosopher with an economics background, approaches blocked exchange from a different angle than Walzer[34].

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31 For a hostile critique of Walzer's approach from a libertarian standpoint see Tibor B. Machan "Blocked Exchanges Revisited" *Journal of Applied Philosophy* 14(3): 249-262, 1997.

32 Walzer 1983 p.22.

33 Walzer 1983 p.79.

34 Elizabeth Anderson, `The Ethical Limitations of the Market', *Economics and Philosophy*, vol. 6, 1990, pp. 179-206; *Value in Ethics and Economics*, Cambridge Mass.: Harvard University Press, 1993; and "Practical Reason and Incommensurable Goods" in Ruth Chang (ed)

Whereas Walzer starts from the empirical observation that exchanges are blocked in practice, and works back from this to the identification of "spheres of justice", Anderson tackles from first principles the question of which categories of human values can and cannot be embodied, and realised in money terms, by the market and the price mechanism. She defines economic goods as "those goods whose dimensions of value are best realized within market relations"[35], and argues that

> The market, like any relations) can thus be explored in part by seeking the answers to three questions.
>
> First, what dimensions of value in things, relationships and persons are acknowledged and successfully realized, or ignored and undermined, by the norms of the market? Second, what are the ideals of self and society that the market attempts to embody? Do market institutions embody an adequate interpretation of these ideals, or do they fail to realize the ideals to which they give expression? Third, does the extension of the market to a certain realm undermine the realization of other ideals?"

The key thing that people get from market transactions is command over commodities, "the exclusive power to use and dispose of things and services in the private sphere"[36]. The "use value" of commodities, however, is impersonal and transient:

> A mere commodity is something one regards as interchangeable with any other commodity of the same kind and quality and something that one is prepared to trade with equanimity for any other commodity at some price. But a cherished item is viewed as unique and irreplaceable... valued for its special connections to the self [and] sold only under duress[37].

Differences in the appropriate modes of valuation, and the meaning of value itself, mark out the limits of the legitimate reach of the market mechanism, Anderson argues. For example,

> use values may be contrasted with shared values, whose value for oneself is dependent on other people also enjoying them. Such values cannot be realized in private acts of use, but rather reside in a shared public understanding of the meanings of the goods. For example, certain sites of historical events may be valued as parts of a national heritage or the layout of a neighbourhood valued as the locus of a particular community….[T]he preservation of these values requires constraints on use. For instance, zoning laws may be required to preserve the architectural integrity of a city …" (1990 181)

Incommensurability, Incomparability, and Practical Reason Cambridge Mass.: Harvard University Press, 1997.

35 Anderson 1990 p.179.

36 Anderson 1990 p.181.

37 Anderson 190 p.181.

and

> [T]he market does not draw any distinction between reflective desires, which can be backed up by reasons or principles, and mere matters of taste. Since it provides no means for discriminating among the reasons people have for wanting or providing things, it cannot function as a forum for the expression of principles about the things traded in it.

Clear distinctions are drawn by Anderson to separate the market from the personal sphere, and from the political sphere. Regarding the first of these,[38]

> The goods proper to the personal sphere … cannot be genuinely procured for oneself by paying others to produce them … . The authenticity and worth of these goods depend on the motives that people have in providing them. Among these goods are trust, loyalty, conviviality, sympathy, affection, admiration, companionship and devotion.

The intrusion of market norms into this sphere undermines its essential values. The same is true of the key political values of fraternity and freedom:[39]

> [C]itizens are equals engaged in a common cooperative project. In the democratic tradition, this project is collective self-rule … . Citizens cannot interact with one another in the spirit of fraternity without a shared understanding of this ideal forged through participation in democratic institutions. Democratic freedom and fraternity are thus complementary goods …
>
> Many goods can be secured only through a form of democratic provision that is nonexclusive, principle- and need-regarding, and regulated primarily through voice. To attempt to provide these goods through market mechanisms is to change the kind of good they are for the worse. They contribute to human flourishing in lesser ways when they are provided through the market than when they are provided on a democratic basis. Goods of this kind I shall define as 'political goods'

Key among the political goods that Anderson identifies are the commons – areas to which all citizens have equal rights of access, and where the establishment of the private property rights required for the market to function would eliminate the essential values realised by the institution of the commons. Blocking many aspects of market exchanges from the commons is necessary to preserve key elements of freedom and citizenship:[40]

> [S]ome freedoms can only be exercised in spaces over which no individual has more control than others. These are the public spaces of free association among

[38] Anderson 1990 p.186.
[39] Anderson 1990 pp.192-3.
[40] Anderson 1990 p. 196.

> individuals … . Association in public spaces is needed to cultivate relations of civility among citizens of all walks of life.

Anderson then pulls her argument together in the following passages[41]

> [T]he realisation of some values … demands that certain goods be produced, exchanged, and enjoyed outside of market relations, or in accordance with nonmarket norms.
>
> Shared values differ from commodity values in that their being good for a group of people cannot be fully analysed in terms of their being independently good for each member of the group. Part of their being good consists in the fact that they are understood to be held in common – that everyone in the group both acknowledges the thing to be good and participates in its benefits … . The realization of shared values needs to take place within social relations that differ from market relations in at least three respects. First, since these values are sustained in part through a common activity of working out how they are valuable for the group, their realization requires a forum for working out these understandings together. Most of these values must be provided by the same people who enjoy them … . Second, since part of its value lies in the fact that all members of the relevant group have access to it, some provision must be made for opening access to those members of the group who lack the ability to pay their share of the costs of providing it … . Finally, since the value of shared goods is realized not in individual, exclusive appropriation and use but in common activities, rights over the physical vehicles of these values cannot be fully distributed in exclusive bundles. This was the basis for my arguments against 'dividing the commons'.
>
> …
>
> Arguments of this form do not conclusively show that the goods in question may never be traded on the market. It may be that the distinctive dimensions of value in the goods can be preserved short of prohibiting their sale. Zoning laws represent an attempt to preserve certain public goods while allowing a private market in land. Prohibiting or regulating the sale of goods prevents certain economic goods from being realized. If the Grand Canyon is permanently preserved from strip-mining in appreciation of its aesthetic value, its commercial value is unrealized. An argument against marketing a good is stronger if it shows not just that a noneconomic value is lost in marketing it, but that the value is degraded or perverted in marketing the good.
>
> The market cannot make claims to superior efficiency when it changes the qualities of the good it provides, since claims to efficiency are valid only when ends are unchanged by alternative means of provision … . Some ways of valuing goods require a shared understanding that the goods are not commodities.

[41] Anderson 1990 pp.201-203.

Anderson concludes her 1990 paper with the comment that "the difficult task for modern societies is to reap the advantages of the market while keeping its activities confined to the goods proper to it."[42]

3.3 Sagoff and the Limits to Cost-benefit

The issue of balancing competing values in reaching decisions on environmental concerns is explored at length by Mark Sagoff of George Mason University[43]. Society, he says,

> has developed a number of ethical tests and standards that it applies to set allowable levels of pollution, to determine at least for a time how safe is safe enough, clean is clean enough, and so on. These resting points … rely on ethical principles and moral intuitions that help society strike a balance between contradictory ideas, in this case, a principled abhorrence of pollution as coercion and an equally principled belief that economic growth is essential to social progress and welfare.[44]

Central to Sagoff's discussion is the need to "hold two ideas in one's head at the same time" as a prerequisite for being able to achieve the right balance between these "economic" and "ethical" considerations.[45] The market works on individual consumer preferences applied across commodities, whereas the values that are relevant in the environmental sphere are reflective of moral principles and aesthetic judgments and have a public, collective, political character[46]:

> Our environmental goals rest on views or beliefs that find their way, as ethical principles and intuitions, into legislation and common-law adjudication. These goals – cleaner air and water, the preservation of wilderness and wildlife, and the like – should not be construed as personal wants or preferences to be 'valued' by the criteria of economic theory. These goals represent not goods we choose but values we recognise – not what we want but who we are … .
>
> We debate social policies on the basis of their moral qualities and objective merits; it is not a question of personal benefit, although we take economic factors into account … The possibility that people act politically to protect the environment (rather than just individually to satisfy their preferences) presupposes the reality of public values we can recognise together, values that

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42 Anderson 1990 p.204.

43 Mark Sagoff, *The Economy of the Earth*, Cambridge: Cambridge University Press, 2nd ed 1988.

44 Sagoff 1988 p.10.

45 The word "economic" here carries the connotation of a narrow concern with individually-profitable productive and consumptive activity organised by the price mechanism; this contrasts with the wider application of the term in, for example, the transaction-cost economics mentioned earlier.

46 Sagoff 1988 p. 26-27.

> are discussed as shared intentions and are not to be confused with personal wants or satisfactions.

For Sagoff, the contrast between the political and the market spheres is clear: "In political institutions and processes, individuals must defend what they believe with reasons that will persuade others; in markets, individuals pay the competitive price for goods they want to buy."[47] The relevant standards of value are different in kind, not simply in magnitude. Consequently, Sagoff argues, it is not possible to translate political judgments about the "common will" or the "public interest" into money values of the sort that rule in the market sphere; the judgments made by each individual as a citizen coexist with, but are quite separate from, the individual preferences of the same individual in the role of consumer. Decisions made by citizens collectively to place limits on the extent to which natural systems are exposed to market forces are made not in terms of prices but on the basis of public reasoning:

> An environmental ethic does not assert that society should preserve natural places and native species just to the extent it is efficient to do so – and should turn them over to loggers or developers when it is not. On the contrary, an environmental ethic … asserts that we are obliged to appreciate, respect, and protect the intrinsic properties of nature that are magnificent in themselves and denies that their value depends … only on the economic purposes they may satisfy.[48]

Consequently, Sagoff emphasises, the limits to cost-benefit analysis are implied by the limits to the market, in terms of which cost-benefit calculations are conventionally performed.

> When cost-benefit analysis attempts to do the work of ethical and political judgment, it loses whatever objectivity it might have had and becomes a tool of partisan politics. Economic analysis expands to play the role of moral philosophy, political deliberation, and aesthetic judgment.[49]

While it may be technically possible to elicit data on "Willingness to Pay" (WTP) to preserve some aspect of nature, monetary measures of this sort are not effective in capturing the values that support imposition of legislated boundaries keeping the market separated from the sphere of interaction with nature. (Other issues with cost-benefit and WTP are explored further below.)

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47 Sagoff 1988 p.29.

48 Sagoff 1988 p.151. Note again that Sagoff's use of the terms "efficiency" and "economic purposes" corresponds to the narrow view of economics as concerned only with individual maximisation of money values.

49 Sagoff 1988 p.37.

3.4 Keat

University of Edinburgh political theorist Russell Keat, building on the work of Walzer and Sagoff, has emphasised that in a market society even things that are not literally commodities can inappropriately come to be "thought of" as if they were commodities – a process which distorts the making of political decisions about the boundaries imposed on the market. Keat distinguishes between two categories of blocked exchanges:[50]

> If one considers Walzer's list of blocked exchanges one can, I think, distinguish two kinds of cases. First, there are those where the item could, as it were, perfectly well be bought and sold (and/or provided through the market), but where one has reasons either for not allowing this, or for also securing provision through non-market means - for example, dangerous or harmful goods; or bodily organs, health-care, etc. Second, there are those where one feels that the item concerned just *cannot* be purchased, or at least not without radically transforming or devaluing its existing or desired character - for example, love and friendship, `things' which, it is often said, `money can't buy', and which are de-valued when any attempt to do so is made. However, if one considers why one believes that these latter kinds of items `cannot' be bought or sold one will, I suggest, need to focus not so much on the purely formal/legal fact of their being `purchased', but rather on what might be called the social meaning (or perhaps meanings) of such transactions - what is involved in treating or regarding something <u>as</u> a commodity. And once this is recognised, one will also realise that things (including people) may be treated or regarded in this way without their literally being commodities, in the sense of formally purchaseable items; and that it is perhaps the former, rather than the latter, that is the morally significant feature here. Thus, being literally a commodity is not a necessary condition for being regarded as one in the morally relevant sense.

Hence (Keat p.8),

> the dominance of the market domain might itself take the form of an illegitimate extension of its social meanings and norms to other institutions and activities, without these being straightforwardly (re-)located within the market. The political sphere provides ample illustrations of such potential (and indeed actual) forms of colonization.

The transformation of judgments of value in the broad sense into mere expression of individual preference is, Keat suggests, the key problem with applying cost-benefit analysis to non-market spheres, because it treats unmarketable values as if they were marketable, and in the process reverses the logic of valuation. The consumer making decisions about purchases of goods and services can usefully be conceived of as possessing some fixed set of preferences which can be taken as given (as neoclassical economics conventionally does) and which are "revealed" by the consumption choices made. But the citizen participating in decisions about, say, protection of natural

[50] Russell Keat , "The Moral Boundaries Of The Market", in Colin Crouch and David Marquand eds, *Ethics and Markets: Co-operation and Competition within Capitalist Economies*, Blackwell, Oxford, 1993, p.7.

systems from market encroachment, is engaged not in the revelation of individual preferences but in the actual formation and expression of collective judgments about the social good. The two types of decisions are, in a fundamental sense, incommensurable – that is, a single standard of value cannot consistently apply to both. In particular, assigning monetary values to natural systems obscures the real values that warrant the erection of boundaries between the market and non-market spheres.

Incommensurability in this sense has been the subject of an extensive academic literature[51], discussed further in Part 4 of this paper. Central to that literature is the question of whether, and how, social choices can rationally be made between incommensurable alternatives. Since it is clear that in practice, political decisions are actually made which have the same effect as ranking alternative competing values, it cannot be the case that choice is impossible, but it definitely is the case that choice is likely to be contentious, in the sense of arousing heated disagreement between those who, for example, assign priority to "economic development" – understood as the expansion of the market sphere - and those who seek to protect "environmental values" and resist such expansion.

3.5 Andre

Many subsequent writers have built on the work of Walzer and Anderson to explore the ways in which market exchange, as an organising principle for social behaviour, is necessarily limited. Judith Andre of Michigan State University points out that market exchange requires, as an essential prerequisite, the existence of property rights[52]

> Nothing can literally be sold unless someone has certain prior legal relationships to it. Roughly, nothing can be sold unless it is first owned. Ownership admits of degrees; I can own a sewing machine more completely than I can own historic buildings, for instance, since the law allows me to do whatever I want with the machine but not to the building. Not every set of rights, duties, and so on concerning an object constitute ownership. Full ownership incudes the privilege of using something, a claim to state assistance in excluding others, and the right to alter and destroy what is owned … . Nothing can be sold, then, unless rights over it can and do exist. Nor can anything be sold unless it is possible to separate those rights from the person who has them.

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51 See, for example, Ruth Chang (ed) *Incommensurability, Incomparability and Practical Reason*, Harvard University Press 1997; Berlin, I., 1969, "Two Concepts of Liberty", in *Four Essays on Liberty*, New York: Oxford University Press; Williams, B., 1981, "Conflicts of Values", in *Moral Luck*, Cambridge: Cambridge University; Richard A. Epstein, "Are Values Incommensurable, or Is Utility the Ruler of the World?", 3 *Utah Law Review* 683, 693 (1995); Sen, A., 1997, "Maximization and the Act of Choice", *Econometrica*, 65: 745-779.

52 Judith Andre, "Blocked Exchanges: A Taxonomy", *Ethics* 103(1): 29-47, October 1992; see also her Ch 8 in David Miller and Michael Walzer (eds) *Pluralism, Justice and Equality*, New York: Oxford University Press, 1995.

Since property rights, and the limits on them, are social constructs, the means of blocking certain exchanges is already present at the instant markets come into being, and is inherent in the basic idea of a property right.[53]

"Money", Andre says, "is so powerful that the borders between its domain and others will always need defense."[54] Andre sets out five types of blocked exchanges that amount to placing limits on "commodification" of things that are of value to people:

- **Things that by their nature cannot be made subject to legal ownership**. Friendship, love and divine grace are easy examples of the first; some pure public goods as defined in economic theory are another: "the air we breathe, the climate of trust in which we operate, quiet. To some of these things we can have enforceable rights, and conceivably those rights could be owned or sold. But since those rights are not rights to exclusive use, nor to alteration or destruction, they do not constitute ownership" (Andre 1992 p.33).

- **Things that by their nature should not be made subject to legal ownership** Under the heading of "should not be owned" come human beings - in this case the issue is the (historically recent) prohibition of slavery rather than any inherent impossibility of establishing legal property rights to own human beings – and public goods in the wider sense of things that are provided collectively on a non-exclusive basis as a matter of choice, not necessity: roads, defence, beaches and parks, the preservation of community resources such as "wetlands that protect biological diversity and forests that maintain the ozone layer [sic]" [55] (Andre 1992 p.35). All these are examples of "things which should not be [owned], for their own sake (e.g. human beings) or for ours (e.g. public goods)".

- **Things that cannot be alienated**. To alienate something is to separate it from the person to whom it is currently connected. "Inalienable rights" are, by definition, in this category, insofar as they are natural rights rather than simply legal ones.

- **Things that should not be alienated.** Most of Walzer's concerns fall into this category, Andre argues: freedom of speech, press, assembly and religion; rights to marry, emigrate and procreate; rights to education and police protection.

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53 This point is generally accepted by philosophers; even the libertarian Robert Nozick, in his *Anarchy, State and Utopia* (New York: Basic Books, 2nd ed 1986, p.178) emphasises the limits to property rights entailed by the "Lockean proviso" that "a process normally giving rise to a permanent bequeathable property right in a previously unowned thing will not do so if the position of others no longer at liberty to use the thing is thereby worsened".

54 Andre 1992 p.46.

55 Andre is clearly not coming from a scientific background regarding the environmental role of forests, just as her use here of the term "public goods" does not match the strict textbook definition.

- **Things that should not be sold for gain even though it is appropriate to own them and to give them away**. Many of the arguments here are moral ones about the sale of babies, human organs, blood, religious indulgences. But a more general issue is the corrupting effect of money itself, and of the unequal power that possession of unequal amounts of money implies, especially when what is being bought and sold is not things but actions. "[A]ctions inherently involve purposes. When something is done for money, it is done for a different purpose than it otherwise is, and the change in purpose can change the nature of the action … . Many interactions change so radically when they are done for money that they need new names" (Andre 1992 p.44). Examples are criminal justice and democratic government, neither of which should be open to purchase; sex which has a particular character when it takes the form of prostitution; and any action which differs in its essential character when performed out of self-interest for money rather than in response to other values.

It is apparent from this taxonomy of blocked exchanges that protection of the environment is only a small subset of the total picture, and that many environmental issues fall most obviously into the area of things that "cannot or should not be legally owned". Ownership rights, and the limits placed on private property rights, are crucial in environmental matters. Hence the widespread scholarly concern with "privatisation of the commons" and "commodification of nature".

3.5 Cohen

The Harvard legal scholar Glenn Cohen[56] works through a systematic discussion of theories of blocked exchange – what he calls "objectionable commodifying exchanges" – understood as transactions that illegitimately "express … value equilibrium (nature of the transaction) between two goods belonging to different spheres of valuation (nature of the goods)".

Cohen begins by noting that

> Under current law, sperm, art, pollution rights, and life insurance can be sold; votes, draft cards, and children cannot. Articulating a principled line between what can and cannot permissibly be sold is the goal of the commodification debate.

Cohen argues that Walzer's "conventionalist" approach, which accepts that each society may draw the boundaries of the market in its own way, is unsatisfactory because it "risks moral relativism and becomes especially unworkable when the

[56] I. Glenn Cohen, "The Price of Everything, the Value of Nothing: Reframing the Commodification Debate", *Harvard Law Review* 117(2): 689-710, December 2003.

problem spans multiple communities" (Cohen 2003 p.695). The social preferences that underlie conventions and compacts are malleable, subject to manipulation and domination by powerful interest groups, and in general an unsatisfactory basis for a general theory. Cohen therefore takes an "essentialist" line, that there is "something objective and timeless in the good that requires a particular mode of valuation, and to the extent our or other societies have failed to recognize it, they have just been 'wrong.'" (Cohen 2003 p 693).

Cohen argues also that the threat of coercion of the weak by the powerful does not suffice as a basis for blocking exchanges, since in principle that problem can always be tackled by eliminating the coercion – e.g. the maldistribution of wealth or power - directly rather than by blocking its downstream consequences. He settles instead for what he calls the "corruption" justification for blocking: that an exchange "corrupts," "taints," or "denigrates" at least one of the things being exchanged:[57]

> Cass Sunstein offers a good starting formulation of the corruption argument: an exchange is corrupting when "the relevant goods cannot be aligned along a single metric without doing violence to our considered judgments about how these goods are best characterized." More specifically, one might suggest that there are various "spheres" (sometimes called "modes") of valuation, and an exchange is corrupting when it ignores the differences between these spheres of valuation and forces us to value all goods in the same way. For example, exchanging children for money corrupts the value of children because money and children belong in different spheres of valuation.

The issue to which Cohen then devotes most of his paper is whether the issue is that the two goods being exchanged have inherently different appropriate modes of valuation (the "argument from the nature of the goods") or that the transaction itself is objectionable (the "argument from the nature of the transaction"), and concludes that elements of both are required for a complete consistent "anticommodification" position. He presents a careful sequence of logical examples to demonstrate that the inherent nature of a good cannot be the whole problem; the nature of the transaction matters also, and potentially more. When considering commodification of some good, the other thing for which it is exchanged is usually money, which means that the "argument from the nature of the good" is really about whether or not the essential value of the good can be expressed in money terms, or whether the two are incommensurable. (When exchange takes the form of barter, the issue is whether the two bartered items are of commensurable value.) The crucial distinction, Cohen

[57] Cohen 2003 p.692; the Sunstein reference he cites is Cass Sunstein, "Incommensurability and Kinds of Valuation: Some Applications in Law", in *incommensurability, Incomparability, and Practical Reason*, edited by Ruth Chang, 1997.

argues, is between exchanges that "express... a relationship of value equilibrium" (Cohen 2003 p.706) and those that do not.

In Cohen's discussions an "anticommodification" position does not necessarily imply that exchanges that "denigrate value" are blocked altogether; but it does rule out as impermissible any exchange in which it is falsely claimed that equal values have been transferred between the parties when in fact there is some uncompensated residue left over:[58]

> The problematic expression of value equilibrium in impermissible exchanges is not one of quantity (that the sale price is too low), but of quality; more precisely, it is the confusion of quantity with quality and the idea that a good with a "higher" mode of valuation and a good with a "lower" one can be traded off in a way that leaves no value remainder. It is not that $5 million is too little to pay for a child, but that money, no matter how much of it, is of a lower quality of value than human life.

Strictly this is a matter of incommensurability of values between various "spheres of valuation", and Cohen leaves open the controversial question of how many such spheres there are and how widely their boundaries should be drawn; he does reject, however, the notion that there can be a single sphere into which all goods can be categorised and in which they can all be valued by a single uniform metric. "The environment" he sees as located in a separate sphere from both the sale of human beings (where blocked exchange arises from Kantian ideas about human dignity) and from the market sphere where commodities exchange on the basis of their use-values.

[58] Cohen 2003 p.709.

4. Incommensurability

4.1 Introduction: the Issue in Relation to the RMA

Incommensurability arises whenever two competing proposals cannot be compared and ranked in terms of a single metric. The most familiar case is that of money prices, which can be assigned to all goods and services that pass through markets, but cannot be clearly used as a way to express many of the values in spheres other than the market. Things that literally have no price, in the sense that they cannot be bought and sold at all, or cannot be traded without losing their original meanings and values, include the standard "blocked exchange" areas of justice, human affection, political power, individual freedom, and protected areas and species. But the problem of incommensurability goes well beyond blocked exchanges; it is inherent in a wide range of situations where courts, tribunals, local authorities and other agencies find themselves adjudicating amongst competing values which cannot be reduced to a single metric such as money.

One piece of New Zealand legislation in which the multiplicity of standards of value is explicit is the Resource Management Act 1991. The Act's purpose is to promote "sustainable management of natural and physical resources" which is stated to mean (section 5)

> managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while—
>
> (a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and
>
> (b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and
>
> (c) avoiding, remedying, or mitigating any adverse effects of activities on the environment.

Adjudication of resource permits under the RMA requires councils and tribunals to take into account a wide range of issues. Listed as "matters of national importance" in section 6 are:

> (a) the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:
>
> (b) the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development:
>
> (c) the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:

(d) the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:
(e) the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:
(f) the protection of historic heritage from inappropriate subdivision, use, and development:
(g) the protection of protected customary rights.

None of these is susceptible of conversion to monetary values. All stand in their own right, to be evaluated in terms drawn from and matched to the particular context in which each issue arises. Under section 6 these matters of national importance are to be "recognise[d] and provide[d] for" by decision-makers when making decisions about "managing the use, development, and protection of natural and physical resources". In this context, development (the arena where the sphere of the market impinges directly on the natural environment) is only one of three allocative possibilities identified (use, development, and protection). None of these is formally defined in the Act, but it seems reasonably clear that "use" is to be understood as covering human interaction with nature for non-commercial motives (basically, recreation, research, and aesthetic/spiritual enjoyment); "development" involves the exploitation of natural resources for economic gain, motivated by profit; and "protection" means the maintenance unaltered of some aspects of the natural environment, if necessary by excluding, or restricting the scope of, both "use" and "development".

The "matters of national importance" listed above, in respect of which there is a mandatory statutory requirement that they be "recognised and provided for", are all of genuine but non-monetary value in relation to the use and protection of natural and physical resources. They all stand as limits on development – explicitly so in the case of (a), (b) and (f). Exactly how the relevant authorities are to "recognise and provide for" these values is not spelt out, but it is inescapable that some weighing-up of intrinsically-incommensurable values is involved when implementing section 6 in relation to economic development projects.

Nor is this all. Having imposed a mandatory requirement for the matters of national importance to be recognised and provided for, the Resource Management Act goes on in section 7 to list other matters to which "all persons exercising functions and powers under [the Act]… shall have particular regard", namely:

(a) kaitiakitanga:
(aa) the ethic of stewardship:
(b) the efficient use and development of natural and physical resources:
(ba) the efficiency of the end use of energy:
(c) the maintenance and enhancement of amenity values:
(d) intrinsic values of ecosystems:

(e) [Repealed]
(f) maintenance and enhancement of the quality of the environment:
(g) any finite characteristics of natural and physical resources:
(h) the protection of the habitat of trout and salmon:
(i) the effects of climate change:
(j) the benefits to be derived from the use and development of renewable energy.

Within this list of eleven only (b), (ba) and (j) point the decision-maker towards the sort of values that are readily quantified in money terms. Of the rest, (c) and (d) make reference to "values", thus potentially opening up the murky territory where monetary measures of "intrinsic value" and "amenity values" contend with non-monetary statements of these values from other sources. The remaining six matters to which "particular regard" is due involve the physical or cultural enumeration of things that have no monetary expression (hence no price in any authoritative market) and which must be weighed against any monetary values that are in play.

Faced with the need to resolve what often seem intractable issues of incommensurable values, the Environment Court has at times sought to force parties before it to convert things such as landscape values into monetary equivalents, in order to make the adjudication process simply a form of cost-benefit analysis. The issue came to a head in the Project Hayes windfarm case, where the Court complained that[59]

> We received little or no evidence on the economic values of any "intrinsic values" possessed by the land subject to the application. The "existence value" of ecosystems has been the subject of investigation by economists recently, so there is the potential for probative evidence to be given on this issue. That is important because a matter we are to have particular regard to should not have been simply ignored by the parties.

The windfarm project had been announced in 2006 and resource consents were granted in 2007, but were appealed to the Environment Court, which overturned them in November 2009. While its central reason for refusing consent was the unquantifiable loss of landscape values in east-central Otago, the Court considered that it was provided with inadequate quantitative cost-benefit evidence, particularly with regard to the possibility of developing alternative sites. The Environment Court said:[60]

> In summary, section 7(b) [of the RMA] requires a comprehensive and explicit cost-benefit analysis of the proposal. In that analysis:

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59 *Maniatoto Environmental Society Incorporated v Central Otago District Council and Otago Regional Council Environment Court* Decision No. C103/2009 6 November 2009, paragraph 217.

60 Paragraph 242

> (a) where market valuations are not available, non-market techniques may be used; and
>
> (b) where the values of the market are different from those of society, alternative societal values may be applied.
>
> The idea behind the cost-benefit analysis is to assess, firstly, whether the proposal has a positive net benefit, and then whether there are credible alternative uses of the resources, or credible alternative resources that could produce the desired output, which have a greater net benefit.

The Court then undertook its own wide-ranging cost-benefit analysis using such quantitative evidence as had been provided, and expressed strong dissatisfaction with Meridian Energy's failure to do more quantification of environmental costs in monetary terms[61]:

> The environmental costs are the major concerns for opponents of Meridian's proposal. The assessment of Meridian's experts was that these environmental costs are acceptable. The qualitative assessments by Meridian's experts should have been supported by the quantitative assessments of the costs through the methods that Dr Layton identified are available. Such estimates, and the cautions that come with them, would have been valuable to the Court. We have to weigh the quantified benefits detailed above plus any other unquantified benefits against those costs that have been quantified, together with any other costs not quantified. Some of these other costs could have been quantified but have not been.

Meridian's failure to quantify intangibles and alternatives clearly influenced the Environment Court In reaching its decision to refuse consent for the windfarm:[62]

> As we have analysed in detail Meridian, the Central Otago District Council, and the Crown failed to put full evidence before the Court in respect of the efficient use of all the relevant natural and physical resources of the Lammermoor. Such an examination not only of all the benefits of the proposal (which we did receive) but also of all the costs would have further increased the objectivity of this decision, as would have an analysis of the likely benefits and costs of reasonable alternatives to the Meridian proposal.

Meridian appealed to the High Court on several points of law including that, by demanding full monetary cost-benefit analysis of all alternatives, the Environment Court was setting new and unreasonably tough legal tests for any project to meet. In August 2010 the High Court allowed the appeal and sent the case back to the Environment Court for further consideration, a decision which was in turn appealed to the Court of Appeal. That process had not been completed when in January 2012

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61 Paragraph 639.

62 Paragraph 757(5).

Meridian announced that the project was being abandoned and the legal proceedings lapsed.

In allowing Meridian's appeal, the High Court indicated its reservations about the legitimate scope of cost-benefit analysis in a resource management setting. It asked "*Was it an error of law for the Environment Court to call for a comprehensive and explicit cost benefit analysis of the proposal as part of its examination of the efficiency criterion in s 7(b)?"*, and noted that "we are … aware that divisions of the Environment Court chaired by Judge Jackson have been pursuing the underlying theme for some time, but with less specificity"[63]. An economist witness before the Environment Court, Dr Brent Layton, had outlined various techniques that might be applied to put monetary values on environmental goods, but had not actually applied any of these and had simply acknowledged intangible costs in a qualitative sense, arguing that any monetary valuation would be unhelpfully contentious and subject to extreme uncertainty as to its accuracy. The High Court agreed:[64]

> Section 32(4)(a) [of the Resource Management Act] does not carry any mandatory requirement for all the benefits and costs to be quantified in economic terms, and no such requirement can be reasonably inferred…. [I]t is simply not possible to express some benefits or costs in dollar or economic terms. For example, the loss of an ecosystem such as a wetland hosting a large bird population which is going to be overwhelmed by land reclamation may not be capable of expression in dollar terms … . Likewise it would be difficult, if not impossible, to express some of the criteria within Part 2 of the Act (ss 5 – 8) in terms of quantitative values. We take by way of example the following paragraphs in s 7:
>
> (c) The maintenance and enhancement of amenity values:
> (d) Intrinsic values of ecosystems:
> (f) Maintenance and enhancement of the quality of the environment:
>
> If any of these matters are relevant, the consent authority "shall have particular regard to" them even if they are only capable of expression in *qualitative,* as opposed to *quantitative,* terms. … We have not been referred to any provision stating that this process should be exercised or expressed in dollar terms or by some other economic formula … .
>
> Parliament has not mandated that the decisions of consent authorities should be "objectified" by some kind of quantification process. Nor does it disparage, as a lesser means of decision making, the need for duly authorised decision makers to reach decisions which are ultimately an evaluation of the merits of the proposal against relevant provisions of policy statements and plans and the criteria arrayed in Part 2. That process cannot be criticised as "subjective". It is not inferior to a cost benefit analysis. Consent authorities, be they councillors, commissioners or the

63 Meridian Energy Limited v Central Otago District Council and Ors HC DUN CIV 2009 412 000980 16 August 2010 paragraph 96.

64 Meridian Energy Limited v Central Otago District Council and Ors HC DUN CIV 2009 412 000980 16 August 2010 paragraphs 106-111.

> Environment Court, and upon appeal the High Court Judges, have to respect that reality and approach decision making in accordance with the process mandated by the statute. It is not a good or bad process, it simply is the statutory process.

The High Court concluded that[65]

> While we can understand the Environment Court's desire to maximise objectivity in the decision making process, it is our view that the Court went too far when it decided that s 7(b) required a comprehensive and explicit cost benefit analysis in this case. We believe this resulted in s 7(b) being overplayed. Rather than dominating any other relevant Part 2 criteria, s 7(b) was intended to be weighed and balanced alongside them.

The current state of New Zealand law with respect to cost-benefit is therefore that it may be a valuable input to decisions, but is not to be accorded priority status relative to non-monetary evidence of non-market impacts. The High Court's scepticism regarding the usefulness of "contingent valuation" and similar techniques for quantifying intangibles in monetary terms, and explicit recognition of the need to acknowledge non-market values on their own terms rather than through the metric of money, leaves open the issue of how contests between incommensurable values are to be adjudicated.

4.2 Sen and Sunstein: the Possibility of Adjudication

That disagreement about values need not prevent decisions from being reached is the most basic justification for democratic government. In a major contribution to this debate from the standpoint of economic theory, Amartya Sen has pointed out that incomparability of two alternatives means simply that neither can be clearly judged worse than the other on any single yardstick of value - which leaves the way open for reasoned deliberation that takes into account multiple standards of human value.

> Non-commensurability is present when several dimensions of value are irreducible to one another … The presence of non-commensurable results only indicates that the choice decisions will not be trivial (reducible just to counting what is 'more' and what is 'less), but it does not at all indicate that it is impossible.[66]

Hence[67]

> A chooser, who may have to balance conflicting considerations to arrive at a reflected judgment, may not, in many cases, be able to converge on a complete ordering when the point of decision comes. If there is no escape from choosing, a choice decision will have to be made even with incompleteness in ranking.

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65 Meridian Energy Limited v Central Otago District Council and Ors HC DUN CIV 2009 412 000980 16 August 2010 paragraph 116.

66 Amartya Sen, *the Idea of Justice*, Harvard University Press 2009, pp. 239-241.

67 Sen, A., 1997, "Maximization and the Act of Choice", *Econometrica*, 65: 745-779, p.746.

Such choices involve, Sen says, "maximisation" as distinct from the "optimisation" that is the subject of standard (neoclassical) economic theory. Optimisation involves choosing the best, whereas maximisation "only requires choosing an alternative that is not judged to be worse than any other"[68]. Where incommensurable values confront one another, optimisation is automatically ruled out but maximisation is still feasible. One common strategy is such circumstances is the following of conventional ethical rules which, Sen notes, can be the result of evolutionary selection in society as a whole.

This points to adoption of socially-agreed conventions or compacts to impose defensible boundaries, separating spheres in which one set of values is to be allowed to predominate from those where other sets of value are to predominate. Typical examples of this solution are the establishment and protection of national parks, marine reserves, and wildlife sanctuaries.

Cass Sunstein of Chicago University addresses the incommensurability problem from the standpoint of legal philosophy in a 1997 paper[69]. He begins by echoing Sen's distinction between incommensurability and incomparability: human beings continually make actual choices amongst incommensurable things, and although those choices cannot be made simply by comparing values on a single scale such as dollars, the choices are not random or whimsical – they are made for reasons which can be stated even though they cannot be measured in a single metric.

> [T]he traditional liberal effort to use law so as to create diverse social spheres – families, markets, politics, religious organizations – makes space for different kinds of valuation. … An understanding of issues of commensurability helps explain why some exchanges are blocked. Some otherwise puzzling anomalies in the theory of environmental protection … tend to dissolve if we attend to diverse kinds of valuation.)[70]

In many policy debates, people are really disagreeing about appropriate kinds (not levels) of valuation:[71]

> Human beings value goods, things, relationships and states of affairs in diverse ways. Some things are for use: consider (most) hammers, or forks, or money. Other things have intrinsic value; consider knowledge or friendship. Intrinsically valued things produce a wide range of responses. Some bring about wonder and awe; consider a mountain or certain artistic works. Toward some people, we feel respect; toward others, affection; toward others, love. Some events produce gratitude; others

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68 Sen, A., 1997, "Maximization and the Act of Choice", *Econometrica*, 65: 745-779, p.746.

69 Cass Sunstein, "Incommensurability and kinds of valuation: some applications in law", Ch 13 in Ruth Chang (ed) *Incommensurability, Incomparability, and Practical Reason*, Harvard University Press 1997. An earlier version of the paper is "Incommensurability and valuation in law", *Michigan Law Review* 92: 779-861, 1993-94.

70 Sunstein 1997 p.234.

71 Sunstein (1997) pp.235-236.

> produce joy; others are thrilling; others make us feel content; others bring about delight.
>
> Conflicts among diverse kinds of valuation permeate private and public choice … . [S]uppose that we feel awe toward something. If we do, we will not believe that it should be valued in the same way as its cash equivalent. The judgment that a mountain is 'really worth' $10 million may well be right in an important sense, but it is inconsistent with the way that most people value the mountain. This is because the mountain is valued for different purposes than the $10 million … . The point does not suggest that pristine areas cannot be degraded, nor does it suggest that $10 million is not the right amount to pay for preservation of the mountain, nor does it challenge decision theory in its modern form. But it does have consequences for how participants in the legal system might think about environmental protection…
>
> An understanding of diverse kinds of valuation helps explain the anticommodification position for law or social norms – the view that some things ought not to be tradable on markets. The objection to commodification is simply a special case of the general problem of diverse kinds of valuation.

In a process of deliberation over hard cases involving conflicting kind of values, the distinction between a metric (a means of quantifying some value) and a criterion (a evaluative standard that need not be quantifiable to be meaningful) must be borne in mind:[72]

> A metric allows comparison along the same dimension, effacing qualitative differences among the goods measured. So many "standards" – excellence, well-being, allegiance – count as criteria but not as metrics. Some kinds of valuation – love, respect, wonder and worship – embody no metrics in this sense … .
>
> [I]ncommensurability … is an essential part of our social experience and also constitutive of an appropriately discerning and differentiated and (to that extent) good life" … [W]e can have comparability (and hence reason-guided choice) without commensurability.

The process by which decisions are reached under these circumstances is often described as "practical reason"[73] – the application of informed judgment supported by clearly-stated reasons once "all things have been considered".

4.3 A hierarchy of Adjudication Situations

Confronted with incommensurable competing values A and B, it is possible to distinguish three general possibilities that determine the way practical reason will adjudicate the contest:

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[72] Sunstein 1997 pp.238-239

[73] Brett G Scharffs, "Adjudication and the Problems of Incommensurability", *William and Mary Law Review* 42(4):1367-1435, 2001.

(a) Trumping

A "trumps" B: there exists a rule that says that A must always prevail. "*Any* amount of A, no matter how small, is more valuable than any amount of B, no matter how large. In short A trumps B"[74]. In cases involving environmental protection, this corresponds to situations of blocked exchange: A always prevails, which removes the need to weigh up contending reasons for deciding in favour of A or B. Inclusion of an area of land in Schedule 4 of the Crown Minerals Act automatically "trumps" mining development. Establishment of a marine sanctuary means that its sanctuary status "trumps" fishing, whether for commercial or recreational purposes. Once indigenous forests have been placed into the conservation estate, their conservation "trumps" commercial logging.

(b) Discontinuity

"So long as we have enough of B, any amount of A outranks any further amount of B". This situation Griffin calls discontinuity[75], and it seems to correspond to the intent attributed to the Resource Management Act 1991 by Simon Upton, as the Minister for the Environment responsible for seeing the bill through the House. Speaking in the Third Reading debate on the bill, Upton expressed its philosophy as follows[76]:

> The [Resource Management Bill] provides us with a framework to establish objectives by a physical bottom line that must not be compromised. Provided that those objectives are met, what people get up to is their affair. As such, the Bill provides a more liberal regime for developers. On the other hand activities will have to be compatible with hard environmental standards, and society will set those standards. [Section 5] sets out the biophysical bottom line …

As a 1997 review of the courts' early interpretations of the Act pointed out[77], the clarity that Upton had envisaged, with a set of line-in-the-sand biophysical preconditions that had to be satisfied, after which the free market was to be turned loose to undertake the development of natural and physical resources to meet human needs, morphed in practice into a more complex and less certain balancing exercise among competing values. Nevertheless, a number of decisions under the RMA have asserted discontinuity; examples are the Mackenzie Basin and One Plan decisions of the Environment Court, discussed later in this paper, which set a bottom-

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74 James Grifin, *Well-being: its meaning, measurement, and moral importance*, Oxford: Clarendon Press, 1986, p.83. Use of the term "trumps" comes from Ronald Dworkin, *Taking Rights Seriously*, London: Duckworth, 1977, p.xi, speaking of political rights.

75 Griffin 1986, p.85.

76 *Hansard* 1991 p.3016.

77 Gordon Smith, ""*The Resource Management Act 1991* 'a biophysical bottom line' vs 'a more liberal regime'; a dichotomy?" *Canterbury Law Review* 6: 499-538, 1997,

line standard to be met and allow development to proceed only within the limits of that standard.

(c) Trade-off

"Enough of A outranks any amount of B". Here practical reason confronts the most common situation in resource management hearings, where the issue is whether the gains from, say, a commercial development are on such a scale as to overwhelm, as a matter of practical judgment, the environmental values that will be sacrificed.

These three situations can be represented in terms of a familiar diagrammatic construction from economics texts, the production possibility frontier. This is the subject of the next section.

5. The Economist's Production Frontier and Resource Management Decisions

5.1 The Basic Tradeoffs

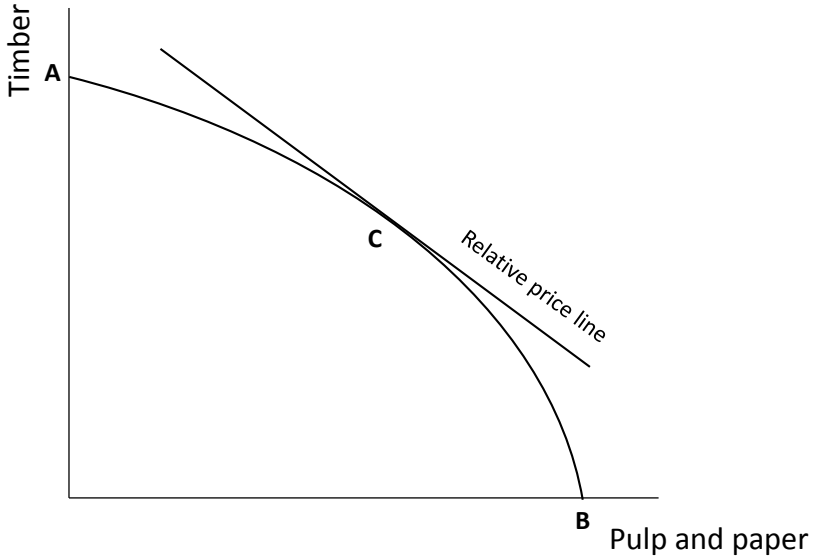
In New Zealand, Regional Council hearings and Environment Court cases continually address the need to choose among often-incommensurable values, on the basis of reasoned deliberation. An important part of the deliberations of these bodies is assessing the (monetary and nonmonetary) positives and negatives of competing activities, and competing claims, where incommensurable values are at stake and where market forces cannot be left free to produce socially-optimal (or socially-acceptable) outcomes.

An economic framework for thinking about balancing exercises of this kind is provided by the diagrammatic device of a "production possibility frontier" or "technical possibility locus", which (despite the intimidating jargon title) is one of the simplest and most intuitive constructs in introductory economics courses.

Consider two different goods, and suppose that the quantities of each can be measured in some meaningful way, in terms that are meaningful to that good and which enable different quantities of it to be ranked. Construct a diagram with two axes, one for each good, and suppose that they are competing for some scarce input or set of inputs, so that expanding the supply of one good reduces the available supply of the other (that is, there is a trade-off between the two). The production possibility frontier, or technical possibility locus, then maps the outer limit of combinations of the two goods that can be supplied.

The most common use of the frontier diagram is for the case where both goods are marketed and hence have money prices, so that issues of incommensurability do not arise. To illustrate at the level of a single firm, think of the allocation of the annual harvest from a forest between production of sawn timber and production of pulp and paper, as in the diagram below.

Figure 1: Production frontier for a single forest

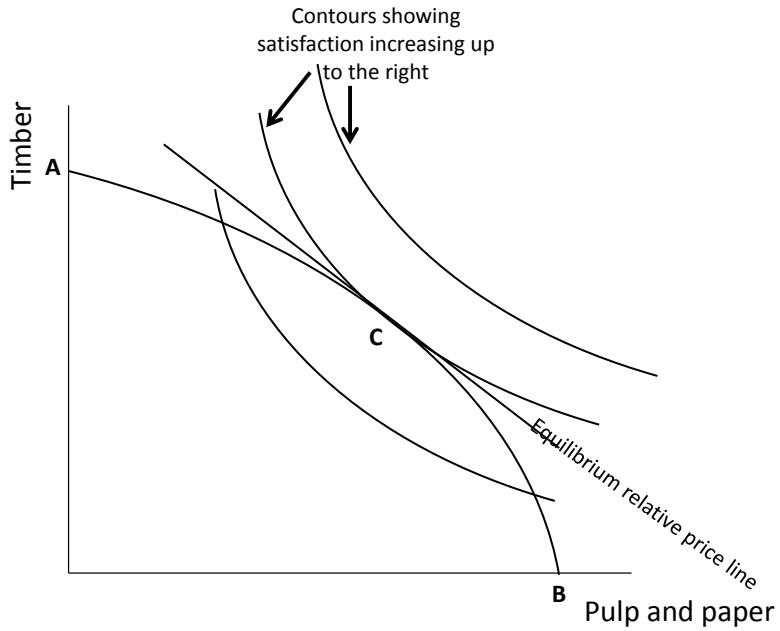


The frontier (or possibility locus) is the line ACB. Any point inside this frontier lies within the "production set" (that is, is technically feasible), but only points on the frontier make full use of the scarce resource and hence meet the usual economist's criterion of efficiency. The production set is "convex" when its frontier is bowed outwards, as it is drawn in Figure 1. To interpret the diagram, start at point A where only timber is produced and no pulp. Suppose that if pulp production is started up on a small scale (ignore here the technical constraints on producing very small quantities of pulp!) this initially causes only a small reduction in timber output, since pulp production can use parts of the tree that are unsuitable for timber. As pulp production increases, it diverts progressively more of the timber-suitable harvest so the slope of the frontier (the rate at which timber output is sacrificed to increase pulp output) gets progressively steeper until at point B timber production ceases completely and the maximum amount of pulp is produced. The forest owner, observing the relative price of timber and pulp (shown by the slope of the relative-price line) can identify the most efficient mix of output at C by equating the marginal rate at which output of timber must be sacrificed to produce more pulp to the price ratio at which timber and pulp exchange for one another in the market. For firms active in the market sphere, this process of production decisions guided by the impersonal price mechanism is repeated across all the vast range of goods and services that trade in the market economy.

The same construction on a larger scale shows how the relative prices that guide micro-level allocative decisions (as in Figure 1) are theoretically determined economy-wide in a perfectly competitive market. Instead of looking at a single forest as in

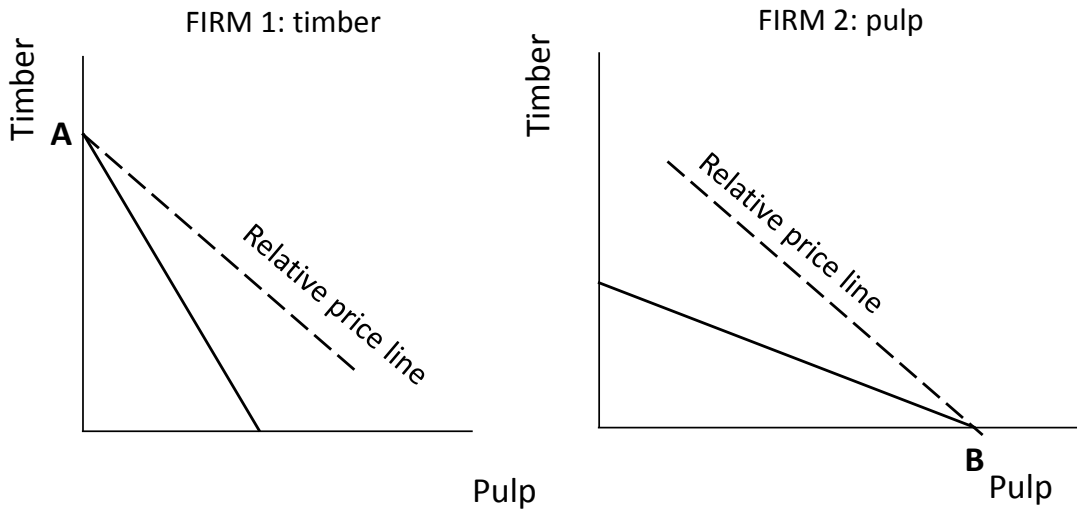
Figure 1, take the whole economy's productive capacity for timber and pulp, again assuming "convexity of the production set", and show the demand for the two products in terms of a map of indifference curves (contour lines showing increasing consumer satisfaction up to the 'northeast' in the diagram) superimposed on the map of production possibilities, as in Figure 2. With the feasible output combinations limited by the possibility locus, and with consumer satisfaction (which drives market demand) increasing up to the right as shown by the contours of the indifference map, the highest possible satisfaction is at point C where a tangency between the possibility locus (supply) and the highest achievable indifference curve (demand) occurs. Left to themselves, the forces of supply and demand should drive relative prices so as to bring the economy to this combination of timber and pulp output. This adjustment of relative prices drives the relative-price line to take the same slope as the possibility locus and the relevant indifference curve at C.

Figure 2: Determining the economy-wide market-clearing relative prices



A simpler (and often more realistic) version of the story sticks with the economy-wide production frontier shaped as in Figure 2 but constructs it by combining large numbers of individual firms, each facing a straight-line production possibility frontier of its own. Figure 3 shows such possibility frontiers for two such individual firms, along with the economy-wide market-clearing relative price ratio. Firm 1 will specialise in timber (since it is cheaper for that firm to get pulp on the open market in exchange for timber than to produce its own), and Firm 2 will specialise in pulp. These straight-line frontiers at firm level are consistent with "convexity of the production set" and with market efficiency.

Figure 3: Straight-line frontiers at firm level



For goods and activities within the "market sphere", the story of resource allocation shown in Figures 1, 2 and 3 serves as a good approximation for understanding market outcomes, and as a basis for advising policymakers to let the price mechanism do its work wherever possible, so long as there are no identifiable market failures. Within the market sphere the price mechanism generally provides an effective means of resolving conflicting claims on resources by allocating them to the highest bidder, provided that certain conditions are satisfied:

- The production possibility locus has the convex-outwards (or straight-line) shape drawn above
- All goods are marketed and hence each has a money price
- There are no unpriced externalities
- The measurement of quantities along the axes is unambiguous and both the goods can have their full values expressed in or converted to money terms
- Markets are competitive so that prices are not distorted by manipulation
- The distribution of income and wealth (which determines whose willingness-to-pay is reflected in the aggregate demand picture) is acceptable

As was apparent from the first section of this paper, the market sphere does not encompass all social life. When the focus of analysis shifts from the core of the market sphere to its boundaries with other spheres, more sophisticated and complex issues have to be captured in the basic diagram, to take account of the fact that the necessary conditions for market efficiency do not hold. The forestry example of Figure 1, for example, set out the tradeoff between two commodity outputs from forestry,

but ignored the issue of whether the forest might have some value for purposes other than supplying markets for pulp or timber. If the forest concerned has high conservation value, it may well be that blocked exchange intervenes to bar the cutting-down of trees – as indeed occurred when indigenous forests were removed from the control of the New Zealand Forest Service in 1987. In that case the tradeoff shown in Figure 1 continues to exist in a hypothetical sense but is blocked from becoming an actual choice by the ban on logging. This would be an example of "trumping" of commercial market values by a conservation value, in a situation where the second of the six conditions for market efficiency listed above does not hold.

In general the term "market failure" applies to all situations where one or more of the six conditions above do not apply. In the remainder of this part of the paper, all except the last two of the six will be discussed[78], using the diagrammatic device of the frontier, to illustrate the range of issues that arise in the context of resource management and environmental protection, and to identify several specific issues that have to be taken into account in designing decision rules and institutions governing resource allocation at the market boundary.

Where one of the goods in the diagram is non-marketed – and where it is not feasible to set up an efficient and ethically-sound market for it - the conceptual scheme of the possibility frontier can be lifted out of the market setting that it is given in elementary economics texts, and applied to the real-world issues that arise for decision-makers at, e.g., the economy-environment boundary or the economy-politics boundary. Along the horizontal axis we still measure the quantifiable, marketed good or service that competes with other non-marketed human values for access to the natural environment. Up the vertical axis we put those other values, acknowledging that they will often not be strictly quantifiable, nor commensurable with market prices. The market mechanism now cannot resolve the tradeoff, but qualitatively sketching the relevant curves (including in our mapping any quantifiable values that can be identified) often helps to clarify the analytical issues facing decision-making bodies.

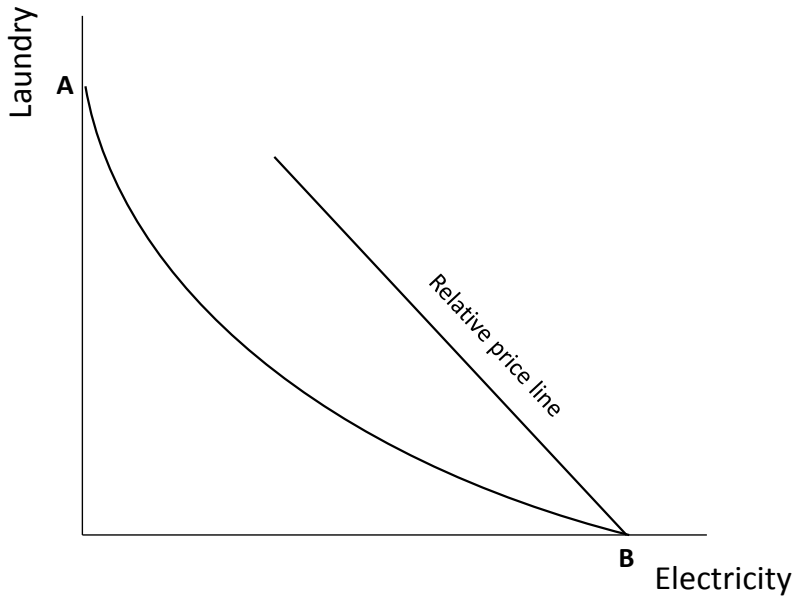
5.2 Non-convexity of the Production Set

The harmonious outcomes in Figures 1, 2 and 3 above, and the idea of market efficiency with which they are associated, become less clear if the production set does not have the convex-outward shape drawn above. This can occur when the production of one good has strongly adverse spillover effects (negative externalities)

[78] When the distribution of income and wealth is "wrong" in some identifiable sense, the highest bidder in any market will often be the individual with the largest budget, and the resulting outcome is not necessarily the socially desirable one. Similarly, the acquisition and use of undue market power by some market participants can enable them to skew the market in their favour and against the general public interest.

on production of the other. In a famous 1972 paper by Baumol and Bradford[79], two hypothetical market-valued goods are dirty coal-fired electricity generation (with heavy air pollution by soot) and laundry services which require clean air to produce immaculately white sheets. One industry thrives on environmental degradation, while the other requires a high-quality environment. In Figure 4 below, laundry output can be sustained at A so long as there is no pollution (which means no electricity production) but as electricity production begins it has a sharp impact on laundry output - even a low level of electricity production dramatically cuts the feasible output of clean laundry. At higher levels of electricity production the curve flattens out, since most of the damage has been done; laundry output is already sharply reduced, and adding growing volumes of soot to the air has progressively less negative effects on laundry at the margin as the last vestiges of that industry are squeezed out. The scarce input for which the two sectors are competing here is clean air. The likely outcome is that only one type of output is produced, which means either laundry services or electricity output will have to cease in the location for which the diagram has been drawn. In the case drawn below, relative prices dictate specialisation in electricity at point B, with the laundry industry eliminated from this locality.

Figure 4: Baumol and Bradford's non-convex case



[79] W.J. Baumol and David F. Bradford "Detrimental externalities and non-convexity of the production set", *Economica* 39(154):160-176, May 1972. The model is presented also as Chapter 8 in W.J. Baumol and W.E. Oates, *The Theory of Environmental Policy*, 2ed, Cambridge University Press, 1988. Essentially the same basic idea, but written in a much more technically demanding form, is David A. Starrett, "Fundamental non-convexities in the theory of externalities", Journal of Economic Theory 4(2):180-199, April 1972.

Since relative prices are driven by market supply and demand, in theory the economy-wide demand for laundry services would drive their price up relative to that of electricity, until some localities dropped electricity and became specialist laundry suppliers, trading laundry for other localities' electricity. Baumol and Bradford cite the case of river valleys in the Ruhr (in Germany) in the mid-twentieth century:[80]

> [S]ufficiently severe externalities make locational specialization economical. An example of the application of this point is seen in the Ruhr region in Germany, where the Emscher River valley has been completely devoted to waste disposal, while two other river basins have been preserved free from pollution.

The service provided by those pollution-free valleys may well have included laundry, but clearly there is more at stake here. Clean environments do not trade in a market of their own and so are largely unpriced; besides which many of the benefits they confer for human welfare are not expressible in money terms – they are incommensurable with, say, electricity. In real-world conditions with market imperfections of these kinds, the zoning of localities into industrial wasteland and protected spaces flows not just from pure market forces but from administrative planning decisions, using zoning rules to separate incompatible activities – as occurred in the Ruhr case. Baumol and Bradford acknowledge that the market mechanism cannot be relied on to solve the problem of which activity to allocate to which location[81]:

> In a world in which detrimental externalities are sufficiently severe to cause non-convexity of the social production possibility set, prices can no longer be depended upon to give us the right signals. *Even if we know the entire set of feasible output vectors, equilibrium prices usually tell us nothing about the Pareto-optimality of current output or even the direction in which to seek improvement.* While tax instruments will be effective in guiding the economy, the choice of the equilibrium point at which to settle must be made collectively by cost-benefit techniques.

They then add (tongue in cheek) a further difficulty: there is often a degree of irreversibility to locational specialisation[82].

> The danger of an incorrect choice by planners in this context appears clear. If it should turn out that, unpolluted, the Emscher River valley is uniquely well suited to growing marijuana it may turn out to have been a mistake to pick that one rather than one of the others for the area's sewer.

There are at least three separate problems identified in the above case, of which non-convexity is only one.

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80 Baumol and Bradford 1972 p.167.

81 Baumol and Bradford 1972 p.173. Emphasis in original.

82 Baumol and Bradford 1972 p.168.

- First, there is the externalities phenomenon between two activities – electricity and laundry – that lie fully within the market sphere. Since both goods are marketed, without regulation the price mechanism does its work in each locality by driving one or other industry out of existence.

- Secondly, the analysis extends immediately to situations where a third good (the public amenity of a clean river valley) is non-marketed, which means that the price mechanism cannot resolve the conflict between that good and heavy industry. Under free-market rules the marketed good would prevail and the non-marketed one would be foregone; hence only a deliberate collective or administrative decision can ensure supply of the non-marketed good.

- Third, the irreversibility of some allocative decisions raises issues of intertemporal efficiency in resource allocation, and hence of sustainability: decisions which look economically efficient from today's standpoint may eliminate better long-term options.

Examples of non-convexity are not hard to think of in the New Zealand setting. A particularly dramatic one is the tradeoff between genetically-modified cultivars and GE-free agriculture within any contiguous landmass. For New Zealand, this means the country as a whole (though some islands - say, the Chatham or Kermadec Islands - might be isolated enough to accommodate release of GM organisms without contaminating the remainder). When the possibility-locus diagram is drawn for these two categories of agricultural production, the frontier lies along the axes, as in Figure 5. The options are quantity B of GM agriculture with no GE-free; or quantity A of GE-free with no GM. Intermediate combinations are not feasible.

Figure 5: Extreme non-convexity: GE-free versus GM agriculture

Not only is there no trade-off available in this case, but the price mechanism cannot produce the right result in a free market setting for at least two reasons: the 'lumpiness' of the externality, and the irreversibility of release of GM organisms. Once genetically modified plants and animals have been introduced into a landmass or region, its GE-free status is compromised absolutely and immediately; and the change is an irreversible one, which means that the relevant choices are high-stakes from society's point of view. A single producer releasing GM organisms on that producer's own private land immediately eliminates the GE-free status of all other producers[83], so that the entire "lump" of the negative externality comes to bear at the instant of even marginal GM output; while with regard to irreversibility, the current market prices for GE-free product versus GM product give a very poor forecast of the longer-run cost of losing GE-free status, because of the very large uncertainties surrounding the entire issue of genetic modification.

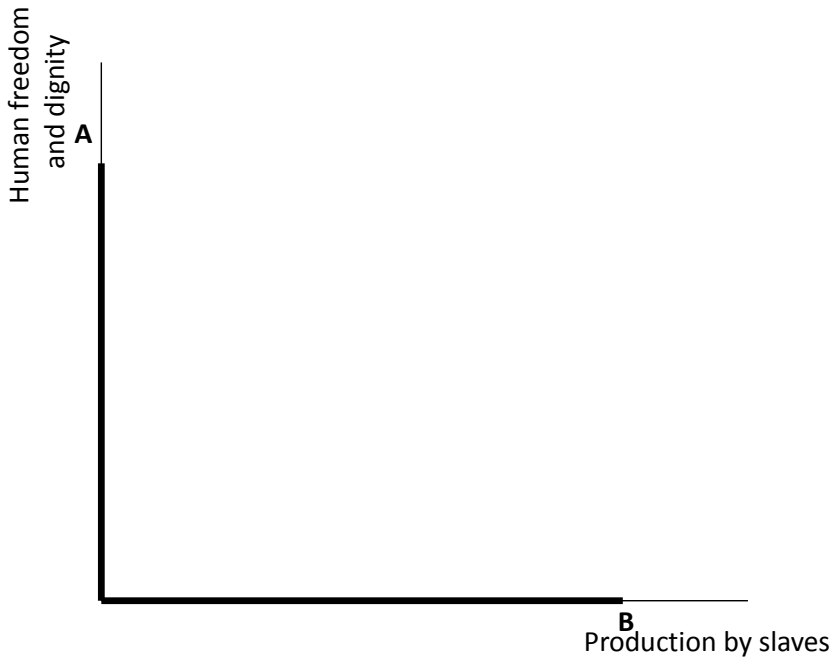
The picture in Figure 5 can be extended to various other resource management contexts. For example, Meridian Energy's now-abandoned proposal to build a hydroelectric scheme on the Mokihinui River in Westland involved a dam and lake which would be "lumpy" in the sense that they would either exist (point B in the diagram) or not. The indigenous flora and fauna in the area to be covered by the lake would be, respectively, destroyed (when point B prevails – zero conservation and OB

[83] Unless absolutely secure containment is possible, the costs of which would almost certainly destroy the profit incentive for GM adoption, and which would not be voluntarily undertaken without regulatory requirements of some sort.

of electricity) or retained (point A with zero electricity). Intermediate combinations of the two were not feasible.[84]

The extreme non-convexity set-up of Figure 5 has wide application in relation to the blocked exchanges discussed earlier, where certain values (sometimes commensurable with money, sometimes not) are given pre-emptive priority over production of market goods on the basis that to allow any of the market-driven activity at all will cause effective elimination of those protected values. Slavery (a standard philosophers' example of blocked exchange) provides an example where no trade-off is allowed under modern conceptions of human rights, because however high a money price may be available for goods produced using slave labour, the exchange of slaves' human freedom for entrepreneurs' profit is considered to involve instant sacrifice of their dignity and freedom; see Figure 6.

Figure 6: Blocked exchange - slavery as a situation of extreme non-convexity



The legislative exclusion of protected areas from mining encroachment in New Zealand under Schedule 4 of the Crown Minerals Act 1991 represents a blocked exchange of this sort: the value of potential mineral production lies along the horizontal axis, while the value of the inviolable status of Schedule 4 land lies up the vertical axis. To get one, the other must be sacrificed, and to attempt a tradeoff would be to encroach on

[84] The idea of "offsets", whereby environmental enhancement elsewhere is traded off for environmental degradation in the project area, adds a level of complexity by introducing a new set of created-from-scratch externalities to the equation. This is not pursued here, as side-payments do not affect the underlying technical situation portrayed in the diagram.

the essential meaning of Schedule 4 protection – effectively, in Anderson's term quoted earlier, "failing to realise the ideals to which [protection] gives expression".

Many blocked exchanges arise in situations where the value of one of the competing alternatives is an institutional/cultural artefact that might change over time, as attitudes towards slavery have done, and as New Zealand legislative provisions for mining did with passage of the Schedule 4 legislation in 1996. This makes the measurement of non-market, non-monetisable values a central problem for policy in areas such as resource management. This issue was discussed in section 4.1.

Before leaving the issue of convexity or non-convexity, it is important to emphasise the danger of oversimplifying. The production-frontier diagram is a general model within which each particular case has to be represented in its own terms. Negative externalities do not necessarily produce non-convexity – the cases shown above in Figures 4, 5 and 6 all require especially strong negative externalities across the entire range of the tradeoff.

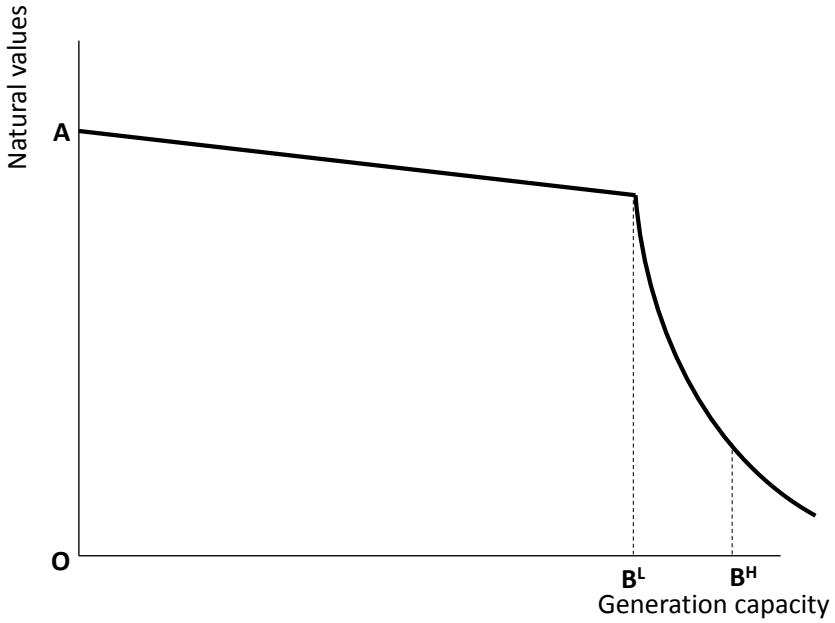
5.3 The Production Frontier Shape and Resource Management Decisions

The Mokihinui project drawn as in Figure 5 was as an either-or, on-off activity conducted at the scale OB, but in real life many projects can be carried on a larger or smaller scale – that is, they are "divisible" – in which case the shape of the possibility locus will reflect any resulting tradeoffs. If scaling-down a project can bring, say, non-monetised costs within tolerable limits, a decision in its favour might then pass muster. This is the process of shifting from a "trumping" situation to a "discontinuity" or a "trade-off" one, in terms of the hierarchy discussed in section 4.3.

Historically, probably the most prominent New Zealand example of a switch from non-convexity to discontinuity was the Manapouri debate of the early 1970s, when it was apparent that the hydro scheme would, if constructed to the engineers' preferred scale, incur sharply-increased marginal environmental damage due to the need to raise the lake level and thereby destroy existing indigenous landscape and vegetation (a non-convexity problem), whereas a scaled-down scheme that retained the existing lake level would have minimal environmental cost (discontinuity). In terms of the production-frontier diagram, the situation was as shown in Figure 7, with limited environmental damage from the low-level version OB^L but large-scale loss of natural values as the project was scaled up to the high-lake-level capacity of OB^H. Effectively the production frontier turned non-convex at the critical scale B^L, and the final

decision to curtail the size of the scheme rested on that discontinuity[85]; to the left of B^L the possibility locus was convex.

Figure 7: Schematic possibility locus for Manapouri project



In most resource management situations, convexity of the frontier prevails, but classification between "discontinuity" and tradeoff" cases remains relevant. Take, for example, the use of jetboats on the Wilkin River, the subject of a 2010 Environment Court case.[86] Under the Queenstown District Plan, the natural landscapes in the area are divided into wilderness areas, multiple-use (semi-wilderness), and other, with the rivers in the three zoned accordingly. The Wilkin River was in the semi-wilderness category, with an established jetboat operator (Wilkin River Jetboats, WRJ) providing transportation for day-walkers and fishers. A competing company, Southern Alps Air Ltd (SAA), sought to establish a second jetboat service on the river and was turned down. Having summarised the criteria set out in Section 7 of the Resource Management Act 1991 the court ruled (paragraphs 99-100):

> We are particularly concerned that refusing consent would benefit WRJ as a trade competitor, but consider that the adverse effects on amenities are so important as to outweigh the positive effects of SAA's proposal. There will come a time on any river where the cumulative effects of jetboats start to substantially diminish the amenities of other users, and we hold that environmental limit is already reached or nearly so

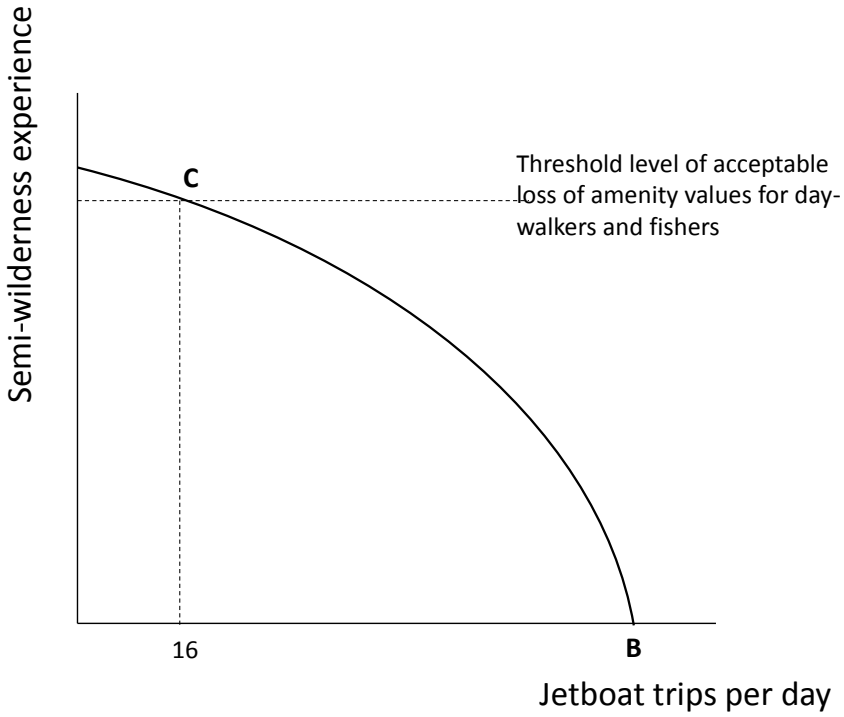
[85] The discontinuity formula, set out in section 4.3, is "so long as we have enough of B, any amount of A outranks any further amount of B". In the Manapouri case, B corresponds to the indigenous forests above the existing lake level; with those preserved, electricity generation was then the priority.

[86] Southern Alps Air Limited v Queenstown Lakes District Council [2010] NZEnvC 132 (28 April 2010).

> by WRJ's jetboats under the current operating environment, and is likely to be exceeded if WRJ can somehow operate to its maximum of 16 jetboat trips per day. Granting a right to operate yet more jetboats will ruin the amenities of the Lower Wilkin River which the district plan seeks to protect without achieving enough benefits to outweigh those adverse effects.
>
> Weighing all the matters we have identified we conclude that the purpose of the Act is better met by refusing consent and will make orders accordingly.

The situation can be captured by a convex possibility-locus diagram: at a low level of jetboat penetration the loss of amenity values was judged low, but at higher levels of penetration amenity values were increasingly threatened. There was, thus, a negative externality, but not one severe enough to cause non-convexity. The reason for failure of the market mechanism in this case is not the shape of the frontier but the non-marketed nature of the values being measured up the vertical axis in Figure 8, which means that the allocative tradeoff must be resolved administratively. The level of jetboat use permitted in the District Plan, and allowed by the Court, already opened the area to up to 16 trips per day. The would-be competitor was barred from entry on the basis of the Court's judgment that the loss of semi-wilderness values was within reasonable bounds up to that level of jetboat penetration, but that to the right of point C the steepening tradeoff justified a ban on expansion of jetboat numbers beyond 16 per day. Whether a zone of non-convexity of the sort drawn for Manapouri in Figure 7 should be included in Figure 8 to the right of point C is unclear; the court's decision is framed in terms that suggest a steadily-steepening tradeoff (convexity) rather than a sharp well-defined discontinuity.

Figure 8 Wilkin River case



Numerous other Environment Court cases turn on implicit judgments regarding the shape of the production frontier:

- In Totally Tourism Limited v Queenstown Lakes District Council [2010] NZEnvC 165 (12 May 2010), TTL was seeking to make increased use of a helicopter pad at Arthurs Point, originally constructed to transport rafting parties into the Shotover River, for the expanded purpose of running sightseeing flights. The expanded use was allowed but the number of flights was limited to four per day on the basis of the negative externalities for local residents from helicopter landings.

- In High Country Rosehip Orchards Limited v Mackenzie District Council [2011] NZEnvC 387 (12 December 2011), the Court upheld and strengthened a District Plan change by Mackenzie District Council to protect outstanding landscape values in the northern part of the MacKenzie basin by restricting commercial development. The Court found (para 106) that in terms of the Resource Management Act, "the grandeur and openness of the general landscape" of the Mackenzie Basin, of all landscapes in New Zealand's high country, make it an outstanding natural landscape". In that context (para 135) the Court accepted the District Plan's contention that

> Rural lifestyle developments and rural residential development around existing towns if too extensive or in the wrong location have the potential to alter the extensive open character that much of the Mackenzie Basin still offers. Where subdivision and housing occurs, the Basin becomes more strongly an "occupied

> rural place" as in the lowlands of South Canterbury. This potentially reduces the Basin's unspoiled openness and vastness, which are its main attributes. The breaking up of land through subdivision could result in the loss of the former high country ethos and landscape pattern. It may also result in more intensive use of the remaining farmed areas. This process has the potential to increase with the freeholding of former pastoral lease land, much of it at the lower altitudes and with other pressures for lifestyle housing. Particular landscape values, which could be degraded by inappropriate redevelopment, include visual openness, a sense of naturalness, sense of landform continuity, small well-separated towns and spectacular views such as the iconic views up the lakes, particularly Tekapo and Pukaki. The loss or degradation of views from the iconic views up the lakes, could also occur. Another issue associated with retaining values of the Basin is the extent to which additional irrigation will "green" the Basin and change land use patterns."

The relevant tradeoffs were described in the District Plan in terms that suggest a convex possibility locus, with a steepening slope if commercial penetration was allowed to increase (para 36):

> The high country landscape … is not only important for its residents and a drawcard for recreation and tourism, it is also part of the identity of New Zealand which can be seen in writings, paintings, songs and advertisements. … The landscape values of the high country, in particular higher altitude areas, are very sensitive to change by activities, particularly activities involving earthworks, establishment of buildings and structures, the planting of trees and intensification of pastoral and arable use. Changes to indigenous vegetation patterns can also affect the visual qualities of the landscape, as they contribute to the colour, texture and naturalness of an area. The challenge is to find an appropriate balance between land uses and activities and the maintenance of outstanding landscape qualities.

In this case irreversibility was also considered relevant (para 251):

> [I]f we take no action in respect of the issues raised there is a strong chance that the Mackenzie Basin"s landscape values will be strongly adversely affected. If we take some judicious action then those values will be affected but, we judge, in a way that largely retains the landscape's character. In terms of risk the important point is that if we are wrong, little harm has been done. The district plan can be unwound and further development allowed at a later stage if the evidence warrants it. The opportunity costs of not acting are very high, those of acting are relatively low.

- In Port Gore Marine Farms v Marlborough District Council [2012] NZEnvC 72 (23 April 2012), the Court declined applications by Sanfords and Marine Farms to establish new mussel farms at Port Gore in the Marlborough Sounds, on the basis that other potential coastal sites for this type of development would be more

suitable (negative externalities less serious) whereas the particular outstanding landscape qualities at Port Gore made the production frontier there non-convex:

> while the coastal environment stretches around all of New Zealand's extremely long coastlines, and every segment of the coastal environment may be seen as part of one (or sometimes more than one) landscape or a (landscape) feature, relatively few parts of the coastal environment are in an outstanding natural landscape. So when a part of the coastal environment is also within, or coincides with, an outstanding natural landscape the landscape is at first sight (and depending on context) even more important to the national interest than the coastal environment is. The result is that adverse effects which may be appropriate in the coastal environment normally may be inappropriate in a coastal environment which is also an outstanding natural landscape. (para 190)
>
> Major changes in the landscape occur when new elements are first introduced which conflict with the character already there. For example, the first mussel farm into a bay changes the bay from a smooth water surface, while additional mussel farms merely add to the change. That is important because while in this case (as we shall describe) the major adverse effects of the Sanfords' mussel farms will not be the passive effects on the surface of the water, but the active effects of harvesting, each of the farms can be regarded as the first one in the southeastern corner of Port Gore, and in Cockle Bay particularly. Thus, reinforced by the Sounds Plan, we find that if we were to grant consent to one mussel farm, then that first farm would be a major change to the natural character of eastern Port Gore. (para 227)

- In Intercontinental Hotel v Waterfront Investments Limited W015/2008 [2008] NZEnvC 72 (14 March 2008) the Court turned down a proposal to build a hotel on an existing wharf in Wellington Harbour. Again the Court's description of the situation implies non-convexity (paras 196-199):

> We acknowledge that the Hilton development will enable its developer and the hotel operator to promote their economic wellbeing. It will provide economic benefits to the wider community. The Hilton will provide five star accommodation facilities for those who choose to stay in it. It may attract additional tourists. There will be dining and socialising opportunities for those who choose to use the restaurant and bar facilities.
>
> Regrettably we consider that those positive effects are achieved at the expense of many of the qualities which make this site special and unique. The hotel building will dominate the public space due to its bulk and reduce the public access area around the Outer-T. The scale of historic development will be disrupted and the new building will dominate the heritage buildings around it. The stem of the Outer-T will become a vehicle precinct. We were not told how this would be safely managed. The amenity value of the area will be reduced. The use of the Outer-T as a working wharf and a place of berthage for a wide

> range of vessels will be substantially diminished. Views of the harbour and beyond from private buildings in the city and from at least one important viewpoint in the city will be significantly reduced. We do not consider that the adverse effects of the proposed development which we have identified can be adequately avoided, remedied or mitigated. Taking all of those matters into account we have reached the conclusion that the proposed Hilton development does not constitute sustainable management of the Outer-T of Queens Wharf.

- In Day v Manawatu-Wanganui Regional Council (Proposed One Plan Appeals) [2012] NZEnvC 182 (30 August 2012)[87] the Court upheld provisions in the regional council's "Proposed One Plan" to limit pastoral runoff into local rivers. The court's description of the tradeoffs is indicative of a convex production frontier between [the profitability of] agricultural/pastoral production and reasonable standards for clean water, but with a point of discontinuity beyond which agriculture should be prevented from expanding:

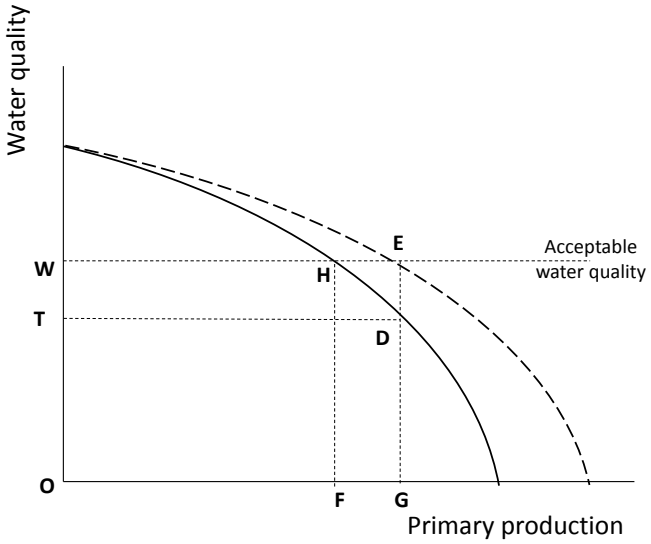
  > … land available for primary production is a finite resource and … land-based industries are the basis for the region's economic wellbeing… The allocation of an N loss limit based on the natural capital of the soils … [is] the best option to meet the dual requirements for continued economic growth and ongoing flexibility in in the region, while meeting water quality targets.[88]

  Figure 9 summarises the situation as the court saw it, where OW up the vertical axis represents an adequate water quality standard and point D corresponds to the current position where primary production has been pushed beyond the limit implied by the frontier.

[87] Online at http://www.nzlii.org/cgi-bin/download.cgi/cgi-bin/download.cgi/download/nz/cases/NZEnvC/2012/182.pdf

[88] Paragraph 5-90.

Figure 9: Horizons Proposed One Plan Nitrogen limits



The Court commented that [89]

> in many parts of the region the quality of the natural water is degraded to the point of being not potable for humans or stock, unsafe for contact recreation, and its aquatic ecosystems range between sub-optimal and imperilled. We also know what is causing that decline, and we know how to stop it, and reverse it. To fail to take available and appropriate steps within the terms of the legislation … would be inexcusable.

With nitrogen limits imposed either production must fall from OG (its present level, with water quality degraded to OT corresponding to point D on the frontier) to OF in order to meet the required water standard under existing farming practices (point H on the present-technology frontier). Or improved farm practices (technological progress) must shift the frontier itself out to the dashed line, enabling production to be sustained while bringing water quality up to the acceptable level (point E). The hope of the Regional Council and of the Court was clearly that the proposed limits on nitrogen would, by imposing a cost of pollution on farmers, induce them to adopt better practices.

Just as Environment Court cases often frame their reasoning implicitly in the framework of production-frontier tradeoffs and discontinuities, the same is true of the planning documents produced by various bodies under resource management legislation. The Conservation Act 1987, for example, charges the Department of Conservation not only to undertake management and conservation of protected lands, and to advocate for conservation, but also "to the extent that the use of any natural or historic resource for recreation or tourism is not inconsistent with its conservation, to

[89] Paragraph 5-8.

foster the use of natural and historic resources for recreation, and to allow their use for tourism" (section 6e)[90]. National Park plans produced by the Department[91] are filled with the resulting balancing exercises between conservation priorities and tourism impacts, ranging from outright prohibition of certain activities where strong non-convexities are present, to graduated fine-tuning where the production set has generally convex shape.

The Olivine Wilderness Area in the Mount Aspiring National Park is clearly a case of non-convexity: even a single aircraft intruding into pure wilderness has a large negative impact on the relevant amenity values, as do the construction of huts and tracks, so that reasoned deliberation supports a full ban on these things. The values running up the vertical axis are more sharply and narrowly defined than those for semi-wilderness in Figure 8, and the Park Plan states[92]:

> The Olivine Wilderness Area is a significant area of the park and is buffered by the remote zone. As required by legislation, tracks and huts are not provided and aircraft use for recreational users is not permitted in the wilderness area….
>
> …the department, along with other parties, will consider how to minimise the effects of over-flights on visitors, especially in the Olivine Wilderness Area and the Mount Aspiring climbing region

The blocking of commercial aircraft from this particular zone of the park coexists with a more nuanced view of the aircraft-versus-solitude tradeoff across the park as a whole:

> Aircraft can assist public use and enjoyment, and are used for conservation management purposes. However, they can adversely affect other visitors and diminish the values associated with solitude and natural quiet. Aircraft use can also create both a perception of crowding and conflict between user groups.

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90 On New Zealand management of tourism and recreation in the conservation estate see, e.g., Kerry Wray, Kerry, 'The Socio-cultural value of New Zealand wilderness' *USDA Forest Service Proceedings* RMRS-P-64, 2011, http://www.fs.fed.us/rm/pubs/rmrs_p064/rmrs_p064_087_094.pdf; Gordon Cessford and Rob Burns *Monitoring visitor numbers in New Zealand national parks and protected areas a literature review and development summary* , 2008, http://www.doc.govt.nz/upload/documents/science-and-technical/drds293.pdf; Rogério Ferreira de Souza Dias, *Tourism management in protected areas: Guiding concessions and environmental interpretation in New Zealand's conservation estate* VUW MTM thesis 2010**,** DoC *Visitor Strategy*, 1996, http://www.doc.govt.nz/upload/documents/about-doc/role/policies-and-plans/visitor-strategy.pdf; Cessford, G., & Thompson, A. (2002). Managing tourism in the New Zealand protected area system *Parks, 12*(1), 26–36.

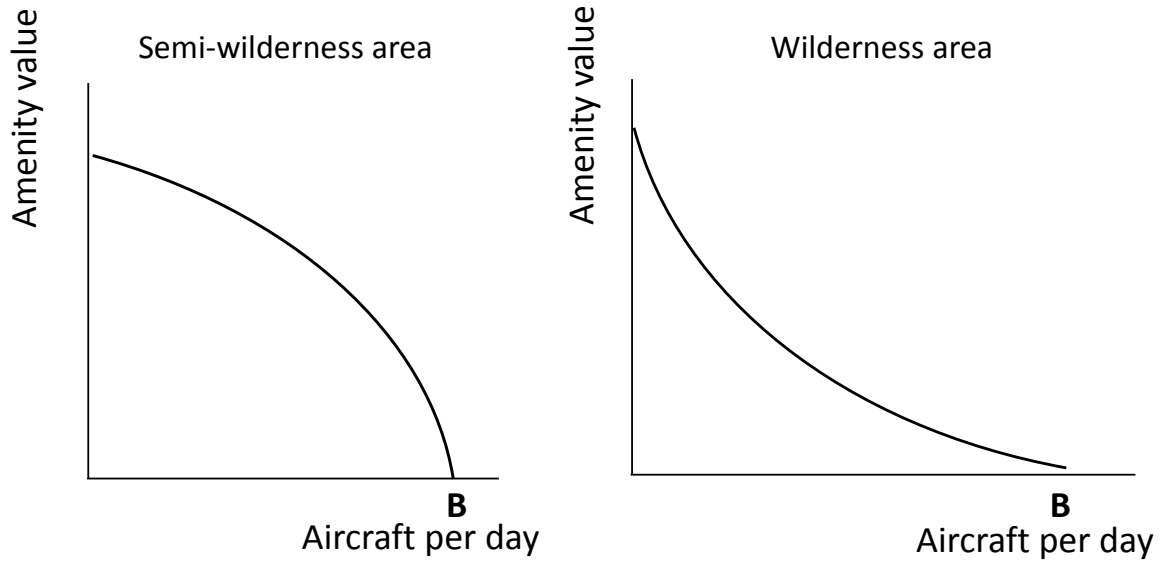
91 At http://www.doc.govt.nz/publications/about-doc/role/policies-and-plans/national-park-management-plans/

92 *Mount Aspiring National Park Management Plan* June 2011 http://www.doc.govt.nz/upload/documents/about-doc/role/policies-and-plans/national-park-management-plans/mount-aspiring/mount-aspiring-national-park-management-plan.pdf p.20 and p.22.

> The aircraft use provisions reflect management intent to preserve, as far as possible, the park's remote character and natural quiet values, while recognising that controlled use can assist public appreciation of some parts of the park.
>
> Most landings are confined to designated sites in the back country and front country zones and limits are placed on landings at each site. Landing sites in the remote zone are (except for Bevan Col) low use sites located on the western side of the park. They are used primarily by recreational hunters during the roar period but one site (on the Waiatoto River) is a suitable entry point onto the river for kayaking parties.

These examples show how, in reaching resource management decisions, the decision-making process involves constructing a mental analogue of the possibility locus and then choosing a point on it. A crucial step in this is to decide what are the key qualitative features of the non-marketed values at stake. Conceptually, hypothetical diagrams for semi-wilderness and pure wilderness can be constructed by starting, in each case, from point B – the level of jetboat or aircraft penetration at which the non-market values are entirely suppressed – in Figure 10, and working back to the left, asking at each stage whether the tradeoff is steepening or flattening as penetration reduces. In Figure 10 this is done for two cases: semi-wilderness (the Wilkin River case) where the steep portion of the frontier leaves space for limited penetration, and pure wilderness (the Olivine case) where even a single aircraft is judged to immediately eliminate a large part of the non-market value.

Figure 10: Non-market values and conceptualised convexity or non-convexity



5.4 In-kind Institutional Constraints and Specific Performance

In the discussion of the Horizons One Plan above (Figure 9) a case was shown where a planning authority (the Manawatu-Wanganui Regional Council) had opted to impose a quantitative limit on nitrogen use per hectare of various categories of land, as a means of controlling effluent runoff into rivers and lakes and thereby restoring water quality. Such limits logically follow as appropriate policy responses in situations where the values at stake on one side of a resource management decision are best expressed not in money but in physical terms, such as concentrations of pollutants in the environment, and the response measures are equally best expressed physically rather than via monetary incentives.[93] This is the logic of the solution often adopted by decision-makers faced with conflicts between market and non-market values: to introduce an institutionally-imposed constraint of some kind that endeavours to capture the non-market values in-kind rather than via money.

There is a well-established legal approach that echoes the setting of physical limits to protect environment values in situations where monetary valuations are radically uncertain. When awarding damages for loss, courts can require "specific performance" rather than simply payment of cash, as the means of making a victim whole:[94]

> Specific performance might be awarded because the good in question is not commensurable with cash. This is not to say that it is more valuable than cash. Indeed it is less valuable, often, than a great deal of cash. The claim is instead that the good is valued in a way that is inconsistent with cash valuation. *What the plaintiff wants, and what she is entitled to get, is a good that she values in the way that she values the object for which she has contracted.* A good that she values in some sense equally – perhaps in terms of 'aggregate' valuation – is not a perfect substitute.
>
> If this point is correct, it suggests the need to supplement Calabresi and Melamed's well-known discussion[95] of the choice between liability and property rules. In their terminology, a right is protected by a liability rule if it can be taken upon payment of compensation. A right is protected by a property rule if it can be taken only through voluntary exchange, and if compensation is therefore an inadequate justification for the taking. … [P]roperty rules will tend to be used in cases in which the relevant right or good is valued in a different way from money. In such cases courts are reluctant to use liability rules, not because the relevant amount will be set too low, but because it will reflect the wrong kind of valuation of the good at issue. The litigant is

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93 In the case of the Proposed One Plan in Manawatu-Wanganui, there were strong arguments put to the Environment Court in favour of some sort of emissions trading scheme for nitrogen, and a scheme of this sort has actually been implemented in the Lake Taupo catchment. Nitrogen effluent thus is susceptible of either a market-based or a direct regulatory response; the Court decided in favour of direct limits based on LUC land areas.

94 Cass Sunstein, "Incommensurability and kinds of valuation: some applications in law", Ch 13 in Ruth Chang (ed) *Incommensurability, Incomparability, and Practical Reason*, Harvard University Press 1997, p.251.

95 The reference here is to Guido Calabresi and A. Douglas Melamed, "Property rules, liability rules, and inalienability: one view of the cathedral" *Harvard Law Review* 85 (1972): 1089-1128.

> entitled to the good and its existing kind of valuation, rather than to a substitute valued in a different way, even if in some sense 'equally'.

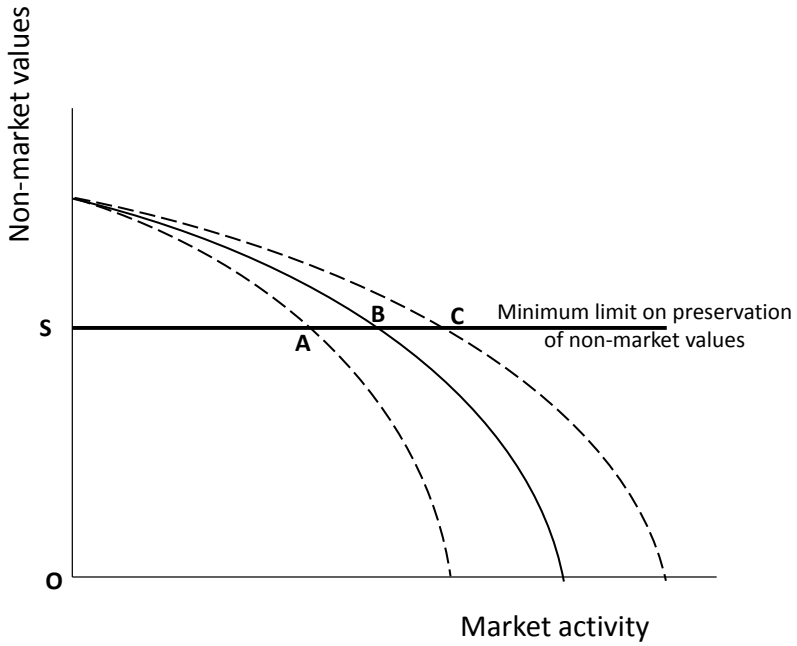
This argument applies directly to the issue of damages for environmental pollution:[96]

> There may be a large difference between 'restoration cost' for, say, a portion of the Alaska seashore, and 'use value', understood as aggregate private willingness to pay for the area in question. Through an important regulation, the Department of the Interior indicated its preference for use value if it was lower than restoration cost. The court of appeals invalidated the regulation. The decision stemmed from an understanding that those who injure natural resources should be required to restore the status quo ante, not because that is more valuable, but because people are entitled to have a good thing they value in the way they use natural resources, rather than the so-called cash compensation."

In terms of the two-good diagram, the setting of "specific performance" regulatory limits on market activity on the basis of physical requirements for environmental sustainability or protection produces the "discontinuity" case shown in Figure 12. Here a sustainability requirement is set by regulatory means requiring that non-market values be sustained at or above OS as a condition for market activity to proceed. The feasible scope of market activity is then determined by the position and shape of the production frontier: corresponding to point A for producers with high negative impacts on the environment, but point C for more environment-friendly production techniques. In order to expand output while complying with the environmental restraint, firms in the market sphere must innovate in an environmentally-friendly direction. This logic underlies theoretical arguments for both straightforward regulatory arrangements and more flexible cap-and trade schemes; the dynamic pressure for innovation is frequently greater with regulation of this sort, notwithstanding the prospect of some static allocative inefficiency.

[96] Sunstein 1997 pp.251-252.

Figure 12: Environmental limits as incentives for technical progress



5.5 More on Non-market Values

How to plot nonmonetary values up the vertical axis of the diagram, and how to undertake the comparison of incommensurable competing types of values, are issues that arise regardless of the shape of the production frontier. They have to do with how to think about the scale of the vertical axis when trying to reach resource management decisions that respect both sets of values at stake – for example those of a marketed good and those of a nonmarketed one. Since by definition there is no market price for the non-market good, both the type of value and the metric in which it is measured have to be identified, and brought into the decision-making process, as a matter of explicit deliberation – not by relying upon any impersonal mechanism to throw up the answer.

The review of philosophical writing earlier has already raised the issue of where values themselves come from – in particular Andersen's distinction between 'use value' and 'shared values'. In standard neoclassical economic theory, the assumption is made that each individual entering a market arrives with an already-established set of preferences across different goods and services, and when these preferences are confronted with market relative prices, the individual "reveals" their preferences via the quantity of each good they elect to purchase. The value of the goods to the consumer in terms of utility, thus, is formed prior to and independently of the purchase decision. Non-market goods, however, commonly do not fit this account of prior preference, because the process of evaluating a non-market good is typically undertaken simultaneously with, and as an integral part of, decisions about whether and how to protect or sacrifice it.

The issue of whether individual preferences can be taken as given, or should be expected to emerge from a process of reasoned reflection and discussion once the person is actually asked to address a question such as a public-policy choice, has been at the heart of the philosophical and methodological critique of neoclassical economics. One of the strongest critics of contingent valuation (from a right-wing stance that is suspicious of the large numbers emerging in contingent-valuation studies of environmental values) is economist Jerry Hausman[97]:

> I believe that respondents to contingent valuation surveys are often not responding out of stable or well-defined preferences, but are essentially inventing their answers on the fly, in a way which makes the resulting data useless for serious analysis … . My view is that expert government agencies and Congress should make informed decisions and enact regulations that attempt to improve the economic allocation process … To the extent that contingent valuation is viewed as an opinion poll about the environment in general, rather than a measure of preferences abut a specific project, public officials and regulators should recognise this concern. However, public policy will do better if expert opinion is used to evaluate specific projects, including nonuse value … .

Sagoff argues that[98]

> equality or justice is not the only ethical or cultural goal that concerns us as citizens. We may also be concerned as citizens with education, the arts and sciences, safety and health, and the integrity and beauty of the natural environment. These concerns cannot be assimilated to the personal, arbitrary preference-maps of consumers.

Economist Tony Atkinson notes[99]

> The modeling of individual decision making has been questioned in the recent literature on behavioral public economics. As expressed by Diamond (2008), "in standard modelling, we assume consistent behaviour across economic environments, captured in preferences that are defined only in terms of commodities acquired (absent externalities). One of the key messages of behavioural economics is that context (also referred to as situation) matters in ways that are not recognized in standard modelling".

The need to move beyond thinking of all economic problems in terms of individual preferences is a central theme of behavioural economics. Introducing a major

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97 Jerry Hausman "Contingent valuation: from dubious to hopeless", *Journal of Economic Perspectives* 26(4): 43-56, Fall 2012, pp.43-44.

98 Mark Sagoff *The Economy of the Earth*, Cambridge University Press, Cambridge, 1988, p.52.

99 'The Mirrlees Review and the State of Public Economics' *Journal of Economic Literature* 2012, 50(3), p.778.

collection of papers in this field, Diamond points to the role of policy in forming and changing preferences[100]

> it may be good to change individual preferences in ways the individuals do not contemplate. Governments have a range of ways of affecting choices, as discussed above, and suitable responses will be different in different settings. Similarly, norms matter for behavior and norms can be influenced by governments. Normative evaluation of government interventions in these settings requires evaluating people with different (changed) preferences as a consequence of a policy intervention. And that requires moving beyond traditional normative analyses that respect revealed preference

A good summary of the issues raised in, for example, "valuing" biodiversity up the vertical axis of Figure 11 comes from the philosopher J. O'Neill:[101]

> Ethical 'preferences' are not like nonethical preferences. They are substantive positions that reject the presuppositions of utilitarianism and the resolution of the differences between them is a matter of public argument, not aggregation. Protest bids to contingent valuation surveys on this account become a quite proper response. If 'preferences' for environmental goods are matters of ethical principle then such commitments are exhibited precisely by a refusal to betray them when offered cash. One should no more accept a price where issues of environmental value are involved than one should on issues of abortion, euthanasia, commercial surrogacy, hanging or any other issue of principle. To engage in monetary valuation in these arenas would be quite properly rejected as inappropriate, to ask willingness to pay questions an exercise in corruption. The proper mode of resolution is public debate in which utilitarians have to state their case with others - as they now do in issues of abortion, euthanasia, commercial surrogacy or hanging.
>
> Thus, in the case of biodiversity, to introduce information is not to provide better grounded beliefs to realize a given set of preferences: it is to alter preferences by pointing out features of an object that make them [sic] valuable. One is not increasing a person's well-being by allowing them to better realize their given preferences, but rather by allowing them to realize better preferences. That is what education, both formal and informal, is all about. The reason why the preferences of the informed respondents count is that they are in a better position to make judgements about the value of different habitats. What is important is not any price that is put upon the habitats, but the soundness of the information and reasons a person has for valuing the habitat. What matters in the valuations is not the preference, but the quality of reasons and information. What is presented as an exercise in eliciting monetary valuation is being transformed into an occasion for

[100] Peter Diamond, "Behavioral Economics." *Journal of Public Economics* 92 (8–9): 1858–62, 2008, p.1861.

[101] J. O'Neill, "Managing without prices: the monetary value of biodiversity", *Ambio*, 26 (8): 546-550 December 1997, pp.546-547.

> educating the respondent. Moreover, this is how it should be. Improvements in well-being come through public deliberation and education of our preferences, not simply through satisfying those we have.

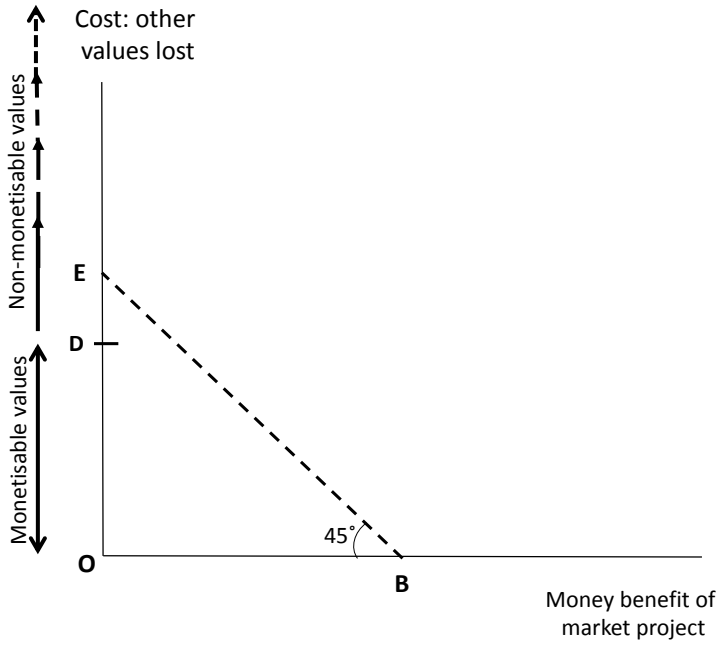
Commonsense and careful deliberation therefore matter more than numerical precision, and where numerical precision is attempted it is vitally important not to lose sight of its limitations. This raises immediately the question of the role of cost-benefit analysis in environment-related decision-making.

5.6 Cost-benefit

Cost-benefit analysis, when conducted properly and in good faith, uses all available techniques for measuring those things that can be so measured in terms of the single metric, money, and then acknowledges, identifies, lists, and so far as possible evaluates in non-monetary terms, the remaining values that are not convertible to money. Often the issue is whether a market-related project ought to proceed or not, and this choice can be represented diagrammatically in Figure 11. The monetary value of the marketed activity (the project) is measured along the horizontal axis as the distance OB. The monetisable values of the non-market activity that the project will crowd out are measured up the first part of the vertical axis as the distance OD, and the non-monetisable costs are shown conceptually by an indeterminately-scaled part of the vertical axis above D.

The monetisable costs of proceeding with the project, OD, can be compared with the monetary value OB by means of a 45-degree (that is, dollar-for-dollar) line BE running northwest from B, along which a dollar of benefit is the same quantum as a dollar of monetisable cost. Then if point D were to lie above point E on the vertical axis in Figure 11, the monetisable costs would exceed the money benefits, and the project should not proceed on a purely monetary calculus. There is then no need to embark on the challenging task of evaluating the non-monetisable elements of value. In this sense, cost-benefit analysis provides a valuable preliminary filter to eliminate projects that fail to meet even commensurable monetary tests of value.

Figure 11: Cost-benefit analysis of a market project with non-monetisable costs



If, however, the project is one for which monetisable cost OD is below monetary benefits OB=OE (the situation for which Figure 11 has been drawn) the need to make comparisons between incommensurable competing goods arises, and at this point the limits of cost-benefit analysis are quickly reached. The analyst can (and should, so far as possible) identify the values at stake, and describe them fully enough to bring them clearly before the decision-maker, but the process of weighing them up in the balance requires a different set of skills and procedures than simply the adding-up of money numbers.

At the outer boundaries of cost-benefit analysis lies the grey area of contingent valuation – the attempt to push out the limits of what can be expressed in monetary terms, and hence brought within the ambit of standard cost-benefit. This is discussed further in section 6.1 below.

6. Monetary Measurement at the Environment/Economy Boundary

The allure of money values is seductive because of the ability to appeal to the authority of the market in defence of resource management decisions, and economists have conducted extensive research efforts to push out the frontier of what can be captured and measured in money terms. The central conclusion from this research programme to date is that incommensurability is a genuine stumbling block. This section of the paper reviews some of the recent work, starting with the idea of contingent valuation, then moving on to the recent attempts to establish "green national accounts" and to put monetary values on stocks of natural capital.

6.1 Contingent Valuation

Contingent valuation is the technique of assigning monetary values to goods that have no market price because there are no markets in which they can be traded. The desire to have such valuations arises in three quite separate contexts:

- When making decisions about resource allocation, as in consent hearings under the RMA, it is sometimes considered useful to have money values assigned wherever possible to competing uses of the resource, even if there remains an irreducible set of issues that cannot be resolved by appeal to monetary value.

- When determining compensation for environmental damage, a court or government agency is often compelled to come up with a monetary figure to guide them in setting fines and monetary compensation for damage caused. The issue is what is fair and reasonable in the circumstances. Estimating this requires some notion of (i) what something is or was worth to those affected by the event, or (ii) what is the cost of restoring the damaged environment to its pre-existing [or some enhanced] state, or (iii) what value the damaged area or natural system would have had if put on the market.

- One way in which policymakers may seek to correct for externalities and other consequences of "missing markets" is to create artificial markets such as emission trading schemes to allow market mechanisms to guide individuals in adjusting their behaviour in the direction sought by policy. The prices that emerge from these markets depend heavily on the way the market institutions are designed, which bear a direct relationship to the techniques used by researchers to elicit people's contingent valuations of natural systems or resources.

In all three situations the issue that lurks in the background is the limit of commensurability between money and the good in question. Academic positions vary

widely on this, as do competing valuations of the same good. For example, the 1989 Exxon-Valdez oil spill in Alaska created an official demand for economic estimates of the cost of spilling 250,000 barrels of oil onto 1,300 kilometres of Alaskan coastline. At the low end, an estimate of the direct loss of recreational values to users of the area came to $3.8 million. At the high end, a contingent valuation of lost economic values including "passive, non-use value" (the existence value to the population in general of pristine coastline) produced a figure of $4,900 million.[102] In economists' terms the difference is between "revealed preference" and "stated preference". Revealed preference is the willingness of individuals to pay for some good when they are actually purchasing it in a market at current prices; it therefore has a solid grounding in actual observed behaviour, but fails to capture any non-marketed attributes of a good. Stated preference is measured from surveys in which individuals are asked to declare their willingness to pay (WTP) for something, or their willingness to accept payment (WTA) for being deprived of something. Contingent valuation depends heavily upon the reliability of information secured by such survey techniques.

Both "revealed preference" and "stated preference" are affected by the income and wealth distribution. The willingness of any individual to pay for anything depends upon their income or wealth: people generally are unlikely to state a willingness to pay more than their existing total budget. Hence the distribution of income and wealth can have a strong influence on survey responses. A highly unequal income distribution means a large number of individuals are (i) excluded from actual markets and (ii) likely to state low WTP for non-marketed goods in an interview setting, simply because of their budget constraints

In relation to the key themes of this paper, contingent valuation using stated preference faces three particular issues which have become increasingly salient in the economic literature in the two decades since Exxon-Valdez:

- The assumption that individuals have fully-developed preferences over the complete range of goods and services, including those that do not pass through any market, has been strongly challenged on the basis that many preferences relating to public goods, or benefits to people in general that can be secured by collective action, are not 'brought to the table' fully formed at the outset, but are actually formed through the process of deliberation and discussion leading up to a political decision. The whole point of public deliberation, after all, is to form judgments and reach decisions that match the general will as it emerges from the debate. Conceptually it is impossible to square the generally-accepted model of democratic decision-making with the

[102] Catherine L. Kling, Daniel J. Phaneuf, and Jinhua Zhao "From Exxon to BP: Has Some Number Become Better than No Number?", *Journal of Economic Perspectives* 26(4): 3-26, Fall 2012, pp.3-4

neoclassical economist's assumption that each individual is equipped in advance with a complete set of preferences ready to be expressed and not subject to change through reasoned discussion.

- Insisting, in a survey interview, that an individual must convert values that are meaningful only in non-monetary terms into monetary values produces responses that cannot be reconciled with the narrow economic concept of rationality, and that are not subject to the axioms of "rational choice". One such response is simply to refuse to give any answer; another is to give an entirely arbitrary answer reflecting simply the desire to satisfy the interviewer. As Sunstein notes[103],

  > [P]eople may believe that a species or a pristine area has intrinsic rather than instrumental value. When this is so, they do not want to assume the kind of responsibility that is entailed by allowing its alienation for cash. If something of this kind is right, it may be that people think that the loss through one's deliberate action of a pristine area or an endangered species is incommensurably bad, and that this thought should be expressed through regulatory proscriptions. The well-known disparity between willingness to pay and willingness to accept – found by Tversky, Kahnemann, Thaler and others – may well be attributable to in part to ideas of this kind, finding different expressive judgments in the two contexts, and distinguishing between the moral status of those judgments.

- Even in situations where it may be reasonable to think that individuals have some sort of well-defined prior preferences which can be revealed in an interview setting, there is generally a dramatic gap between stated Willingness to Pay and stated Willingness to Accept. The compensation a typical individual demands for losing something already possessed is far higher than the amount the same individual would be willing to pay to secure the thing from scratch. This reflects an apparent behavioural constant in human psychology.

The original economic theory behind WTP and WTA is due to the work of Hicks[104], Kaldor[105] and Scitovsky[106] in the 1940s and led originally to the prediction that there

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103 Cass Sunstein, "Incommensurability and kinds of valuation: some applications in law", Ch 13 in Ruth Chang (ed) *Incommensurability, Incomparability, and Practical Reason*, Harvard University Press 1997, p.249.

104 J. R. Hicks: " Foundations of Welfare Economics," Economic Journal, vol. 49 (196): 696-712, December 1939.

105 N. Kaldor: "Welfare Propositions of Economics and Interpersonal Comparisons of Utility," *Economic Journal*, vol. 49(195): 549-552, September 1939.

106 Tibor Scitovsky, "A note on welfare propositions in economics", *Review of Economic Studies* 9(1): 77-88, November 1941.

ought not to be any very dramatic difference between the two[107]. Those early writers were seeking to evaluate the effect of a policy change on society's welfare when there were losers as well as winners from the change (it was obviously trivial that a change that produced all winners and no losers – a "pareto improvement" - must be a welfare gain). If the winners could pay the losers a large enough sum of money to bring the losers back to their original level of individual welfare, then in theory there would be no losers and the policy could be implemented. Carrying this logic over to cost-benefit methodology, the idea was that any welfare change for an individual could be converted to a monetary equivalent by asking what compensation payment – or monetary charge - would return the individual to the same level of welfare as before the change. In modern contingent valuation surveys, therefore, the respondent is asked to put a monetary value on any change, either by saying how much they would be willing to pay to avoid the change, or by saying how much compensation would have to be paid to leave them feeling no worse off after the change takes place.

Once the results of such surveys began to accumulate, and as behavioural experiments were conducted to explore the issue, it became obvious that empirically there was a wide gulf between WTP and WTA[108]. People place a far higher monetary value on losses than on gains, a phenomenon known as "loss aversion"[109]. In practice, contingent valuation studies have tended to measure WTP rather than WTA, and as a result have produced numbers that are lower-bound rather than upper-bound, which introduces a potentially strong pro-market-project bias into any cost-benefit study using WTP.

This fundamentally weakens the usefulness of contingent valuation as a means of pushing the reach of cost-benefit analysis further up the vertical axis in Figure 11, because the sort of tradeoffs typically contemplated between market and non-market activities involve some sacrifice of the non-market values – the situation in which WTA is conceptually the relevant issue – rather than gains (where WTP is more defensible).

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107 A.M. Henderson, "Consumer's surplus and the compensating variation", *Review of Economic Studies* 8(2): 117-121, February 1941.

108 For a summary of early studies yielding this result see Jack Knetsch, "Values of Gains and Losses: Reference States and Choice of Measure", *Environmental and Resource Economics* 46(2): 179-199, June 2010, pp.180-181. For one of those early studies, see Rebecca Byce et al, "An experimental examination of intrinsic values as a source of the WTA-WTP disparity" *American Economic Review* 82(5): 1366-1373, 1992.

109 Kahneman, D. and A. Tversky "Prospect Theory: An analysis of Decisions Under Risk", *Econometrica* 47, 263–291, 1979; Kahneman, D. and A. Tversky, (eds.) (2000), *Choices, Values, and Frames*, New York: Cambridge University Press, 2000; Daniel Kahneman, Jack L. Knetsch JL, and Richard H. Thaler , "Experimental tests of the endowment effect and the coase theorem", *Journal of Political Economy* 98(6) :728–741, 1990

The emerging disquiet among economists about contingent valuation in the context of damages claims[110] led to the setting-up in 1993 of a National Oceanic and Atmospheric Administration (NOAA) panel of leading economists, whose 2001 report[111] is the economics profession's authoritative take on the issues. The central distinction drawn by the report is between direct use values, to which market values can be assigned, and passive values (often called existence values) which are accessible only indirectly. The panel posed the problem as follows[112]:

> If passive-use values are to be included among the compensable losses for which trustees can make recovery under the Oil Pollution Act, how will they be estimated? Unlike losses to commercial fishermen or recreational property owners, there are no direct market transactions that can be observed to provide information on which estimates can be based. Unlike losses to boaters, swimmers, recreational fishermen and others, there exist no indirect methods through which market data can provide at least some clues as to lost values. In other words, there appear to be neither obvious nor even subtle behavioral trails that can provide information about lost passive-use values.

The panel noted the general practice of seeking WTP rather than WTA measures[113]:

> Because of concern that respondents would give unrealistically high answers to such questions, virtually all previous CV studies have described scenarios in which respondents are asked to pay to prevent future occurrences of similar accidents. This is the conservative choice because willingness to accept compensation should exceed willingness to pay.

After an extensive review of the strengths and weaknesses of contingent valuation the panel concluded that it could play a useful contributory role in the context of awarding damages provided that the relevant studies were rigorously designed and conducted (the report included a detailed prescribed methodology to overcome some of the more obvious pitfalls); but that it should be seen only as[114]

> the starting point of a judicial process of damage assessment, including lost passive-use values. … The phrase "be the starting point" is meant to emphasize that the Panel does not suggest that CV estimates can be taken as automatically defining the range of compensable damages within narrow limits.

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110 Especially after *Ohio v DOI,* 880 F.2d 432 (D.C. Cir. 1989) in which damages for an oil spill were ruled to include passive existence value of the damaged environment.

111 Kenneth Arrow, Robert Solow, Paul R. Portney, Edward E. Leamer, Roy Radner, and Howard Schuman, *Report of the NOAA Panel on Contingent Valuation*, May 9 2001, http://www.darrp.noaa.gov/library/pdf/cvblue.pdf

112 Arrow et al 2001 p.3.

113 Arrow et al 2001 p.4.

114 Arrow et al 2001 p.43.

As at 2002, there were reported to have been about 85 non-market valuation studies of freshwater undertaken in New Zealand.[115] The Lincoln University online database of "non-market valuation studies"[116] lists over 140 studies in total, using a variety of valuation methodologies (contingent valuation, hedonic pricing, travel-cost method, benefit transfer, choice-based, and others) of which 80 are contingent-value studies. Another bibliography of non-market valuation studies contains nearly 1,000 entries spanning New Zealand and overseas studies[117].

A leading New Zealand practitioner notes that the Resource Management Act 1991 section 32 requires "consideration of alternatives, benefits, and costs" and that this has given rise to disagreement over the extent to which methods such as contingent valuation ought to be utilised in hearings involving environmental impacts. While successive official guidelines to the Act have acknowledged that environmental and community impacts are largely intangible and non-quantifiable and that "a robust evaluation of efficiency should not be regarded as requiring the full and comprehensive monetisation of every cost and every benefit[118], the Environment Court has at times pressured the parties before it to make more use of valuation techniques such as contingent valuation. However, as noted in section 4.1, the High Court in 2010 reiterated the importance of evaluating non-monetisable values in their own terms.

6.2 National Accounting

The widespread desire to revise national accounting frameworks to give credit to non-marketed activities and resources arises from the tendency for national governments and government agencies to give dominant status to GDP and other standard national accounting aggregates in making policy decisions. Advocates for policies whose costs can be measured in terms of market prices paid, but whose benefits are only able to be valued fully on a different, non-monetary basis - along with opponents of policies with marketed outputs but large non-marketed costs - find themselves at a disadvantage in policy debates because of the psychological propensity of the contemporary human mind to seize upon, and give often undue weight to, numerical magnitudes expressed in money terms. Hence the quest for alternative methodologies

115 Statistics New Zealand, *Water Monetary Stock Report: Partial monetary accounts plus review of background and valuation methods*, December 2004, http://www.stats.govt.nz/~/media/Statistics/browse-categories/environment/natural-resources/water-monetary-stock-report/wms-report.pdf p.16.

116 http://www2.lincoln.ac.nz/nonmarketvaluation/ .

117 http://www.lincoln.ac.nz/Documents/Ecosystem-Services/2010-Bibliography-Ecosystem-Valuation-Database.pdf

118 G.N. Kerr, *A New Zealand Perspective on Value Transfer*. Invited presentation to Symposium on Benefit Transfer, 55th annual conference, Australian Agricultural and Resource Economics Society. Crown Conference Centre, Melbourne. 8-11 February 2011, slide 14.

to attach monetary values to economy-wide magnitudes which are strictly not convertible into money and are, to varying degrees, incommensurable with money.

As the 2009 Commission on the Measurement of Economic Performance and Social Progress (the Stiglitz Commission) argued[119]

> statistical indicators are important for designing and assessing policies aiming at advancing the progress of society, as well as for assessing and influencing the functioning of economic markets…. What we measure affects what we do; and if our measurements are flawed, decisions may be distorted. Choices between promoting GDP and protecting the environment may be false choices, once environmental degradation is appropriately included in our measurement of economic performance.

Orthodox national accounts use the single metric of money to record and add up the huge range of goods and services produced and used by the market sphere of modern society. For those goods and services that are explicitly exchanged in markets the task is straightforward; but three areas of social life present difficulty:

- Services that are not actually traded on markets but which can be thought of in commodified terms without doing violence to common notions of their value. One such set of services – the value of owner-occupied housing – is already included in the national accounts, by the device of imputing the rental value of those properties. Others – unpaid housework, subsistence agriculture, community voluntary activity – remain outside the scope of national accounting[120], largely for the practical reason that such a large proportion of the total population is engaged in the relevant activities that to include it would jeopardise the meaningfulness of the GDP concept itself – but also partly because much of their value might not be captured by conceptual or actual commodification.

- The second major problem is the issue of whether and how to measure resources appropriated from nature. These enter into the national accounts only to the extent that economic rents[121] are generated through the market mechanism and captured by those who do the appropriating, as part of their operating surplus. Some services rendered by nature which could, but do not,

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119 Joseph E. Stiglitz, Amartya Sen, and Jean-Paul Fitoussi, *Report by the Commission on the Measurement of Economic Performance and Social Progress*, Paris: 2009 http://www.stiglitz-sen-fitoussi.fr/documents/rapport_anglais.pdf, Executive Summary.

120 Marilyn Waring *Counting for Nothing: What Men Value and What Women are Worth* Wellington: Allen & Unwin/Port Nicholson Press, 1988.

121 A rent is income from any activity that remains as a residual after paying in full for all labour, capital, and other marketed productive inputs other than "land". If all relevant "land" is privately owned then rent is captured as income by the owner. If there is neither private ownership nor regulation of use of the natural commons, rent is dissipated via over-exploitation and degradation of land.

pass through markets are unrecorded, as are the future monetary costs attributable to degradation of natural ecosystems and depletion of natural resources.

- The third is how to acknowledge the importance of services that do not and should not pass through markets because they lie in non-market spheres of social experience and are valued according to non-monetary criteria.

Unless some technique exists for uncontroversially converting these various sorts of goods and services into the single metric of money, the use of GDP as the sole, or even the dominant, metric in policy decision-making must result in serious bias whenever human welfare depends on paying full attention to non-market spheres. No such technique has yet been found, which gives rise to two parallel (and not necessarily incompatible) lines of statistical work: on the one hand a programme of research on producing an extended set of national accounts that could bring a wider range of considerations within the ambit of the GDP metric; and on the other hand a recognition of the need for policymakers to ensure that 'GDP-focusedness' does not lead them to override crucial information from non-market spheres of social action and experience.

Both monetary and non-monetary composite indices of environmental performance can be and have been constructed, but it is not clear what such an index actually says about sustainability unless the underlying detailed data are separately arrayed; and the weighting schemes used to construct such indices tend to be arbitrary in a way that the market prices used in GDP are not.[122] "No limited set of figures can pretend to forecast the sustainable or unsustainable character of a highly complex system with certainty"[123]. In its extensive and detailed review of indicators such as the Index of Well-being[124], the Green Human Development Index[125], the Environmental Sustainability Index (ESI)[126], the Environmental Performance Index (EPI)[127], the

122 Stiglitz et al p.65

123 Stiglitz et al p.82.

124 Osberg, L. and Sharpe, A. "An index of economic well-being for selected countries", *Review of Income and Wealth*, September 2002; reviewed on pp.64, 201-202 and 237-238 of Stiglitz et al 2009.

125 Desai, M. "Greening the HDI?" in The New Economic Foundation (Eds) *Acccounting for change*, MacGillivray 1994; Lasso de la Vega, M.C. and Urrutia, A.M. "HDPI: a framework for pollution sensitive human development indicators", *Environment, Development and Sustainability* (3), 199-215. 2001; Nourry, M. (2008) "Measuring sustainable development: Some empirical evidence for France from eight alternative indicators", *Ecological Economics*, 67 (3): 441-456, 2008; Stiglitz et al p.237.

126 United Nations, *Indicators of Sustainable Development: Guidelines and Methodologies* http://www.un.org/esa/sustdev/natlinfo/indicators/isdms2001/isd-ms2001isd.htm reviewed on pp.64 and 238 of Stiglitz et al 2009

127 Estes, R., Levy, M., Srebotnjak.T. and de Shrebinin, A. (2005) *2005 environmental sustainability index: benchmarking national environmental stewardship*, New Haven: Yale Center for Environmental Law and Policy, reviewed on p.64 and p.238 of Stiglitz et al 2009.

Sustainable Measure of Economic Welfare (SMEW)[128], the Indicator of Sustainability of Economic Welfare (ISEW)[129], the Genuine Progress Indicator[130], the System of Eco-Environmental Accounting (SEEA) with its concepts of green GDP and green NNP[131]; Adjusted Net Savings (ANS)[132]; and the ecological footprint (EF)[133], the Commission repeatedly came up against the problem that the further these measures stray from things that are traded in markets, or whose economic contribution can be estimated from the market prices of goods in which they are embodied, the more the resulting measures become arbitrary and/or normatively loaded, and hence unlikely to command consensus respect in the way that "objective" measures can:[134]

> … monetary or not, an aggregation procedure always means putting relative values on the items that are introduced in the index. In the case of composite sustainability indicators, we have little understanding of the arguments for putting one relative value or another on all the different variables that matter for sustainability. The problem is not that these weighting procedures are hidden, non-transparent or non-replicable – they are often very explicitly presented by the authors of the indices, and this is one of the strengths of this literature. The problem is rather that their normative implications are seldom made explicit or justified.

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128 Nordhaus, W. and Tobin, J. (1973) "Is Growth Obsolete?" in *The Measurement of Economic and Social Performance, National Bureau of Economic Research*, 1973, reviewed on p.64 and p.239 of Stiglitz et al 2009.

129 Cobb, J. and Daly, H. *For the common good, redirecting the economy toward community, the environment and a sustainable future*, Boston, Beacon Press, 1989; Cobb, C.W. and Cobb, J. (1994) *The green national product*, Lanham, University Press of America, 1994; Stiglitz et al p.238.

130 Talberth, Cobb and Slattery, 2006); Stiglitz et al p.238.

131 Repetto, R., Malgrath W., Wells, M., Beer C. and F. Rossini, Wasting Assets: Natural Resources in the National Income Accounts, *World Resources Institute* 1989; Andre Vanoli, "Reflections on environmental accounting issues", *Review of income and wealth*, 41(2): 113-137, June 1995. Alfsen, K.H, Hass, J.L. Tao, H. and You, W. (2006) "International experiences with 'green GDP'", Report 2006/32, Statistics Norway, 2006; United Nations, *Handbook of National Accounting: Integrated Environmental and Economic Accounting 2003,* http://unstats.un.org/unsd/envaccounting/seea2003.pdf ; Stiglitz et al 2009 p.233.

132 Hamilton, K., "Pollution and Pollution Abatement in the National Accounts", *Review of Income and Wealth* 42(1), 13-33., 1996 ; Pearce, D.W. and Atkinson, G. "Capital theory and the measurement of sustainable development: an indicator of weak sustainability" , *Ecological Economics*, 8(2): 103-108, 1993; Kirk Hamilton and Michael Clemens "Genuine Savings Rates in Developing Countries", *World Bank Economic* Review 13(2): 333-356, 1999; World Bank *World Development Report 2003*; Stiglitz et al 2009 p.234, 241-244. Genuine savings are defined by Hamilton and Clemens p.333 as "traditional net savings less the value of resource depletion and environmental degradation plus the value of investment in human capital".

133 Wackernagel, M. and Rees, W. *Our ecological footprint: reducing human impact on the earth*, New society publishers, The New Catalyst Bioregional Series, Gabriola Island,BC, 1995; Moran, D., Wackernagel, M., Kitzes, J., Godlfinger, S. and A. Boutaud (2008), Measuring sustainable development - Nation by Nation, *Ecological Economics* 64(3), 470-474, 2008; Global Footprint Network *National Footprint Accounts* http://www.footprintnetwork.org/images/uploads/NFA_2010_Results.xls; Ewing, B. et al *National Footprint Atlas 2010* http://www.footprintnetwork.org/en/index.php/GFN/page/ecological_footprint_atlas_2010 ; Stiglitz et al 2009 pp.234 and 244-247.

134 Stiglitz et al p.65.

The difficulty of producing "objective" measurements is encountered particularly in the issue of valuing resource degradation in green national accounts.

> [E]xperience from the field suggests two main options for valuing degradation. The first relies on damage-based estimates and the second on cost-based estimates. …[T]he damage-based option answers the question, 'how much damage is caused by environmental degradation?', and tries to estimate the loss of welfare caused by these degradations on human health and thus on human capital. Cost-based estimates instead answer the question, 'how much would it cost to avoid environmental degradation?', and in turn can be divided into two types. The first type relies on *maintenance costs*, that is, the value of the costs that would have had to be incurred to remedy the environmental degradation caused by current production and consumption, and leads to 'environmentally adjusted' aggregates for those costs. As such, it estimates what the accounting entries would have been for the same level (and structure) of activities and demand if all the costs associated with environmental degradation had been incurred and internalized within market prices. The problem with this approach is that the resultant price rises (potentially high for non-marginal changes) are likely to bring about a change in behaviour, which would affect the level of demand for those products (and thus the level of output and/or the choice of the production technology).
>
> The second type of cost-based estimate attempts to overcome those limitations and answers the following question: *'What level of GDP would be achieved if producers and consumers faced a different set of relative prices in the economy due to the existence of actual prices for environmental functions?'* It is thus a forward-looking modeling approach (known as *greened economy modeling*) rather than a one-time adjustment to a selected number of macro-aggregates. Interest then focuses less on the new 'greened' aggregates themselves than on the gap between the existing economy and the 'greened' version (and on the possible transition paths between the two).

Strikingly when the Commission plotted the three apparently most promising indices – ANS, EF, and ESI – against one another there was a lack of any significant correlation amongst them[135]. Basically,

> as soon as we agree that market prices of assets cannot be the reference for the relative valuation, we are brought back to the problem of knowing on which bases such valuations can be established. [136]

6.3 Green National Accounts or Dashboards?

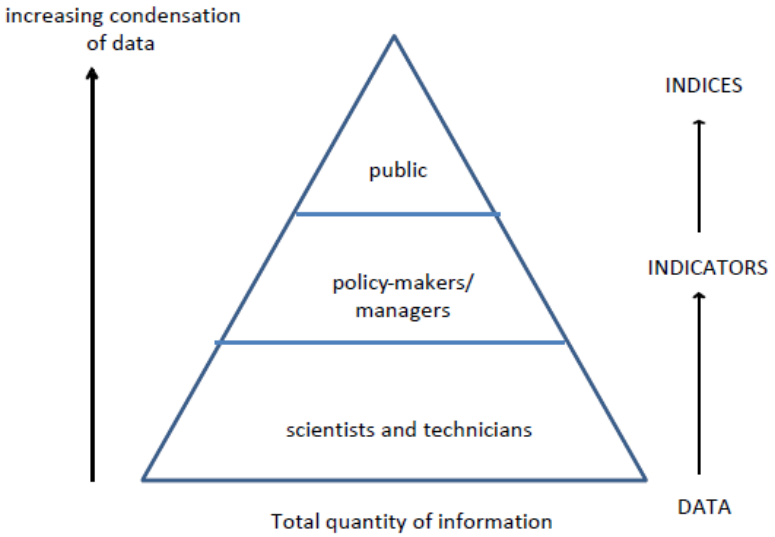
The quest for sustainability indicators[137] at different levels of aggregation has resulted, at the most aggregated level, in attempts to produce "green national accounts", and at less-aggregated levels in the advocacy of "dashboards". The various levels of

[135] Stiglitz et al 2009 p.249 Figures 3.1 and 3.2.

[136] Stiglitz et al 2009 p.261.

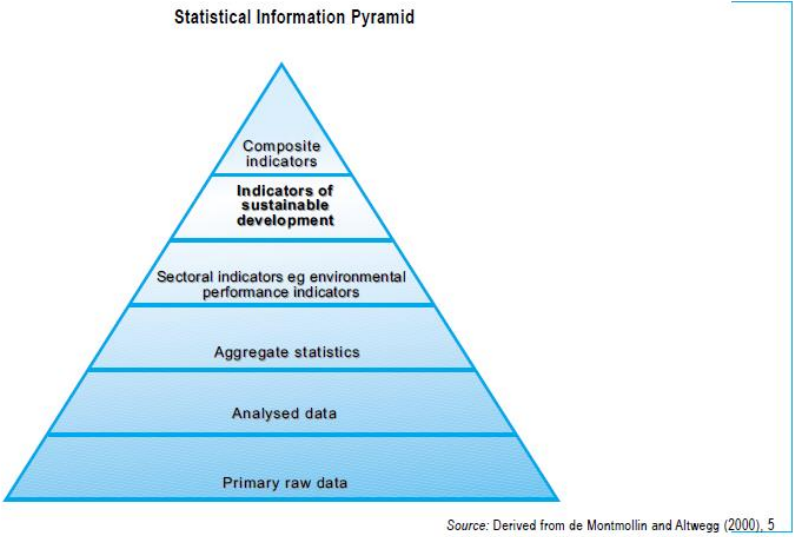
[137] The literature on sustainability indicators is extensive. See, e.g., Simon Bell and Stephen Morse, *Measuring Sustainability: Learning by Doing*, Earthscan 2003.

aggregation are often captured by pyramid diagrams such as the three reproduced below, with "headline indicators" such as "green GDP" at the top, and disaggregated data sets at the bottom:[138]



Source: Masayuki Sagisaka (ed.) *Guidelines to Assess Sustainability of Biomass Utilisation in East Asia*, ERIA Research Project Report 2008-8-2, March 2009, http://www.eria.org/publications/research_project_reports/guidelines-to-assess-sustainability-of-biomass-utilisation-in-east-asia.html, p.51.

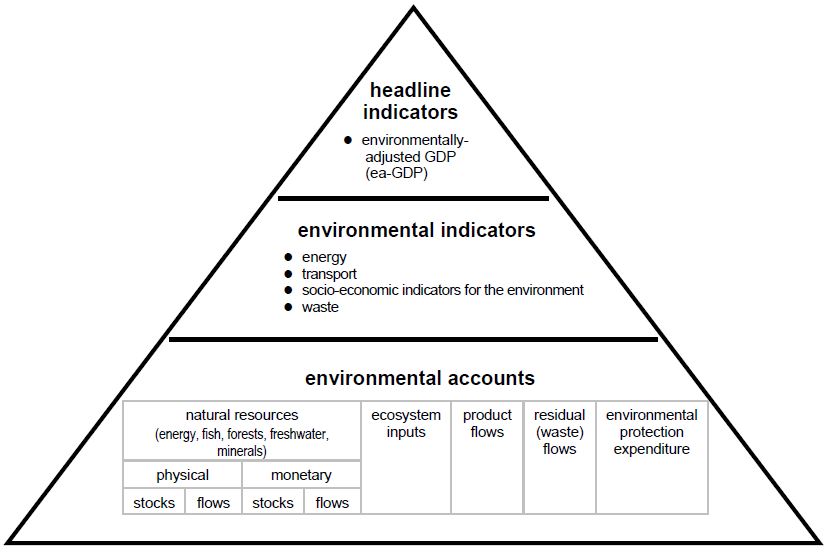
Figure 2.2



Source: Statistics New Zealand, *Monitoring progress towards a sustainable New Zealand: an experimental report and analysis* , August 2002, http://www.stats.govt.nz/~/media/Statistics/browse-categories/environment/sustainable-development/monitoring-progress-sustainable-nz/monitoring-sustainable-development.pdf, p.15.

138 The originator of the pyramid diagrams seems to have been Braat L., "The predictive meaning of sustainability indicators", in: O. Kuik and H. Verbruggen (eds.) *In search of indicators of sustainable developmen*t. Kluwer Academic Publ., Dordrecht, 1991.

Figure 4. Statistics New Zealand's Environment Statistics Framework



Source: Statistics New Zealand, *Water Monetary Stock Report: Partial monetary accounts plus review of background and valuation methods*, December 2004, http://www.stats.govt.nz/~/media/Statistics/browse-categories/environment/natural-resources/water-monetary-stock-report/wms-report.pdf , p.13.

The top-level headline indicators represent the attempt to monetise everything; the bottom tiers of the pyramid are the territory of "dashboard indicators" which present environmental data in terms of scientifically-valid magnitudes but leave the incommensurability problem visibly in place. Dashboards are discussed further in section 7.1 below.

Green accounting has been driven by the desire of statisticians to satisfy "the irrepressible demand for a simple indicator of national welfare" in public debate, and by "an increased appreciation [in economic theory] of the environmental resource base as a fundamental capital asset"[139]. Heal and Kristom's survey of the field identifies four key areas on which research has focused[140]:

- Valuation of ecological services
- Valuation of stocks of natural capital
- Transboundary pollution (involving environmental/ecological impacts that are not contained within national-accounts boundaries)
- Valuing ecological flows

139 Geoffrey Heal and Bengt Kristom, "National Income and the Environment", Chapter 22 in K-G Maler and J.R. Vincent (eds) *Handbook of Environmental Economics Volume 3*, Elsevier, 2005, p.1150.

140 Heal and Kristom (2005) p1183.

To value flows of ecological services (or flows of damage to ecosystems) at the aggregate level[141], two main approaches are outlined by Heal and Kristom. The first is "politically determined willingness to pay", which estimates the monetary costs of foregone market opportunities entailed by policies which protect the environment. On the assumption that decisions by a democratic government fully reflect the public's collective willingness to pay, this provides a default market value for that part of the services supplied by nature which require defence from public policy.

The other approach described by Heal and Kristom is "defensive expenditures", which involves identifying and adding-up all monetary outlays by government or the private sector on protection of the environment. A variant is the "maintenance cost" approach which estimates the monetary outlays that would be required to forestall environmental degradation – "the costs of using the natural environment which would have been incurred if the environment had been used in such a way that its future use would not have been affected".

Approaches of this sort are more useful in answering specific limited questions about particular sectors than in producing economy-wide aggregates, and they are not very clearly grounded in national accounting theory[142]. However, defensive expenditures at least can be measured and reported within the UN's Satellite Environmental and Economic Accounts (SEEA)[143], which first appeared in 1993 as an attempt to make allowance for environmental deterioration in the established System of National Accounts.

An example of an area in which such monetisation techniques have been used in New Zealand is the measurement of the cost of pests to the economy. Bertram[144] assembled figures for defensive expenditures by the public and private sectors through the 1990s, and combined these with estimates of lost production due to pests to produce a total quantified figure of $840 million in the late 1990s: $440 million of defensive expenditure and $400 million of production losses. A more recent study by Geera and Bell repeated the exercise for 2008, finding $836 million of defensive

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141 As distinct from the local level at which techniques such as hedonic pricing, contingent valuation and travel-cost valuation are common. The shortcomings of these in a cost-benefit setting are discussed elsewhere in this paper.

142 Heal and Kristom (2005) provide extensive technical coverage of the theoretical requirements for consistent SNA accounting, and note (pp.1185-1186) the corresponding weaknesses in ecological flows accounting within that framework. Other theoretical problems arise in the wider setting sketched out in other sections of this paper.

143 United Nations, *Handbook of National Accounting: Integrated Environmental and Economic Accounting.* Studies in Methods, Series F, No. 61, Rev. 1. New York: United Nations, 2003; Palm, Viveka, and Maja Larsson. 2007. "Economic Instruments and the Environmental Accounts", *Ecological Economics*, 61(4): 684–92.

144 Geoff Bertram, "The impact of introduced pests on the New Zealand economy", in K. Hackwell and G. Bertram, *Pests and Weeds: the cost of restoring an indigenous dawn chorus*, New Zealand Conservation Authority 1999.

expenditures and $1,292 million of production losses.[145] Bertram noted that his monetary cost figures were lower-bound because they captured only one dimension of the problems presented by introduced pests for the New Zealand environment[146]:

> [T]he most difficult category of costs associated with pests [is] the intangible costs of damage to the indigenous ecosystems of New Zealand…. There are ongoing welfare losses to New Zealand from the damage to indigenous flora and fauna caused by the presently-tolerated levels of infestation. What price can we put on the continued existence of a species such as kaka? New Zealand's unique indigenous flora and fauna are invaluable taonga……[T]he additional level of costs [over and above measured defensive expenditures and production losses] comprises the damage to the indigenous ecosystem for the repair or avoidance of which society is at present not willing to pay… To place any numbers on the existence value of a native taonga species is extremely difficult given the existing state of knowledge … [but] would raise the estimates … by an incalculable amount.

Statistics New Zealand's very limited foray into the production of environmental accounts using the UN SEES framework similarly made use of estimates of defensive expenditure as a proxy for environmental damage costs, producing the following tables[147]:

Table 1

Summary of Government Expenditure, 2001-2003

Environmental protection activity and natural resource management expenditure

	EPE Total $(000)			NRM Total $(000)		
Expenditure	2001	2002	2003	2001	2002	2003
Current expenditure						
Local government	566,400	547,125	585,965	507,604	541,499	521,646
Central government	285,770	312,197	320,151	158,666	165,717	180,620
Total current expenditure	852,170	859,322	906,116	666,270	707,216	702,266
Capital expenditure						
Local government	307,164	386,555	354,862	100,308	74,578	61,738
Central government	5,951	3,749	6,535	1,284	978	889
Total capital expenditure	313,115	390,304	361,397	101,592	75,556	62,627
Total expenditure	1,165,285	1,249,626	1,267,513	767,862	782,772	764,893

145 Nick Geera and Brian Bell, *Economic Costs of Pests to New Zealand,* MAF Biosecurity New Zealand Technical Paper No: 2009/31, September 2009, http://www.biosecurity.govt.nz/files/pests/surv-mgmt/economic-costs-of-pests-to-new-zealand.pdf. The 2009 study applied a multiplier to direct output losses, which Bertram did not do; such use of multiplier analysis in a national setting is theoretically problematic. The direct cost estimates are more informative; the inevitably-larger multiplier-derived costs presumably have greater political impact.

146 Bertram (1999) pp.64-67.

147 Statistics New Zealand, *Environmental Protection Expenditure Account for the Public Sector - Years ended June 2001- June 2003* http://www.stats.govt.nz/~/media/Statistics/browse-categories/environment/natural-resources/environmental-protection-expenditure/epea-2001-2003.pdf

Table 2

Environmental Protection Activity Expenditure

2001-2003

EPE classification	Local government $(000)		Central government $(000)		Total $(000)		
	Current expenditure	Capital expenditure	Current expenditure	Capital expenditure	Current expenditure	Capital expenditure	Total
Year ended June 2001							
Waste management	188,452	25,572	7,526	-	195,978	25,572	221,550
Waste water management	312,029	276,292	-	-	312,029	276,292	588,321
Pollution abatement	13,123	17	3,894	-	17,017	17	17,034
Biodiversity and landscape	38,804	4,819	184,486	5,942	223,290	10,761	234,051
Research and development	1,129	13	74,670	-	75,799	13	75,812
EPE n.c.e.	12,863	451	15,194	9	28,057	460	28,517
Total	566,400	307,164	285,770	5,951	852,170	313,115	1,165,285
Year ended June 2002							
Waste management	182,515	26,398	8,776	-	191,291	26,398	217,689
Waste water management	275,526	359,028	-	-	275,526	359,028	634,554
Pollution abatement	7,347	38	7,148	-	14,495	38	14,533
Biodiversity and landscape	59,669	510	202,917	3,660	262,586	4,170	266,756
Research and development	1,515	-	75,559	-	77,074	-	77,074
EPE n.c.e.	20,553	581	17,797	89	38,350	670	39,020
Total	547,125	386,555	312,197	3,749	859,322	390,304	1,249,626
Year ended June 2003							
Waste management	185,965	23,509	8,857	-	194,822	23,509	218,331
Waste water management	276,034	326,889	-	-	276,034	326,889	602,923
Pollution abatement	9,843	-	6,904	-	16,747	-	16,747
Biodiversity and landscape	67,214	2,475	209,345	6,386	276,559	8,861	285,420
Research and development	3,274	-	76,300	-	79,574	-	79,574
EPE n.c.e.	43,635	1,989	18,745	149	62,380	2,138	64,518
Total	585,965	354,862	320,151	6,535	906,116	361,397	1,267,513

Table 3

Natural Resource Management Expenditure

2001-2003

NRM classification	Local government $(000)		Central government $(000)		Total $(000)		
	Current expenditure	Capital expenditure	Current expenditure	Capital expenditure	Current expenditure	Capital expenditure	Total
Year ended June 2001							
Regulatory control	189,035	2,169	25,201	-	214,236	2,169	216,405
Inland water management	60,478	16,245	1,231	-	61,709	16,245	77,954
Land management	248,892	81,778	43,861	-	292,753	81,778	374,531
Other resource management	9,199	116	88,373	1,284	97,572	1,400	98,972
Total	507,604	100,308	158,666	1,284	666,270	101,592	767,862
Year ended June 2002							
Regulatory control	202,276	1,212	21,450	-	223,726	1,212	224,938
Inland water management	64,560	4,225	1,303	-	65,863	4,225	70,088
Land management	271,708	69,082	44,154	-	315,862	69,082	384,944
Other resource management	2,955	59	98,810	978	101,765	1,037	102,802
Total	541,499	74,578	165,717	978	707,216	75,556	782,772
Year ended June 2003							
Regulatory control	198,506	1,082	23,743	-	222,249	1,082	223,331
Inland water management	62,686	5,270	1,436	-	64,122	5,270	69,392
Land management	257,625	55,386	51,506	-	309,131	55,386	364,517
Other resource management	2,829	-	103,935	889	106,764	889	107,653
Total	521,646	61,738	180,620	889	702,266	62,627	764,893

Only these three years of data have been produced to date, and the prospect of an official set of SEEA accounts for New Zealand has largely faded away. In terms of detailed policy analysis and debate this is probably unfortunate, even given that the ultimate SEEA objective of a meaningful "headline indicator" aggregate adjusted GDP lies far off and seems likely to prove unattainable.

In addition to efforts by official agencies such as the UN and the World Bank, there have been a number of major academic studies undertaken to value ecological services. A report for IUCN on the value of biodiversity in 1994 set out to calculate the economic values that might be attributable to tropical forests, wetlands, and rangelands, including values for carbon fixing, flood control, and tourism. The study's authors speculated as to whether these values would exceed those from profit-driven private exploitation of the land, found that the answer was unclear, and argued that the central problem was not the presence or absence of markets but the imperfections of the markets that actually operate in the real world:[148]

> [B]iodiversity use may well be able to compete with the more traditional land uses if there is greater parity. What this means is that sustainable land use competes with alternative land uses if those uses are not subject to privilege and special fiscal treatment, distorted property rights etc. Where such distortions are present — and they are pervasive — biodiversity use may well fail to `compete'. Indeed, this is one dominant reason why more investment in biodiversity does not automatically take place;
>
> [T]his problem is compounded by a second distortion — the absence of `global markets' in the benefits of biodiversity. In particular, we note that developing countries face major problems of appropriating the global benefits of sustainable use of biodiversity. As long as those global values cannot be captured by host countries, biodiversity will be a risky investment in many contexts.

While true, these observations do not translate readily to a viable policy programme of extending markets into previously non-marketed areas of biodiversity and then relying on the price mechanism to deliver the desired result. The values at stake are various and multifaceted, and although it is easy to understand the desire for monetary payments to communities that sacrifice their ecosystem values in the service of global market demands, the risks of going down that path are not to be underestimated. Large swathes of nature are indeed not for sale, and should remain not for sale; the mechanisms, and valuation language, used to protect them while recognising the legitimate interests of their custodians in securing their own material standards of life, present a major policy dilemma.

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148 David Pearce and Dominic Moran, *The Economic Value of Biodiversity* London: Earthscan, 1994, online version at http://reference.kfupm.edu.sa/content/e/c/the_economic_value_of_biodiversity_107355.pdf p.92.

The danger of over-enthusiastic monetisation is apparent in Costanza et al's 1997 study which famously (or notoriously) estimated the value of the world's ecosystem services to the global economy as a whole at $33 trillion per year, nearly double global GNP of $18 trillion per year.[149] The methodology in that paper pushed various not particularly robust valuation techniques far beyond the range of their plausible and consistent application, to produce a number that was politically noticeable simply because of its gigantic size, but which had no genuine meaning in terms of the market sphere's value discourse (including orthodox economic theory). The problem faced by such statistical excursions beyond the margin of the market where prevailing prices have familiar meanings, into a conceptual realm that imagines the entire global system subjected to an overwhelming revolutionary change that extended markets to include all environmental impacts, is that if indeed markets were to extend as hypothesised, the set of prices that would emerge would be so far from the actual as to make all comparisons with current market values literally meaningless.

The advocates of "valuing ecosystem services" are strongly criticised by Sagoff in his chapter "Can we put a price on Nature's services?"[150], on the basis that standard valuation techniques which rely on prices observed in actually-existing markets are uninformative when applied beyond the market margin at which they provide legitimate orders of magnitude:[151]

> Either we protect (or 'buy') the whole system or forego it; there is no way to trade in marginal amounts. Accordingly, political will and legal institutions may be required to transit industry away from technologies that threaten to destabilise the planetary climate. To be sure, the most effective policies to reduce or limit 'greenhouse' gases will rely on market forces and incentives; nevertheless, there is no meaningful way to 'price' units of the global climate locally or at the margin.
>
> [E]cosystem services at the global scale … should often be analogized not to economic goods to which prices may be attached but to the conditions – like liberty, property rights, the enforcement of contract, and so on – that make production possible. No one suggests that liberty should be 'priced' though everyone knows it must be protected. To ask how a market would settle prices on legal, political and social institutions is to pose a foolish question since no market could function without them. It is the same with biospheric processes on which life depends."

Sagoff's argument usefully emphasises the risks inherent in the unthinking extension of monetisation techniques that work within the market sphere, into other spheres

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149 Costanza R.; d'Arge R.; de Groot R.; Farber S.; Grasso M.; Hannon B.; Limburg K.; Naeem S.; O'Neill R.V.; Paruelo J.; Raskin R.G.; Sutton P.; van den Belt M., "The value of the world's ecosystem services and natural capital", *Nature* 387:253-260, 15 May 1997 and *Ecological Economics* 25(1): 3-15, April 1998.

150 Mark Sagoff, *The Economy of the Earth*, Cambridge: Cambridge University Press, 2nd ed 1988, Chapter 5.

151 Sagoff 1988 pp.88-89.

where the relevant values are incommensurable with money and where there are large indivisibilities.

6.4 Valuation of Natural Capital Stocks

The basic motivation for valuing natural capital in the national accounts is to calculate a depreciation allowance, tracking the depletion and/or replenishment of the ecosystem, that can be used to adjust reported national income to sustainable income (that is, income that can be sustained without running-down the natural capital on which it depends in the long run). In the UN SEEA accounting methodology, this involves accounting for the economy's impacts on non-produced natural assets in terms of the environmental costs of production and consumption activities. A necessary stage is a set of accounts in physical terms for all relevant natural assets, which is then converted to the single monetary metric by some valuation technique. The resulting estimated cost of environmental services is then to be imputed as a cost in the full national accounts. As Heal and Kristom point out, the resulting number for "environmentally adjusted GDP" is very sensitive to the valuation technique used to convert physical inventories to money terms (none of the available techniques is very satisfactory) and there is a serious risk of double-counting. Furthermore, the meaning of the result is not clear:[152]

> … it is not a Keynesian-style set of accounts for macro-economic purposes, neither does it provide welfare-change indices and, as far as we can tell, it does not necessarily produce a measure of sustainable income. Along certain dimensions, the SEEA is a step in the right direction. For example, it helps modelers to obtain information collected within an SNA framework.

The major benefit of the green-accounting debate to date has been the focusing of research effort on capturing particular issues in numerical terms, rather than in producing a meaningful single national aggregate. The World Bank, for example, has developed and applied a concept of "genuine savings" (Adjusted Net Savings) defined as traditional net savings less the value of resource depletion and environmental degradation plus the value of investment in human capital.[153] If genuine savings are negative, the economy is living off its assets rather than creating net wealth.

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152 Heal and Kristom (2005) p.1202.

153 Kirk Hamilton and Michael Clemens "Genuine Savings Rates in Developing Countries", *World Bank Economic* Review 13(2): 333-356, 1999; World Bank *World Development Report 2003*; Stiglitz Commission 2009 pp.234, 241-244.

6.5 Accounting for Air Pollution in National Accounts

A recent paper[154] illustrates the current state of the art in modifying the standard SNA accounting framework, and the familiar GDP metric, to include environmental externalities – in this case, air pollution. The authors construct for each industry a "Gross External Damages" figure which is entered into the national accounts both as a cost and as an unwanted output. The underlying database records 10,000 emissions of six pollutants by country across the USA, and for each emission a shadow price (a marginal damage estimate) is estimated, using an integrated assessment mode, reflecting the external damage it causes across the US economy. To make these estimates the authors take an existing estimate of economy-wide damage from air pollution and then measure the change in this total when each individual point source is removed or added. The result is a lower-bound figure, since the marginal cost/price does not capture consumer surplus; and to make the translation from external effects such as increased mortality and morbidity the authors are obliged to use standard actuarially-based estimates which are both contentious and uncertain. Nevertheless, because (i) their physical damage estimates can be valued using any technique a replicating study might prefer, (ii) their figures are lower-bound, and (iii) they work tightly within the SNA framework, following the path already taken by statisticians for imputing the value of owner-occupied housing, their numerical findings provide a methodologically-consistent answer to the question whether any sectors of the US economy create more external damage than the recorded value added they produce – in other words, whether these sectors' contribution to pollution-adjusted GDP (what the authors call "augmented value added") is positive or negative. Of the 820 industries in the dataset, 17 are classified as high-pollution and of these, seven - solid waste combustion, petroleum-fired electric power generation, sewage treatment, coal-fired electric power generation, stone mining and quarrying, marinas, and petroleum and coal products - had negative "augmented value added".

Muller et al are highly conscious of the act that their results use actual market prices and market-based cost estimates, in a situation where actually making polluters pay would lead to changes in prices across the economy and hence possibly change their findings [emphasis added]:[155]

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154 Nicholas Z. Muller, Robert Mendelsohn and William Nordhaus, "Environmental accounting for pollution in the United States economy", *American Economic Review* 101(5): 1649-1675, August 2011. See also William Nordhaus, "Issues in Non-Market Accounting: Pollution Accounting in Theory and Practice" in *Measuring Capital: Beyond the Measures. Proceedings of the Seminar Session of the 2007 Conference of European Statisticians,* ed. United Nations Economic Commission for Europe, New York: United Nations, 2008, online at http://nordhaus.econ.yale.edu/Nonmarket%20accounting%20UN%202007.pdf .

155 Muller et a 2011 p.1667.

> If these external costs were fully internalized, either through purchases of pollution allowances or emission tax payments valued at the marginal ton, and if output and input prices did not change, the magnitude of the external costs would exceed the market VA for these seven industries. Of course, if the external costs were fully internalized, prices would change, so the results do not imply that the US economy would be better off not having these industries at all.

Hence their only direct policy conclusion is that the regulation of air pollution in the USA is too lax and should be tightened up radically. From a methodological point of view, however, the boundary of what can and can't be measured within the SNA framework is clearly shifting at the margin towards the inclusion of some environmental externalities as imputed outputs and costs within the economy-wide social accounting matrix. The paper concludes[156]

> While the present study has developed methods and estimates only for air pollution, we believe that it would be feasible to extend the analysis to water pollution, solid waste, and hazardous waste pollution. Given the size and distribution of damages found in this study, the development by national statistical agencies of a full set of environmental accounts embedded in the national economic accounts is clearly warranted. While private scholars can make provisional estimates of the present kind, a full set of accounts needs the full-time staff, professional expertise, and access to proprietary source data that only a government agency possesses

[156] Muller et al 2011 p.1673.

7. Environmental Statistical Reporting

While attempts to produce monetary measures of many environmental values have proven unsatisfactory, it remains true that resource management decisions can be improved by availability of statistical information expressed in other metrics that capture essential non-monetary values. This section reviews some of those metrics and evaluates the current state of New Zealand environmental statistics.

7.1 Dashboard Statistics

The Stiglitz Commission report noted at the outset that human well-being is multidimensional, and identified eight components of well-being[157]:

i. Material living standards (income, consumption and wealth);
ii. Health;
iii. Education;
iv. Personal activities including work
v. Political voice and governance;
vi. Social connections and relationships;
vii. Environment (present and future conditions);
viii. Insecurity, of an economic as well as a physical nature.

Commensurability across these eight, in the sense of producing a single numerical index that accurately weights and sums them, could only conceivably be achieved by abandoning key elements of the meaning of several of them. Monetary measures drawn from market data are informative about the first item on the list (material living standards) but cannot convey the most crucial information about political voice, or social relationships, or the state of the environment. Nor is a single monetary measure helpful in reporting inequality of income, social access, voice, and so on.

Of the various areas of human wellbeing that lie outside the scope of conventional national accounting, the one the Commission devoted the third chapter of its report to was sustainable development and the environment. The chapter produced two concrete recommendations for statistical practice. First was the creation of "dashboards" of environmental indicators to provide an objective overview of the state of various environmental systems and resources. Given that "sustainability requires the simultaneous preservation or increase in several 'stocks': quantities and qualities of natural resources, and of human, social and physical capital", the Commission concluded that while single rough-and-ready monetary measures of economic sustainability might be constructed (along the lines, for example, of the World Bank's net natural product indicator) such measures could not substitute for actual physical measures of environment stocks. The Commission looked at various

[157] Stiglitz et al 2009 pp.14-15.

previous attempts to produce single-valued measures of sustainability and found them all wanting. Instead it focused on[158]

> what the literature calls a "wealth" or "stockbased" approach to sustainability. The idea is the following: the well-being of future generations compared to ours will depend on what resources we pass on to them. Many different forms of resource are involved here. Future well-being will depend upon the magnitude of the stocks of exhaustible resources that we leave to the next generations. It will depend also on how well we maintain the quantity and quality of all the other renewable natural resources that are necessary for life. From a more economic point of view, it will also depend upon how much physical capital – machines and buildings – we pass on, and how much we devote to the constitution of the human capital of future generations, essentially through expenditure on education and research. And it also depends upon the quality of the institutions that we transmit to them, which is still another form of "capital" that is crucial for maintaining a properly functioning human society.
>
> How can we measure whether enough of these assets will be left or accumulated for future generations? In other words, when can we say that we are currently living above our means? In particular, is there any reasonable hope of being able to characterize this with one simple number that could play the role for sustainability that GDP has long played for the measurement of economic performance? One reason for such a quest would be to avoid the multiplication of competing numbers. However, if we want to accomplish this, we need to convert all the stocks of resources passed on to future generations into a common metric, be it monetary or not…… Such a goal seems overly ambitious. The aggregation of heterogeneous items seems possible up to a point for physical and human capital or some natural resources that are traded on markets. But the task appears much more complicated for most natural assets, due to the lack of relevant market prices and to the many uncertainties concerning the way these natural assets will interact with other dimensions of sustainability in the future. This will lead us to suggest a pragmatic approach that combines a monetary indicator, which could send us reasonable signals about economic sustainability, and a set of physical indicators devoted to environmental issues.

The Commission favoured presentation of a "dashboard' on which all the physical data are arrayed alongside any legitimate monetary indicators, with all of them to be considered simultaneously by a decision-maker:

> when driving a car, a meter that weighed up in one single value the current speed of the vehicle and the remaining level of gasoline would not be of any help to the driver. Both pieces of information are critical and need to be displayed in distinct, clearly visible areas of the dashboard. [159]

In many cases, the relevant information cannot be usefully displayed as monetary values:

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158 Stiglitz et al 2009 p.62.

159 Stiglitz et al 2009 p.265.

> [P]lacing a monetary value on the natural environment is often difficult and separate sets of physical indicators will be needed to monitor the state of the environment. This is in particular the case when it comes to irreversible and/or discontinuous alterations to the environment. … Physical indicators of this kind can only be identified with the help of the scientific community.

Having concluded that dashboards are inescapably necessary to capture the complexity of natural systems, the Commission conceded, with obvious regret, that:

> Dashboards … suffer because of their heterogeneity, at least in the case of very large and eclectic ones, and most lack indications about causal links, their relationship to sustainability, and/or hierarchies amongst the indicators used. Further, as communications instruments, one frequent criticism is that they lack what has made GDP a success: the powerful attraction of a single headline figure allowing simple comparisons of socioeconomic performance over time or across countries.[160]

7.2 New Zealand Environmental Statistics

In New Zealand, despite the fact that the Resource Management Act 1991 required ecological limits to be accounted for, procedures and data for doing so were slow to emerge. "Objective" statistical reporting of the sort of measures reviewed by the Stiglitz Commission has been patchy and not sustained consistently over time. A priority should be to continually upgrade the statistical record in those areas where quantitative, objective measures can be of use in decision-making regarding environmental matters, and to bring together the information that is available in a publicly-accessible format that allows explicit space for consideration of the less objective aesthetic, ethical and personal values and judgments without which the mere assembly of statistics is a sterile exercise. In New Zealand as elsewhere, the information at the base of the statistical pyramid is scattered across a wide range of scientific publications and ongoing research programmes[161], and the resources to develop both environmental accounts and environmental indicators have been lacking. In 2004 only 10 staff out of 933 employed by Statistics New Zealand were listed as working on "regional and environmental statistics"[162]; in 2009 government budget-cutting led Statistics New Zealand to "reduce the scale and frequency of environmental accounts production and development" and "discontinue regional analyses and local

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160 Stiglitz et al p.65.

161 For example, programmes funded under the New Zealand Biodiversity Strategy – see http://www.biodiversity.govt.nz/picture/doing/programmes/index.html . A recent stocktaking exercise by Statistics New Zealand, *Stocktake for the Environment Domain Plan* http://www.stats.govt.nz/~/media/Statistics/browse-categories/environment/natural-resources/stocktake-environment-domain-plan/7216%20Stocktake%20environment%20domain%20plan_complete%20file_2.pdf , runs to over 200 pages of specific data and sources.

162 *Annual Report of the Government Statistician for the year ended 30 June 2004*, http://www.stats.govt.nz/~/media/Statistics/about-us/corporate-publications/annual-reports/2004/2004AnnualReport.pdf , p.93.

government engagement, and the Quarterly Regional Report"[163]; and progress towards a promised "environment statistics domain plan" in partnership with MfE and DoC has been slow since the project was announced back in 2008[164], with the Plan currently promised for 2013.

Statistics New Zealand's substantive work on measuring sustainable development began in 2002 with publication of a working paper which contained data on a number of indicators selected to match those commonly encountered in the international literature. The paper noted however that[165]

> there are many areas where the indicators used are not particularly good measures, or only measure one part of the area of interest for sustainable development. Monitoring changes in our asset base is difficult, since the definitions are still evolving, particularly in the social and environmental area, and measures of many of the different types of capital are not available. The proxy measures presented here often only hint at changes that might be occurring

Public consultations on the 2002 framework document led to a further report in 2003[166], foreshadowing a Cabinet Paper due in 2003. A more substantial set of indicators were assembled in a 2008 publication[167] and reviewed at workshops held that year[168]. The underlying concept was the definition of sustainability put forward in

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163 *Annual Report of the Government Statistician for the year ended 30 June 2009* http://www.stats.govt.nz/~/media/Statistics/about-us/corporate-publications/annual-reports/2009/annual-report-2009.pdf p.26.

164 *Annual Report of the Government Statistician for the year ended 30 June 2008* http://www.stats.govt.nz/~/media/Statistics/about-us/corporate-publications/annual-reports/2008/annual-report-2008.pdf p.16.

165 Statistics New Zealand, *Monitoring progress towards a sustainable New Zealand: an experimental report and analysis* , August 2002, http://www.stats.govt.nz/~/media/Statistics/browse-categories/environment/sustainable-development/monitoring-progress-sustainable-nz/monitoring-sustainable-development.pdf p.16,

166 Statistics New Zealand, Review of the *Monitoring Progress Towards a Sustainable New Zealand* Report, February 2003, http://www.stats.govt.nz/~/media/Statistics/browse-categories/environment/sustainable-development/monitoring-progress-sustainable-nz/sustainable-development-report-review.pdf .

167 Statistics New Zealand, *Measuring New Zealand's Progress using a Sustainable Development Approach,* 2008, http://www.stats.govt.nz/~/media/Statistics/browse-categories/environment/sustainable-development/measuring-nz-progress/measure-nz-prog.pdf ; and *Key findings on New Zealand's progress using a sustainable development approach: 2008* , http://www.stats.govt.nz/~/media/Statistics/browse-categories/environment/sustainable-development/key-findings/key-findings.pdf . The data tables are at http://www.stats.govt.nz/~/media/Statistics/browse-categories/environment/sustainable-development/measuring-nz-progress/measure-nz-prog-tables-support-graph-data.xls.

168 Statistics New Zealand, *Monitoring Sustainable Development in New Zealand - Auckland and Wellington workshops summary* October 2008, http://www.stats.govt.nz/~/media/Statistics/browse-categories/environment/natural-resources/public-sustainable-development-workshop/summary-4.pdf

the 1987 Brundtland Report[169] and the "key findings" output was in the form of a dashboard showing a selection of 16 indicators with positive or negative performance over the period shown by ticks and crosses. A revised approach, dataset and indicators were published in 2009[170], and updated 2010 figures on a restricted set of 16 indicators appeared in 2011[171], resulting in the dashboard reproduced below, which is still a long way from what the Stiglitz Commission seems to have had in mind. (The 16 "objective" quantitative indicators, which are set out in an Excel workbook accompanying the paper[172], were selected from a much larger set assembled in the 2009 study and also online as an Excel workbook[173]. For people looking for a set of summary statistics on environmental changes over time this collection is a useful quick reference, though unfortunately revealing the relative paucity of data of sufficient quality in New Zealand.)

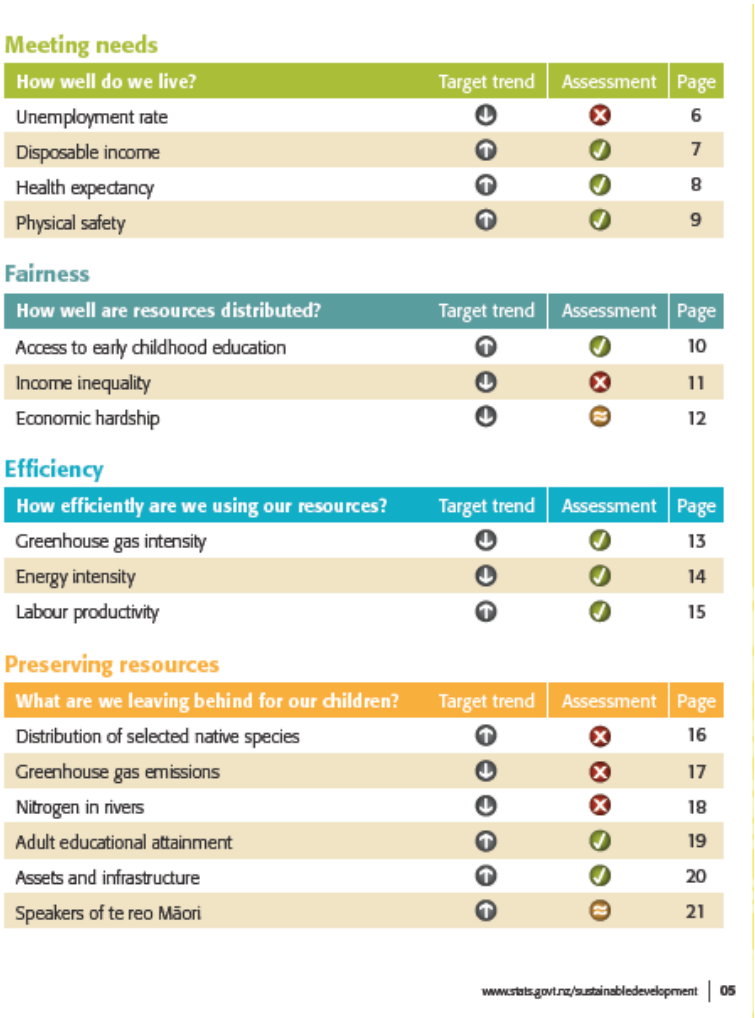
169 World Commission on Environment and Development, *Our Common Future*. Oxford: Oxford University Press 1987.

170 Statistics New Zealand, *Statistics New Zealand's Framework for Measuring Sustainable Development*, 2009, http://www.stats.govt.nz/browse_for_stats/environment/sustainable_development/sustainable-development.aspx

171 Statistics New Zealand, *Key findings on New Zealand's progress using a sustainable development approach: 2010* http://www.stats.govt.nz/~/media/Statistics/browse-categories/environment/sustainable-development/key-findings/key-findings-sustainable-development-2010.pdf .

172 http://www.stats.govt.nz/~/media/Statistics/browse-categories/environment/sustainable-development/key-findings/key-findings-sustainable-development-2010-tables.xls .

173 http://www.stats.govt.nz/~/media/Statistics/browse-categories/environment/sustainable-development/measuring-nz-progress/measure-nz-prog-tables-support-graph-data.xls



Meeting needs

How well do we live?	Target trend	Assessment	Page
Unemployment rate	↓	✗	6
Disposable income	↑	✓	7
Health expectancy	↑	✓	8
Physical safety	↑	✓	9

Fairness

How well are resources distributed?	Target trend	Assessment	Page
Access to early childhood education	↑	✓	10
Income inequality	↓	✗	11
Economic hardship	↓	≈	12

Efficiency

How efficiently are we using our resources?	Target trend	Assessment	Page
Greenhouse gas intensity	↓	✓	13
Energy intensity	↓	✓	14
Labour productivity	↑	✓	15

Preserving resources

What are we leaving behind for our children?	Target trend	Assessment	Page
Distribution of selected native species	↑	✗	16
Greenhouse gas emissions	↓	✗	17
Nitrogen in rivers	↓	✗	18
Adult educational attainment	↑	✓	19
Assets and infrastructure	↑	✓	20
Speakers of te reo Māori	↑	≈	21

Source: Statistics New Zealand, *Key findings on New Zealand's progress using a sustainable development approach: 2010* http://www.stats.govt.nz/~/media/Statistics/browse-categories/environment/sustainable-development/key-findings/key-findings-sustainable-development-2010.pdf . p.5.

A priority for a green-economy manager would be to continually upgrade the statistical record in those areas where quantitative, objective measures can be of use in decision-making regarding environmental matters, and to bring together the information that is available in a publicly-accessible format. The New Zealand sustainability statistics do not yet measure up in terms of best practice after two decades of stop-start work with very limited resources and little official commitment.

In the area of adjusting the national accounts to take account of "green" matters insofar as some sort of monetary indicators can be constructed, New Zealand statisticians made some progress in the 1990s and early 2000s[174] but momentum has

[174] Jeff Cope, Rosemary Goodyear and Anne McAllister, *Measuring economic progress? How Statistics New Zealand has measured the economy since 1945*, paper presented at NZAE conference, Wellington, New Zealand, July 2009, http://www.stats.govt.nz/surveys_and_methods/methods/research-papers/nzae/nzae-

since been almost completely lost. United Nations and OECD initiatives in the 1990s to move towards a System of Environmental-Economic Accounts (SEEA) in tandem with the established SNA national accounts led to a Statistics New Zealand working paper in 1996 and a draft methodology in 2002[175]. The Ministry for the Environment produced its first *State of the Environment* Report in 1996[176] and in the same year Statistics New Zealand published a discussion paper on integrated environmental-economic accounting at national level [177]. Six years later, in June 2002, Statistics New Zealand published a proposal for integrated environment-economy national accounts based on the work of OECD and United Nations agencies over the previous decade.[178] The proposal noted that the 2000 Budget had made provision for the development of "national environmental accounts", and stated that

> New Zealand is the only Organisation for Economic Co-operation and Development (OECD) nation that has not compiled a set of environmental accounts. Producing these accounts will, amongst other things, help New Zealand meet its commitments under various ratified international conventions. Statistics New Zealand is therefore producing a set of developmental natural resource accounts in association with the Ministry for the Environment.

To this end, Statistics New Zealand began producing national-accounts-related satellite accounts dealing with environmental issues[179]. The first of these to be carried to fruition was the "Environmental Protection Expenditure Account for the Public Sector". This account for the year ended June 2001 appeared in July 2002[180], and eventually

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2009/~/media/Statistics/surveys-and-methods/methods/research-papers/NZAE/2009/measuring-economic-progress.pdf pp.32-33 and 38-39.

175 Statistics New Zealand, *Natural Resource Accounts for New Zealand: an Overview Document*, June 2002, http://www.stats.govt.nz/browse_for_stats/environment/natural_resources/~/media/Statistics/browse-categories/environment/natural-resources/environmental-accounts/nra-nz-overview.pdf

176 For a critique see Stephen Knight, "Sins of Emissions – Economics and Ecosystems", *Planning Quarterly* December 1997 pp.4-6.

177 Statistics New Zealand, *Environmental Accounting: A discussion paper*, 1996.

178 Statistics New Zealand, *Natural Resource Accounts for New Zealand: an Overview Document*, June 2002, http://www.stats.govt.nz/browse_for_stats/environment/natural_resources/~/media/Statistics/browse-categories/environment/natural-resources/environmental-accounts/nra-nz-overview.pdf

179 Results of this programme to date are on the department's website at http://www.stats.govt.nz/browse_for_stats/environment/natural_resources/environmental-accounts.aspx

180 Statistics New Zealand, *Environmental Protection Expenditure Account for the Public Sector - Year ended June 2001,* http://www.stats.govt.nz/~/media/Statistics/browse-categories/environment/natural-resources/environmental-protection-expenditure/epea-2001.pdf

annual accounts were produced for three years 2001-2003[181]. The production of these data then ceased and has not resumed since.

More sustained effort has been put into the "monetary fish stock" account, which assembles time series of the asset value of New Zealand's commercial fish resource, based on quota and Annual Catch Entitlement (ACE) values since 1996; this account has been maintained and currently runs up to the 2009 year.[182] However the data are limited to commercial fisheries (no information on recreational fisheries is available), and the relevance to the state of the environment is only tangential.

Similarly listed under Statistics NZ's "environmental accounts" heading are energy statistics showing utilisation rates but no environmental data[183], a marine economy account which "values the contribution of marine based industries to the New Zealand economy" with no attempt to correct for resource depletion or sustainability[184], a "minerals stock account" for 1994-2000 which applies SEEA principles to valuing the total estimated mineral deposits of New Zealand (with results, incidentally, that effectively but only implicitly debunk the extreme claims of the local mining lobby[185]) which has not been updated since 2000; and a "water physical stock account" which now covers the years 1995-2010[186], and which was used to produce a monetary accounting of water stocks for 2003[187]. The latter estimated the value of freshwater flows for reticulation, irrigation, and hydroelectric generation at $1.4 billion annually. Lying behind this last figure is a little-known early exercise in valuing energy inputs to the New Zealand economy[188] which estimated the resource rental on hydro

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181 Statistics New Zealand, *Environmental Protection Expenditure Account for the Public Sector - Years ended June 2001- June 2003* http://www.stats.govt.nz/~/media/Statistics/browse-categories/environment/natural-resources/environmental-protection-expenditure/epea-2001-2003.pdf

182 http://www.stats.govt.nz/browse_for_stats/environment/natural_resources/fish-monetary-stock-account-1996-2009.aspx

183 http://www.stats.govt.nz/browse_for_stats/industry_sectors/Energy/energy-economy-1997-2006.aspx

184 http://www.stats.govt.nz/browse_for_stats/environment/natural_resources/marine.aspx

185 For the accounts see http://www.stats.govt.nz/browse_for_stats/environment/natural_resources/minerals/interpretation-of-the-mineral-stock-account.aspx . For implications in relation to the mining lobby see Geoff Bertram, *Mining and the Conservation Estate*, Simon Terry Associates report for Forest and Bird, September 2010, Chapter 2, http://www.geoffbertram.com/fileadmin/Mining%20Economics%20and%20the%20Conservation%20Estate%20main%20text.pdf .

186 http://www.stats.govt.nz/browse_for_stats/environment/natural_resources/water.aspx

187 Statistics New Zealand, *Water Monetary Stock Report: Partial monetary accounts plus review of background and valuation methods*, December 2004, http://www.stats.govt.nz/~/media/Statistics/browse-categories/environment/natural-resources/water-monetary-stock-report/wms-report.pdf .

188 Statistics New Zealand, *Energy Monetary Stock Account 1987-2001* http://www.stats.govt.nz/~/media/Statistics/browse-categories/industry-sectors/energy/energy-monetary-stock-account-1987-2001/ems-acc-1987-2001.pdf .

generation water using an NPV approach under which "renewable monetary estimates for hydro or geothermal stocks are estimates of the net discounted income stream from the resource". For 2001 the asset value of hydro water was $2.1 billion, but this value was sensitive to the price of the final output (wholesale electricity), as the table below shows[189]:

	Monetary stock asset value $million
1987	1,951.8
1988	1,330.7
1989	2,157.8
1990	2,689.5
1991	1,973.7
1992	1,577.7
1993	1,994.7
1994	2,954.2
1995	3,626.8
1996	2,640.6
1997	3,017.8
1998	3,108.3
1999	2,349.1
2000	3,669.7
2001	2,190.2

Only a few updated estimates of water values under the SEEA framework are available[190], none of them applicable to hydroelectricity.

Apart from Statistics New Zealand's material, the other main official environmental reporting exercise has been the Ministry for the Environment's *State of the Environment* reports, which have also had a difficult stop-start history as Government

189 From Statistics New Zealand, *Energy Monetary Stock Account 1987-2001* http://www.stats.govt.nz/~/media/Statistics/browse-categories/industry-sectors/energy/energy-monetary-stock-account-1987-2001/ems-acc-1987-2001.pdf, p.24 Table 5.5, except for the 2003 figure which is from Statistics New Zealand, *Water Monetary Stock Report: Partial monetary accounts plus review of background and valuation methods*, December 2004, http://www.stats.govt.nz/~/media/Statistics/browse-categories/environment/natural-resources/water-monetary-stock-report/wms-report.pdf , p.

190 Jodi York, *The Value of 'Free': Estimating the Contribution of Free Water Inputs to Agriculture Industry Productivity* , paper presented at the New Zealand Association of Economists (NZAE) Conference, at Wellington, New Zealand, 30 June 2011, http://www.stats.govt.nz/surveys_and_methods/methods/research-papers/nzae/nzae-2011/~/media/Statistics/surveys-and-methods/methods/research-papers/NZAE/2011/york-2011-nzae-water.pdf .

interest has waxed and waned. The first report appeared in 1997, and the second in 2007. Introducing the 1997 report, Minister Simon Upton noted that

> In making choices about the state of our environment we need good information. Without this, we cannot identify our environmental impacts, set realistic targets, assess progress, detect past errors, or objectively weigh economic and environmental values. This report brings together a wide range of information to help in making some of those choices. Although the report's information comes from a variety of sources, the picture that emerges is far from comprehensive. Some issues, some areas and some time periods have been better monitored and studied than others. Some have not been monitored at all.
>
> One message that does come through is that New Zealand's environmental information must be better coordinated if we are to derive maximum value from it. Although there are many information collectors out there, including local authorities, government departments, Crown Research Institutes, university scientists and special interest groups, much of their information is not collected regularly or in a standardised format. This makes it difficult to compare information from different parts of the country or to aggregate it at the national level.
>
> This inconsistency also means that we cannot be sure that the picture that emerges from this monitoring truly tells us about the state of our environment. While this obviously hampers our ability to reach definite conclusions, it does not provide a rationale for inaction. The importance of the environment to New Zealand's quality of life and economic welfare suggests that we need to be much better informed about the cumulative effects of our activities on our environmental assets.
>
> As the Minister responsible not only for the Environment but also Crown Research Institutes, I am pleased to say that efforts are now well underway to address some of these information shortcomings. The Ministry for the Environment is coordinating the development of a set of core national environmental indicators, and the Ministry of Research, Science and Technology is developing research strategies to coordinate better, publicly funded research and analysis. This will mean that future reports will have more robust quantitative information on which the assessment of trends can be based.

The Ministry does still maintain a set of 22 "core environmental indicators"[191], but seven of these are focused primarily on human activity (energy supply and demand, household consumption expenditure, land use, fishing activity, vehicle kilometres travelled, volume of freshwater use). Another three are concerned with institutional and landuse arrangements (extent of marine reserves, land use, waste disposal), and the remainder cover standard environmental measures (air quality, greenhouse gas emissions, stratospheric ozone, native land cover, native species distribution, river water quality, lake water quality, groundwater quality, recreational water quality, soil health, erosion risk). Irregular "environmental report cards" are produced for individual indicators but systematic countrywide overall assessments, in the form of

[191] http://www.mfe.govt.nz/environmental-reporting/about/tools-guidelines/indicators/core-indicators.html

the Ministry's "State of the Environment" reports, have remained a rarity. Only one further "state of the Environment Report" was produced, in 2007[192], and in 2012 the Government announced that the next one, planned to appear at the end of the year five years after its predecessor, had been cancelled[193].

In 2006 an OECD review team studied New Zealand's environmental performance. Its report was published in 2007 and painted a bleak picture of the weak state of environmental reporting. The previous, 1996, OECD review had commented that[194]

> There is a need to develop concrete targets for environmental policies, with good monitoring of progress achieved as well as detailed examination of the costs involved. The current lack of targets and of economic and physical data is an impediment to pursuing cost-effective environmental policies. This approach ought to be corrected

The 2007 review found that most environmental information was collected by regional councils as part of their duties under the Resource Management Act, but this material was not consistent across the country, and national-level syntheses were inadequate:[195]

> Knowledge bases at the *environment-economy interface* remain limited, with data on the economic dimensions of natural resource use even scarcer than general environmental data. New Zealand published its first set of environmental protection expenditure accounts for the public sector in 2002, estimating total expenditure at NZD 1.2 billion in the 12 months to June 2001. Despite the announced intention to publish such accounts annually, the second set was released in 2005 (StatsNZ, 2005b). It estimated expenditure in 2002/03 to have increased by 8.8% over 2000/01 (Chapter 4).
>
> Overall, a serious *lack of nationally aggregated data and trends data* remains in most environmental areas, and stakeholders have expressed frustrations in this regard. The lack of data makes it difficult to use the existing indicators to gauge the state of New Zealand's environment and prioritise actions to improve or conserve it. Indeed, one reason given for delays in developing national environmental standards is that there is insufficient data to convince people such standards are required. Publication of the 1997 State of the Environment Report was a positive step, but needs to be followed up with more streamlined periodic reporting to enable result-oriented policy-making. The publication in 2002 of the first set of national environmental accounts was also an important step, and should be pursued. Since 2003, an attempt has been made to revitalise environmental data work, starting with the establishment by StatsNZ of an Environment Statistics Strategy and the formation of an Environment Statistics User Group to facilitate communication between StatsNZ and statistics users.

192 http://www.mfe.govt.nz/publications/ser/enz07-dec07/ .
193 Amy Adams, reply to parliamentary question 09130(2012), 16 October 2012
194 OECD, *OECD Environmental performance Reviews: New Zealand 1996*, Paris 1996.
195 OECD, *OECD Environmental performance Reviews: New Zealand*, Paris 2007, p.171.

In 2011 the Government released a discussion document, *Measuring Up*[196], which was introduced by the then Minister, Nick Smith, in the following terms:

> … we are in a poor position to provide hard evidence that our clean, green brand is justified. New Zealand is one of only a few OECD countries without a legislative basis for national state of the environment reporting. In Australia, Canada and many other countries, regular national state of the environment reporting is required by law…
>
> This difficulty hampers our capacity to address important environmental issues like freshwater quality. There is a lack of national consistency in what is measured, how and when. … This inconsistency enables some to minimise the problems and others to exaggerate them. Too much energy is wasted in the debate over data rather than focusing on addressing the problem.

The Minister foreshadowed a new Environmental Reporting Act which would shift the responsibility for state-of-environment reporting to the Parliamentary Commissioner for the Environment. The proposal has not proceeded, however, leaving the state of environmental reporting more or less where it was a decade ago.

196 http://www.mfe.govt.nz/publications/ser/measuring-up-environmental-reporting/measuring-up-environmental-reporting.pdf

8. Applying the Theory to Current Issues

8.1 Proposals for Reform of the RMA

- The Resource Management Act is a crucial statute governing the procedures and content of adjudication at the economy/environment boundary. Its legitimacy in this role rests heavily upon the way it directs the relevant authorities to "recognise and provide for", "take account of" or "have regard to" a wide range of values from spheres other than the market. Those values are not generally reducible to the measuring rod of money, but many can be quantified, understood, and respected in their own terms, drawn from the relevant spheres of human activity and well-being.

- The strongest language in this context is that of section 6 dealing with "matters of national importance" - many of which involve non-market values - and is significant in a statute that generally opens matters up to tradeoffs (for economic gain). By requiring authorities to "recognise and provide for" these matters, the section points the way to the possibility of discontinuity thresholds and even blocked exchange as appropriate responses to market-based demands for access to key resources.

- The Government has put forward a proposal to amend section 6 by effectively merging its matters of national importance with "other matters" to be considered in section 7. The proposal is to then have a "single section that lists the matters that decision-makers would be required to 'recognise and provide for'".[197]

- The government argues that: "There is concern that the predominance of environmental matters in section 6, and the hierarchy between sections 6 and 7, may result in an under-weighting of the positive effects (or net benefits) of certain economic and social activities."[198] The clear effect of its proposal is that exchanges that were previously blocked or restricted (as a result of environmental matters in section 6 having to be valued ahead of economic matters) would not be in future. In addition, the list would remove matters material to boundary adjudication, including: 7(aa) the ethic of stewardship and 7(d) intrinsic values of ecosystems.

- The government argues that removing the current hierarchy between sections 6 and 7 would "support more balanced decision-making" and would "ensure the list of matters contained in the Act better reflect today's values".[199] The balance proposed here is to allow tradeoffs where blocking and thresholds would

[197] MFE, *Improving Our Resource Management System: A Discussion Document,* March 2013, p 36. www.mfe.govt.nz/publicati=ons/rma/improving-our-resource-management-system.html

[198] Ibid, p 35.

[199] Ibid, p 36 and 38.

otherwise capture and protect the non-market interests and values that are to be adversely affected by an activity. However, no evidence has been provided by the government to date that the removal of the block to such exchanges would "better reflect today's values".

- The government has argued that the Environment Court should not make these value judgements. "The judiciary should not be placed in the position of having to determine values or policy – this role should be played by publicly-accountable, elected representatives".[200] But local government's elected representatives, and hence immediately affected communities, would have a more circumscribed role than at present. Central government would make decisions that are "nationally important", or involve "nationally-significant values", or simply "where consistency outweighs the value of local specificity".[201] No mechanism for determining what is to be a local government matter and what central government will determine is offered in the proposal, but it provides a clear mechanism in the form of a proposed amendment to the Act that would give the Minister power "to directly amend an existing operative plan" following a staged process of engagement with the council and that "such a power would be similar to regulation-making powers".[202]

- Thus the proposal seems set to reduce to an unknown degree the scope of the current rights under the RMA for communities to block exchanges at the district and regional level. This has constitutional implications and will also be important to the extent it involves decisions that pass risk to the community. For in principle, those who would bear a risk are best placed to determine whether to accept it and to what degree – given that there is no objective standard as to what is a correct level of risk and that the public tends to assess risk differently to analysts.[203]

- The important result from the present study in relation to RMA reform is that there will be cases in which the tradeoff approach is not appropriate and where it

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200 Environment Minister Amy Adams, *RMA discussion document launched*, Media Statement, 28 February, 2013.

201 The full quote reads: "As a general principle, central government should provide very clear direction for matters that are nationally important, where decisions reconcile nationally-significant values, or where consistency outweighs the value of local specificity. Local government should play a key role in decision-making where there are local circumstances that demand a more site or community-specific approach, where the costs and benefits are localised or where the local authority is best placed to make the decision". Environment Minister Amy Adams, *RMA discussion document launched*, Media Statement, 28 February, 2013.

202 MFE, *Improving Our Resource Management System: A Discussion Document,* March 2013, p 40.

203 "Some researchers have found that risk analysts tend to consider only two components of risk - the likelihood of the event occurring, and the size of the event should it occur. The lay public, however, tends to consider risks within a much broader context, and takes into account a wide range of factors." ERMA, *Approaches to Risk*, December 2002, p. 11.

will be better to draw "lines in the sand" marking the boundary within which market forces are to be restricted. Insofar as RMA reform seeks to shift the market/environment boundary without good reason, it runs the risk of draining legitimacy from the established channels of adjudication, opening space for the contest of incommensurable values to shift to other arenas.

- In order to inform a discussion on the proposed amendments, it will be helpful to represent the RMA as it stands in terms of where boundaries have been drawn and show the effect of proposed boundary shifts that open new areas to tradeoffs. Ideally the matters currently included in the less negotiable "matters of national importance" block in section 6 should remain there (and potentially some others might be added) unless there are generally compelling reasons for change – reasons that are persuasive beyond the particular vested interests that would benefit directly.

8.2 Oceans – EEZ Legislation Test Case

- Law governing the EEZ[204] was passed last year in the face of widespread criticism of the process to be used to assess applications for ocean activities outside the 12 mile limit. A key issue is the lack of certain definitions (e.g. what constitutes an economic benefit to New Zealand (s 59 2(f), and hence what is to be counted in any cost benefit assessment produced as quantitative evidence in favor of a project), and the absence of clear principles to guide decision-making, reflected in the general use of the expression "take into account" (s 59 2) without any process specified for how to undertake that task, or what weight to place on competing incommensurable values (such as "the importance of protecting the biological diversity and integrity of marine species, ecosystems, and processes" - s 59 2(d)).

- These are among the pointers strongly suggesting that the first successful application to the EPA under the EEZ law will trigger an important court challenge. Any challenge is restricted to considering points of law, meaning that definitions and process issues will be among the most important.

- The wording of, and Parliamentary debates on, the legislation therefore require careful scrutiny to determine whether, and to what extent, it leaves open the way to decisions matching the blocking and discontinuity categories discussed in this paper. This is likely to involve deriving the rational platform on which the EEZ law could be assumed to have been constructed - since no particular one was specified at the time. The absence of clarity in the accompanying official documents means it is important to attempt to reconstruct what might have

[204] Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012.

been, to enable a coherent description to how the existing law could be interpreted to have been founded.

- A second step would be to look at what limits UNCLOS and other international marine treaties place on New Zealand's sovereign right to undertake activities within the EEZ. If the treaties can for the EPA's purposes be deemed to apply irrespective of the EEZ legislation, or if section 11 is found to give force to them (it is somewhat ambiguous), then a series of boundaries can be established that would be outside the reach of the EPA to make tradeoffs. They would have the effect of setting a ceiling on the environmental costs that could be incurred in certain respects, or simply barring particular environmental impacts. An application violating these requirements should then fail to gain approval as a matter of process. Note that the EEZ legislation departs from another major piece of legislation also administered by the EPA – the HSNO Act – in that there are no such boundaries pre-established. Section 36 of this act sets minimum standards for the use of any hazardous substance or new organism and so draws a clear line below which no amount of economic benefit can justify an activity.

- As the EEZ legislation simply sets out a list of matters to take into account (and some scant information sufficiency principles), there is considerable room for work on boundary setting that takes the international treaty matters and certain other matters of importance and looks at how to set boundaries that the law could reasonably be expected to defend. In particular, it would look at which matters would be best treated outside the cost/benefit framework that the EPA often uses, and should thus not be monetized.

- Even after the effect of the international treaties has been factored in, issues will arise that involve environmental costs that will be very difficult to measure and in the end may best be dealt with administratively. In order to administer such matters, boundaries need to be set.

- The legislation provides for bonds to be set so as to ensure conditions are performed (sections 65 2(c)). This is consistent with seeking actual protection or performance instead of fines. However, unless the bonds are set to a high enough level, then their economic effect can amount to that of a fine as once the cost of performance exceeds that of the bond, the commercial incentive is to simply forfeit the bond. This underlines the importance of ensuring that other sections of the Act are also utilized: that security is sought from the company itself and more importantly that an appropriate third party guarantee is obtained (sections 65 2(d) and (e)).

8.3 Mining Applications Under the RMA

Schedule 4 of the Conservation Act provides a direct example of how areas containing mineral resources can be excluded from mining, and the reaction to proposals to remove this protection demonstrated there was widespread public support for holding that boundary. (The fact that the understood economics would have suggested the mining was in any case at risk of carrying negative national benefits (losses) is interesting, but incidental, as the point of the boundary is to put such estimates to the side.)

The proposal to establish an opencast coal mine at Denniston has already represented a major test of the RMA, with the outcome of the Supreme Court appeal on whether climate change is to be taken into account still unknown at the time of writing. The substantive case on the mining consent application will presumably be heard under the existing version of the Act so that the existing versions of sections 6 and 7 will apply.

The case highlights the question of how climate-change impacts are to be brought into the resource management procedures. They were legislated out of the RMA's scope of consideration on the basis that an effective national economic instrument would separately internalise that particular set of costs. As the envisaged level of pricing never eventuated, and with the ETS most recently having been put into in a comatose state at a time when carbon prices have dropped to 20c/tonne, it is clear that the argument for the exclusion of climate change externalities on the grounds of duplication is void. With such a conspicuous market failure in an area where the market was supposed to operate, there would seem to be a strong case for at least allowing a dual responsibility to be set between the ETS and the RMA. In other words, payments made under the ETS with respect to the activity could be counted in the RMA assessment, but this would not limit an RMA hearing from assessing the full climate change impacts.

8.4 Tourism

Tourism is the pre-eminent sector of the market economy that interacts directly with nature and commodifies the human experience of interaction with nature. The issues raised by this commodification at the economy/environment border are especially stark in the case of ecotourism, whose business model is built around the observation and appreciation of unspoilt natural systems.

The tourism sector presents some of the most difficult resource management issues confronting New Zealand. The sector's contributions to the balance of payments and Gross Domestic Product are sufficient to make it a central player in the market sphere, but its impacts on the environment have been growing rapidly to the point where

several issues that could previously be resolved by tradeoff decisions seem likely to shift into the discontinuity space, requiring absolute limits to be imposed on some tourism operations, with consequent rationing of access.

The economic importance of tourism means that there will be strong lobbying pressures and more aggressive resource consent applications, both pointing in the other direction, towards progressively more pro-market tradeoffs. These pressures are likely to be increasingly serious as the funding constraints on the Department of Conservation make that agency more dependent on corporate goodwill and contributions.

Pro-actively identifying defensible boundary limits on expansion of the tourism sector is therefore likely to be a worthwhile exercise. It would involve measures such as tightening-up provisions in national park plans and district plans, and arguing forcefully the case for thresholds and occasionally blocked exchange before the RMA authorities.

In terms of the theoretical discussion earlier in this paper, policies to keep the impacts of tourism consistent with reasonable levels of environmental protection encounter continually the need to make choices between inherently incommensurable values. They encounter also, however, clashes amongst several monetary values relating to the value of tourism itself and the value of its impacts.

Obviously, tourism services are marketed commodities which sell for a price, and that price represents the Willingness to Pay of tourist clients – in a sense, their monetary evaluation of the experience they expect to enjoy. The WTP of tourism consumers has to be compared, in one way or another, with the values foregone by those in the local community whose lives are affected in some meaningful way by tourism impacts.

A case where tourist WTP seems clearly greater than local values at stake is whale-watching at Kaikoura, where synergies between tourism revenues and local development seem to have been appropriated without undue damage to the resource. The absence of serious critiques of this operation in the scientific literature seems to mark it out as a case of acceptable impacts.

Less clear is the impact of tourism operations that utilise helicopters and fixed-wing aircraft to enable tourists to view unspoilt wilderness areas that have other values than simply the visual. Walking parties visiting the Fox and Franz Josef Glaciers are paying to enjoy an experience that includes peace and solitude in a mountainous environment, and aircraft noise is a clear intrusion. The extensive balancing exercise in the National Park Plan reflects clear awareness that there are likely to be non-convexities in the production frontier trading-off the various categories of tourism

experience, due to the negative externalities imposed by mechanised tourism activities on non-mechanised.

Effectively there is a missing market – there is no way for the ground-based walking tourist to buy-off the airborne viewer – and it is difficult to see how such a market could be created and operated. In the absence of market mechanisms, other restraints on mechanised tourism come to bear – both informal, through peer-group pressure of one group of tourism operators on another, and formally, through restrictions on certain types of activities imposed in the District Plans and National Park Plans for tourism destinations.

In addition to the clash of market values, those responsible for administering the conservation estate that is the basis for most eco-tourism have to take account of, and protect by specific-performance measures, the intrinsic values that the estate was established to preserve. Here again the principal policy measure is likely to be quantitative restrictions on the scope of tourism activity

The Mount Aspiring National Park Plan is clear in its exclusion from the park of certain adventure-tourism and high-externality tourist activities that would intrude unduly on the essential values of the park:[205]

> It is not the intention to try to provide for all possible recreational or tourism experiences or uses in the park. Some activities, and the facilities and services associated with them, are incompatible with national park values. There are usually many opportunities available on lands of similar character outside the park. Thrill-seeking activities such as bungy jumping are in this category. Activities reliant on the use of motorised vehicles are also considered incompatible with national park values although some provision is made for the use of aircraft and jetboats for access purposes.

Nevertheless, it does appear that commercial pressures from tourism operators, combined with fiscal constraints on the Department of Conservation and the brute fact of long-established property rights (such as those of skifield operators on Mount Ruapehu) have in some areas pushed the market boundary further into the natural realm than is fully consistent with essential amenity values or with reasonable environmental constraints. There is clearly scope for more systematic research in this area.

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[205] *Mount Aspiring National Park Management Plan* June 2011 http://www.doc.govt.nz/upload/documents/about-doc/role/policies-and-plans/national-park-management-plans/mount-aspiring/mount-aspiring-national-park-management-plan.pdf p.56.

9. Conclusions

Borders are places of negotiation, and there are several levels at which that negotiation takes place on the economy/environment border. At the most superficial level are issues which are capable of reconciliation by the balancing of competing commensurable values that can be converted to money terms and thence:

- charged to market participants as rentals and compensation payments (when the negotiation is between private parties – for example when ownership of an environmental resource has been privatised and the resource itself commodified); or
- embodied into standard economic policy through market-based devices such as pollution taxes and cap-and-trade mechanisms, when government on behalf of the community stands on the environmental side of the negotiation.

The basic idea of achieving balance between competing commensurable values via the mechanism of the market is not an unreasonable one in cases where the interests of all parties can reasonably be translated into monetary terms.

At a more fundamental level come situations where human choices must be made among radically incommensurable values. Here the market sphere is only one bearer of one type of value, and other spheres must be able to bring their particular values to the negotiation, whether on equal terms or under whatever particular weighting scheme has been agreed by the community through a process of reasoned deliberation. The idea of a "green economy" already carries the implication of a particular set of constraints that prioritise environmental protection and sustainability of natural systems, and that require players in the market sphere to undertake their profit-maximising activities within physical constraints set to achieve green outcomes.

The argument for such hard physical constraints rests on the impossibility of fully and legitimately monetising the values at stake, on the inability to practically substitute for certain essential environmental services, and on the case for 'specific performance' or threshold limits rather than monetary compensation as the appropriate remedy when environmental values are threatened by market activity. In economic terms the argument is that market players are the parties best placed to optimise their resource allocation decisions so as to respect environmental (and other socially-imposed) physical constraints at least cost and with least loss of socially-useful market production – but to induce them to do so, they must confront those constraints in some tangible and well-enforced form.

New Zealand planning law and practice is filled with examples of such physical constraints imposed to induce adjustment by the market sphere, so that its operations

become consistent with sustainability requirements, and so that its commodifying and privatising tendencies are checked in their ability to subvert regulatory outcomes. The most obvious danger in the current policy environment lies in the prospect that the processes of reasoned deliberation, on which a working democracy relies to strike its policy balances, may be undermined by market participants' diversion of resources into propagandistic campaigns seeking to tilt the political playing field in favour of so-called "development" and against environmental interests. Such diversion of market-sphere resources into promoting the self-aggrandisement of the sphere itself fall under the economic theory of 'rent-seeking', and represent a serious issue for institutional design.

The academic disciplines that deal in the monetary values of the market sphere – most notably economics and accountancy – have much to contribute to a green economy, but only if their techniques are deployed in ways that recognise and respect the methodological limits. The cautious extension of national income accounting to include imputed costs of environmental externalities is a positive step; but the Stigitz Commission's warnings of the dangers of pushing monetisation beyond its meaningful limits need to be borne in mind. Monetised calculations work only at the margins of the market, because of their dependence on the relative prices that prevail in markets where only marketed goods and services are trading and non-marketed values are absent. Seriously extending the market sphere to incorporate all of nature via private profit-oriented transactions – as some solutions to the "tragedy of the commons" suggest – would neither yield decentralised solutions to what are inescapable collective policy problems (because of the need to create a near-infinite number of new markets in goods whose inherent nature is unsuited to trading), nor accord due respect to the values that are formed and held in non-market spheres of human life.

The fact that nature in general is not suitable for sale does not render measurement exercises, whether monetary or non-monetary, worthless, but all such exercises have to be viewed within their methodological boundaries, and due respect has to be accorded to the values held by separate spheres, and measured in terms that are meaningful to those spheres.

The same applies to various policy tools that may be deployed by the managers of a green economy. When confronting issues that arise within the market sphere and that can be corrected within the market sphere, so-called "economic instruments" have direct application and can be embraced. The area of pollution externalities, for example, involves a problem which arises within the market sphere and which can be pre-emptively dealt with by market interventions such as taxes, cap-and-trade systems, and adjustments to the property rights exercised by market participants (including, obviously, issues around the state or private ownership of particular market entities).

Similarly, technical progress can be "biased" in different directions by policy measures that shift the incentives facing market players, opening the way to measures that target a structural shift of the economy as a whole towards more renewable technologies. Where, for example, taxes on environmental 'bads' make revenue available to policymakers, deploying those revenues in ways that efficiently bias technical progress in a green direction is one legitimate application of the tax-dividend model.

In addition, many of the sectoral markets that currently operate in the real-world economy have structural characteristics that constrain market players away from green behaviours and towards environmentally-damaging ones. A salient case in point for New Zealand is the design of the electricity market, which is an artefact of large-scale institutional engineering by government that has left demand-side response, distributed generation, and small-scale renewables largely out in the cold. Another example is in the planning rules surrounding transport infrastructure, which utilise high discount rates, arguably undervalue favourable externalities from alternative transport modes, and place other institutionally-determined obstacles in the way of more green transport planning. Thus a green economy's managers would be alert to opportunities for institutional and regulatory reform to shift the economy' incentives and general orientation in a new strategic direction, different from the implicit strategy emerging from decentralised, uncoordinated market forces.

A key conclusion from the research undertaken for this paper is that the institutional architecture for resource management needs to be designed to identify, and respond appropriately to, the three cases in the Griffin hierarchy: trumping, discontinuity, and tradeoff. Proposals for institutional or legislative change that focus on only one of these three – for example, on the notion that all environmental decisions are simply matters of tradeoffs, rather than of respecting specific non-negotiable limits to market activity – will produce outcomes that lack legitimacy and fail to engage effectively with the particular challenges presented by incommensurability and the existence of collectively-agreed blocked-exchange boundaries. In areas such as RMA reform, EEZ litigation, and tourism management, the concepts of discontinuity and "trumping" (blocked exchange) provide essential anchors to restrain any tendency for policy to drift into one-size-fits-all arrangements that tend to unjustifiably privilege one sector or sphere of human activity over others with legitimate claims to consideration.

Ultimately, this boils down to a simple prescription of according due respect to all spheres of human social existence, their values and practices, and allowing those values and practices to be brought into adjudication procedures in terms that retain their essential meanings and modes of measurement.

Appendix I QEII Trust as an example of the Ostrom model

The QEII Trust was set up by statute in 1977 as an independent organisation intended to "encourage and promote, for the benefit of New Zealand, the provision, protection, preservation and enhancement of open space." Private landowners are able to enter into "open space covenants" which set aside areas within their properties that have valued natural or cultural attributes worthy of preservation. The Trust acts as perpetual trustee for areas under covenant, and relies heavily on local communities and management committees to monitor and actively protect covenanted areas. Legal ownership remains with the original landowner, but the boundary of the covenanted area excludes it from direct exploitation as part of the farming or other commercially-oriented venture within which it is situated.

The Trust arrangement finesses the other common arrangement in New Zealand for setting aside protected natural areas, namely direct Crown ownership. As Giller notes[206]

> Many of the more intact remnants of pre-human vegetation [in New Zealand] are now owned by the Crown and administered by the Department of Conservation. However, especially in the South Island, this conservation land is heavily skewed in favour of the inland mountains – often visually dramatic landscapes characterised by steep country of limited agricultural potential. Yet much of New Zealand's beauty and biodiversity richness occurs in the lowland hills, on the plains and along the coasts. Remnants of original vegetation in these areas tend to be small, modified, fragmented - isolated from similar remnants by developed land - and are often threatened by a range of animal pests and invasive weeds. Characteristically such areas are on farms and small rural holdings and their wellbeing is largely dependant on the awareness, goodwill and resources of individual private landowners. The Queen Elizabeth II National Trust (QEII) was established in 1977 to help such landowners protect special features on private land.

As of mid-2012 the QEII Trust holds covenants over 111,000 hectares of privately-owned land, plus 1,686 hectares of "significant habitat" that are directly owned in 29 Trust properties.[207] The box below shows the current spread of covenants. The role of the Trust in the management of these areas of land is similar to that of the entrepreneur in Coase's firm and that of the external "catalysts" in Ostrom's account of how a Cornell University team provided the organising initiative for self-

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206 Miles Giller, "A QEII Regional Representative's View", *Indigena* February 2008, online at http://www.openspace.org.nz/includes/download.aspx?ID=31154 p.1.

207 http://www.openspace.org.nz/Site/About_QEII/default.aspx

governance of the Gal Oya irrigation project in Sri Lanka[208]. Ostrom notes that successful self-organised institutions of the sort analysed in her book "were rich mixtures of public and private instrumentalities"[209], with external agencies often relied upon to perform particular roles that would be costly or unduly difficult for the direct participants. The Trust basically reduces the transaction costs facing private landowners wishing to set aside covenanted areas, by providing legal expertise in drawing up and registering the relevant documents, material assistance with surveying and fencing, monitoring on a two-yearly cycle, and advice from its local representatives. Landowners enter into covenant arrangements voluntarily, on their own initiative, and without surrendering their other ownership rights over the land – which implies that there is no necessary provision of public access to the covenanted areas, and where access is granted it may be subjected to conditions overseen by the Trust.[210]

208 Ostrom 1990 pp.168-171.

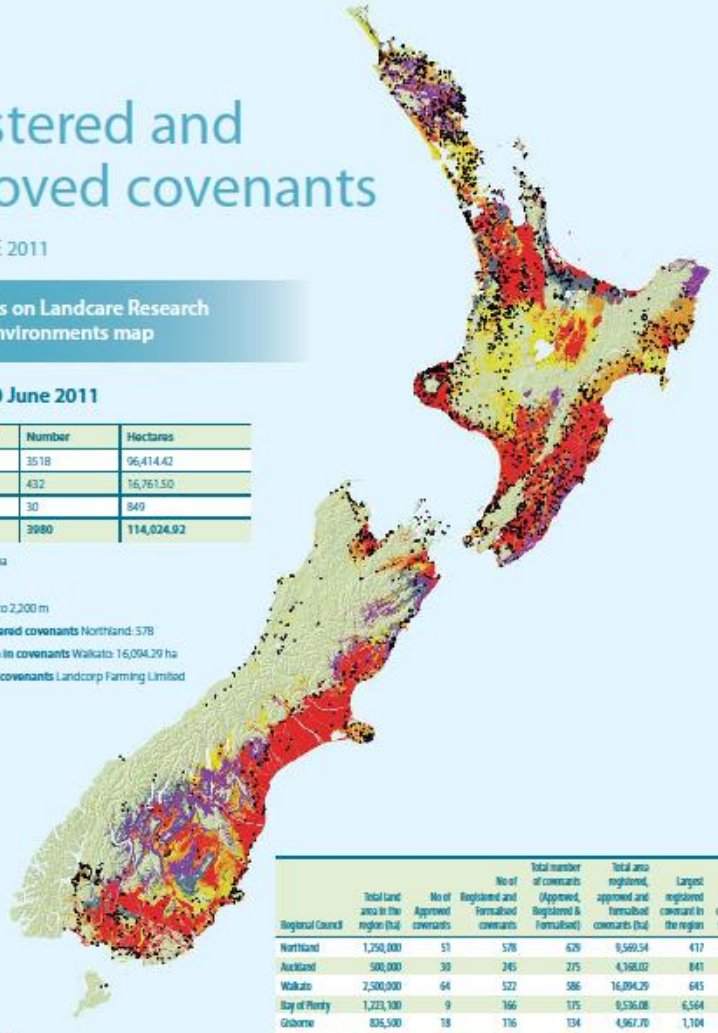
209 Ostrom 1990 p.182

210 See http://www.openspace.org.nz/Site/Places_to_visit/default.aspx

Registered and approved covenants

AS AT 30 JUNE 2011

QEII covenants on Landcare Research Threatened Environments map



Summary – 30 June 2011

Protected open space	Number	Hectares
Registered covenants	3518	96,414.42
Approved covenants	432	16,761.50
Formal agreements	30	849
Total	**3980**	**114,024.92**

Largest covenant 6,564 ha

Average size 28.6 ha

Altitude range Sea level to 2,200 m

Region with most registered covenants Northland: 578

Region with largest area in covenants Waikato: 16,094.29 ha

Organisation with most covenants Landcorp Farming Limited

QEII properties 29

Threat category

- Acutely threatened; < 10% left
- Chronically threatened; 10-20% left
- At risk; 20-30% left
- Critically underprotected; > 30% left and <10% protected
- Underprotected; > 30% left and 10-20% protected
- Less reduced and better protected; > 30% left and > 20% protected
- Registered and approved QEII covenants: symbol represents location only and not actual area of covenanted land.

Regional Council	Total Land area in the region (ha)	No of Approved covenants	Registered and Formalised covenants	Total number of covenants (Approved, Registered & Formalised)	Total area registered, approved and formalised covenants (ha)	Largest registered covenant in the region	Average covenant size (ha)
Northland	1,250,000	51	578	629	9,569.54	417	15.2
Auckland	500,000	30	245	275	4,168.02	841	15.2
Waikato	2,500,000	64	522	586	16,094.29	645	27.5
Bay of Plenty	1,223,100	9	166	175	9,536.08	6,564	54.5
Gisborne	826,500	18	116	134	4,967.70	1,104	37.1
Taranaki	723,600	54	244	298	5,364.01	334	18.0
Hawke's Bay	1,420,000	21	209	230	10,311.02	4,606	44.8
Horizons	2,221,500	28	297	325	7,464.72	306	23.0
Wellington	813,000	32	281	313	6,030.18	824	19.3
Tasman	978,600	14	130	144	2,270.74	641	15.4
Nelson	42,100	0	13	13	300.75	140	23.1
Marlborough	1,049,500	6	59	65	2,965.18	182	45.6
West Coast	2,300,000	18	50	68	2,491.41	619	36.6
Canterbury	4,220,000	42	235	277	16,320.25	1,679	58.9
Otago	3,200,000	23	157	180	10,637.03	2,735	59.1
Southland	3,035,000	22	246	268	5,594.00	214	20.9
Totals		**432**	**3,548**	**3,980**	**114,024.92**		**28.6**

Appendix II: Pest control and climate change: a case for valuing ecosystem services?

The value to the market economy of ecosystem services has been the subject of some recent research, including work commissioned by the Department of Conservation[211]. In particular, there has been discussion recently in New Zealand policy circles of the potential for pest control to achieve simultaneously two desirable outcomes: an improvement in the status of the indigenous forest estate (a non-marketed good that embodies largely non-monetary values) and an increased rate of carbon sequestration, which might produce monetary payoffs in the event that the evolving international carbon market introduces and trades carbon offset credits that include New Zealand's indigenous forests.

The Green Party, for example, has argued that[212]

> New Zealand's old growth indigenous forests are not included in our Kyoto agreement because we did not sign up to Article 3.4. However the world is moving towards full carbon accounting and at some stage we will need to include them.
>
> These forests in the DoC estate alone store a huge 8,785 Mt of carbon dioxide equivalent and managing it well is our greatest opportunity to Contribute to a stable climate. They are currently degraded by introduced pests such as possums, goats and deer which consume large quantities of forest biomass. New research shows that if pests were eliminated or controlled there is the potential for them to store an additional 8% or 705 Mt.(1)
>
> Our current native forests have a carbon value of $220 billion, but DOC is allocated just 0.03% of this amount to slow the rate of degradation of this asset and nothing to enhance it. The greatest potential in the time horizon to 2020 is in active management of shrublands that are failing to succeed into forest due to invasive pests.
>
> The most cost effective gains can likely be made through enabling succession from existing shrubland-forest vegetation to tall forest (through controlling browsing animals and preventing fire) and from grassland sites in areas of

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211 E.g. *Economic Benefits Of Water In Te Papanui Conservation Park: Inception Report,* Butcher Partners Limited, June 2006, and Alan F. Mark and Katharine J. M. Dickinson "Maximizing water yield with indigenous non-forest vegetation: a New Zealand perspective"*, Frontiers in Ecology and the Environment* 6(1): 25-34, February 2008; Graeme Speden "Forestry, farming, conservation and sustainability" *New Zealand Journal of Forestry* 53(2): 11-16, August 2008, http://www.nzjf.org/free_issues/NZJF53_2_2008/50085E8C-BBF3-48e8-BA27-84FF10FA8892.pdf.

212 Green Party, *Getting there*, http://img.scoop.co.nz/media/pdfs/0908/BigAffordableClimateChange.pdf

moderate rainfall and fertility with abundant nearby seed sources. "New [herbivore] control in transitional shrublands, including exotic dominated shrublands, may result in modest increased live above ground biomass carbon during 2008-2012 and significant increased biomass C by 2013-2020. The area is estimated at c. 0.219 Mha on Conservation land.

It is clear from this research that new active management within the DoC estate can significantly reduce our emissions liability during the 2013-2020 period, if we start now. Burrows et. al. conservatively estimate that the potential carbon sequestration for CP1 is 5.475 Mt CO2e and 8.76 Mt CO2e for CP2, resulting from enhanced reversion of shrublands alone. This is independent of the potential to plant new forest on the DoC estate, which will not bear significant fruit until after the 2020 time horizon.

Work within the DoC estate could begin immediately. Parallel with this, the government could alter existing forestry incentive programmes to encourage the same succession enhancement on private lands. Once there is a value to NZ in enhancing carbon storage in indigenous forests it could be a source of income for many owners of Maori land who cannot clear it and want to retain ownership.

Allowing for delays in identifying appropriate sites, programme development and private sector implementation, a conservative estimate is that an additional 2 Mt CO2e could be sequestered during the 2013-2020 period from forests on private land.

Pest control on 219,000 ha DOC land by 2020	8.75 MT
Pest control on 54,000 ha private indigenous forest land by 2020	2.0 MT
Total from pest control	10.75MT

The early research on which this optimistic assessment was based[213] has more recently been tempered by further research that took account of potentially-counteracting effects operating through soil chemistry, seed predation versus seed spreading, and rates of canopy die-back and decay.[214] Holdaway et al 2012 note that[215]

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213 K. R. Tate, D. J. Giltrap, J. J. Claydon, P. F. Newsome, I. A. E. Atkinson, M. D. Taylor, R. Lee, "Organic carbon stocks in New Zealand's terrestrial ecosystems", *Journal of the Royal Society of New Zealand* 27(3): 315-335, 1997; F.E. Carswell, Frame, B., Martin, V., and Turney, I. , Exchanging emissions for biodiversity - in pursuit of an integrated solution in New Zealand. *Ecological Management and Restoration 4*: 85–93, 2003; F.E. Carswell et al, *Synthesis of carbon stock information regarding conservation land*, Landcare Research 2008; Burrows, L.E., Peltzer, D.A., Bellingham, P.J., and Allen, R.B. *Effects of the control of introduced wild animal herbivores on carbon stocks*, Landcare Research Contract Report LC0708/071 for the Department of Conservation, 2008; *F.E. Carswell, L.E. Burrows and N.W.H. Mason, Above-ground carbon sequestration by early-successional woody vegetation: A preliminary analysis*, Science for conservation 297, Department of Conservation, December 2009, http://www.doc.govt.nz/documents/science-and-technical/sfc297entire.pdf;

214 Overseas work on the complexity of the processes involved includes Tanentzap A.J and Coomes D.A, "Carbon storage in terrestrial ecosystems: do browsing and grazing herbivores matter?" *Biological Reviews* 87: 72–94, 2012; and Peltzer D.A., Allen R.B., Lovett G.M.,

> Although there are few direct data on changes in carbon sequestration rates following herbivore control, the data that are available suggest that effect sizes are likely to be small in magnitude, variable in direction, and to occur primarily though complex indirect mechanisms. The largest positive effects of herbivore control (carbon sequestration rate of 1–2 Mg C ha–1 year–1) are likely to occur in localised areas of highly palatable early-successional vegetation and high herbivore densities where control initiates rapid development of woody vegetation. Project location is therefore critical in determining the potential for carbon gain in herbivore control projects. … Although more research is urgently required to quantify potential gains, and the mechanisms that underlie them, our findings suggest that with careful site selection, implementation, and monitoring, control of invasive mammalian herbivores could sometimes provide carbon gains in certain areas of New Zealand's indigenous vegetation.

In fact, their research suggests that[216]

> What data there are suggest that the direction of the effect of herbivores on carbon could be negative, positive, or neutral… In best-case situations where animal control initiates rapid forest development, effect sizes could be in the range of 1–2 Mg C ha–1 year–1 … In contrast, despite sequestering significant amounts of carbon, many tall regenerating forests, or those comprised primarily of unpalatable species (e.g. kānuka forest or young beech–podocarp forest), are unlikely to show a large herbivore effect. This is because any carbon sequestration that occurs in these forests will be primarily due to growth of existing canopy trees or unpalatable tree species, and therefore not likely to be strongly influenced by the presence or absence of herbivores… Mature forests are … not ideal locations for establishment of herbivore control projects.

And Mason et al 2012 conclude[217]

> Conservation land was estimated to currently contain a total of 2578 Mt of C (9461 Mt CO2e) in vegetation and soil. The three different methods provided estimates of Kyoto-compliant carbon gain ranging from 63 to 186 Mt of C (231–682 Mt CO2e) as a result of land use change from nonforest to forest land. This equates to 3–8 years of New Zealand's total greenhouse gas emissions, based on estimated levels for 2005, and would take at least several centuries to be realised.

Whitehead D., and Wardle DA., "Effects of biological invasions on forest carbon sequestration", *Global Change Biology* 16: 732–746, 2010.

215 Robert J. Holdaway, Larry E. Burrows, Fiona E. Carswell and Anna E. Marburg, "Potential for invasive mammalian herbivore control to result in measurable carbon gains" *New Zealand Journal of Ecology* (2012) 36(2): 252-264, http://www.nzes.org.nz/nzje/new_issues/NZJEcol36_2_252.pdf, p252.

216 Holdaway et al 2012 p.255.

217 N.W.H. Mason, F.E. Carswell, J.McC. Overton, C.M. Briggs and G.M.J. Hall, *Estimation of current and potential carbon stocks and Kyoto-compliant carbon gain on conservation land* http://www.doc.govt.nz/upload/documents/science-and-technical/sfc317.pdf, Science for Conservation 317, Department of Conservation, February 2012, p.1.

It is, therefore, premature to project that a major source of lucrative new carbon credits would develop as a collateral benefit of country-wide pest control. The case for a pest-free New Zealand has to rest primarily on the non-market values associated with improved health for indigenous forests.

Appendix III Commodification

One can think of commodification as a process whereby qualitatively distinct things are rendered equivalent and saleable through the medium of money. At the outset a distinction needs to be made between actual commodification, when something with intrinsically non-monetary value is traded in the marketplace and hence acquires a market price; and "proxy commodification"[218] in which no actual market exists or is created, but the object of analysis is "thought of" using a frame of reference drawn from market categories of analysis. The first involves moving a real frontier, as the boundary between nature and the market is shifted in favour of the latter. The second is simply a conceptual colonisation process, applying the tools of economics to a widening range of issues to do with the management of natural resources.

The difficulties raised by actual commodification are well known, and epitomised by the issue of enclosure of the commons. The "tragedy of the commons" model advanced by Hardin[219] and Gordon[220] was widely seen as pointing inexorably to a policy prescription: greater productive efficiency, and more concern for sustainability of a resource, would follow if private property rights were established in nature, thereby creating private incentives for individuals to perform a stewardship role out of self-interest – a switch from long-standing practices of collective ownership of and access to the commons[221]. The theoretical argument was made directly by Demsetz[222], following the lead of Coase[223]. Demsetz' focus is on the internalisation of externalities by the creation of property rights:

> Property rights are an instrument of society and derive their significance from the fact that they help a man [sic] form those expectations which he can reasonably hold in his dealings with others. These expectations find expression in the laws, customs and mores or a society. An owner of property rights possesses the consent of fellowmen to allow him to act in particular ways. An owner expects the community to prevent others from interfering with his actions, provided that those actions are not prohibited in the specification of his rights….

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218 The expression is from N. Castree, "Commodifying what nature?" *Progress in Human Geography* 27(3): 273–297, 2003, p.286.

219 Garret Hardin, "The Tragedy of the Commons", *Science* 162: 1243-1248, 1968;

220 Scott Gordon, "The Economic Theory of a Common-Property Resource: the Fishery", *Journal of Political Economy* 62: 124-42, 1954.

221 The basic idea is not new; John Locke's theories of property rights arising from the appropriation of unclaimed nature, and settler arguments for individualisation of Maori land title in nineteenth-century New Zealand, form part of this tradition.

222 Harold Demsetz, "Toward a Theory of Property Rights", *American Economic Review* 57(2): 347-359, May 1967.

223 R.H. Coase, "The problem of social cost", *Journal of Law and Economics* 3: 1-44, October 1960.

> A primary function of property rights is that of guiding incentives to achieve a greater internalization of externalities.

Demsetz uses the historical example of the fur trade in seventeenth-century Quebec, where the indigenous hunters established a private-property system to regulate overexploitation of the resource. He argues that the advent of large-scale commercial hunting raised the externalities resulting from competitive exploitation of the common resource to a level at which they impelled spontaneous creation of new institutions. As a general rule, Demsetz argues that private property both enables better resource allocation in the present, and provides better for future sustainability, than collective forms of ownership[224]:

> An owner of a private right to use land acts as a broker whose wealth depends on how well he takes into account the competing claims of the present and the future. But with communal rights there is no broker, and the claims of the present generation will be given an uneconomically large weight in determining the intensity with which the land is worked. Future generations might desire to pay present generations enough to change the present intensity of land usage. But they have no living agent to place their claims on the market…. Communal property means that future generations must speak for themselves. No one has yet estimated the cost of carrying on such a conversation… Communal property results in great externalities…. Communal property rules out a 'pay-to-use-the-property' system and high negotiation and policing costs make ineffective a 'pay-him-not-to-use-the-property' system.

These arguments have been recycled across a wide range of policy discourse in favour of the creation of various property rights such as New Zealand's Individual Transferable Quota system for fisheries management, and in favour of allowing the private-property relations typical of the market sphere to encroach into the commons.

There is an obvious difficulty with the Demsetz argument when it is extended to apply outside the market sphere. Demsetz' conception of sustainability and of externalities is limited to situations where the problem is how to achieve the right intertemporal balance in market commodity production between present and future generations, and his case for efficient private solutions depends upon decisions driven purely by a market calculus in a context of perfect competition (so that the potential political-economy issues arising from abuse of market power are set aside). There is, in this sense, a distinctly utopian flavour to the Demsetz paper.

In addition, in common with Coase, Demsetz' faith in the possibilities of solving externality problems by bilateral negotiations between property-owning individuals applies only at small scale, and is not generalizable to the large-scale multi-individual level at which environmental problems commonly arise. In such large-scale settings

[224] Demsetz 1967 p.355.

the agency of a single individual, which is fundamental to the Coase Theorem, becomes submerged in the mass of the social whole, implying that the relevant bargains have to be struck among large groups or sectors, with the outcomes enforced by collective institutions.

Opposed to Demsetz' optimism about private property, and his *a priori* pessimism about communal ownership, run several streams of critique. Ostrom's empirically-grounded rejection of the notion that collective self-management is impossibly cumbersome and necessarily ineffective in confronting externalities has already been noted. A strong theoretically-grounded line of critical thinking addressing the negative side of the neoliberal project vis-à-vis nature is epitomised by the 2005 "political ecology" symposium organised by Heynen and Roberts[225]. The editors distinguished among[226]

> four dominant relations inherent to capital's neoliberal agenda: *governance*, the institutionalized political compromises through which capitalist societies are negotiated; *privatization*, where natural resources, long held in trust by regional, state and municipal authorities, are turned over to firms and individuals; *enclosure*, the capture of common resources and exclusion of the communities to which they are linked; and *valuation*, the process through which invaluable and complex ecosystems are reduced to commodities through pricing.

An important starting point for the critical perspective is the empirical observation of the destructive consequences of unregulated private exploitation of natural resources, from the world's tropical rainforests to the tar sands of northern Canada. In contrast to Demsetz' optimism that the creation of property rights would take place in ways that favour conservation and discourage over-exploitation, the political economy of access to natural resources has exhibited numerous examples of the capture of regulatory and government agencies by large corporate entities bent on early exploitation – what Heynen and Roberts refer to as "the destructive effects and complex interactions of neoliberal capitalism with nature"[227]. Additionally, the political economy of property-rights creation in many real-world cases has been managed in ways that have given privileged priority to large corporate interests, often from outside the region involved, resulting in the emergence of social inequality and the creation of a whole new set of negative externalities flowing from the behaviour of the newly-empowered owners towards both the natural systems to which they have gained a claim, and the local communities on which the negative impacts fall.

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225 Nik Heynen & Paul Robbins, eds, *The neoliberalization of nature: Governance, privatization, enclosure and valuation*, special issue of *Capitalism Nature Socialism* 16(1), March 2005.

226 Nik Heynen & Paul Robbins, "The neoliberalization of nature: Governance, privatization, enclosure and valuation", *Capitalism Nature Socialism* 16(1): 5-8, March 2005.

227 Heynen and Roberts 2005 p.7.

The literature on the actual privatisation of nature and enclosure of the commons continues to expand rapidly.[228] The other, more subtle, face of commodification is:[229]

> proxy commodification of the environment … [which] involves, as it were, 'artificially' commodifying a currently non-commodified entity or set of entities. In the language of environmental economics, it is about compensating for 'missing markets'. Cost-benefit analysis and contingent valuation exercises are two well-known mechanisms of achieving proxy commodification and can serve as precursors to the creation of real markets (for example, in pollution permits). Not all acts of proxy commodification fall strictly under most or all of the six commodification criteria to be found in the … work reviewed here. For example, putting a monetary value on the world's biodiversity – as Constanza *et al*. (1997) (in)famously did – obviously does not imply that this biodiversity is alienable en masse or that it can literally be individuated. However, in other cases – as with the Kyoto carbon credit scheme – proxy commodification can pave the way for real commodification.

228 David Bollier, *Silent Theft: the private plunder of our common wealth*, New York: Routledge, 2002; Hillel Steiner, "Left libertarianism and the ownership of natural resources", *Public Reason* 1(1): 1-8, February 2009; Karl Widerquist "Lockean theories of properties: justifications for unilateral appropriation", *Public Reason* 2(1): 3-26, June 2010; Rutger Claassen, "Public Services on the Market: Issues and Arguments", *Public Reason* 3 (2): 3-12 December 2011 http://publicreason.ro/cuprins/7 ; Tsilly Dagan and Talia Fisher, "The state and the market, a parable: on the state's commodifying effects" *Public Reason* 3 (2): 44-60, December 2011 http://publicreason.ro/cuprins/7.

229 N. Castree "Commodifying what nature?" *Progress in Human Geography* 27(3): 273–297, 2003, p.286.