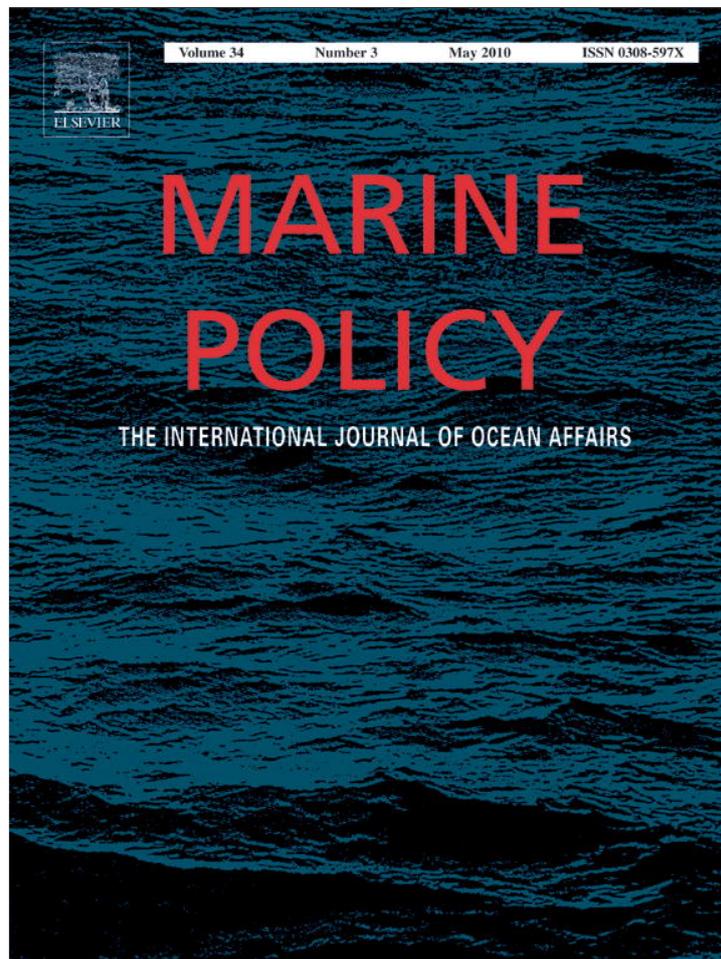


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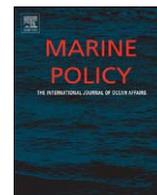
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Maintaining a balance between resource utilisation and protection of the marine environment in New Zealand

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ABSTRACT

New Zealand's brief history of human habitation has led to widespread and often irreversible change in the biophysical environment. Most of the wetlands were drained and de-forestation led to major gully and channel erosions and high amounts of sediment yield in the estuarine and marine environments. The scale of land-based effects on marine species is indeterminable. The legislation for managing the land–sea interface is widely acknowledged as having fallen short of its full potential. After the 2008 general election the new government commenced review of this legislation while consideration was given to 'unlocking New Zealand's energy potential' as a key component to an export-led economic recovery. The government is promoting oil, gas and mineral exploration on land and at sea. The government is also enacting boundaries that extend continental shelf jurisdiction. These developments may lead to further progress on an integrated system that covers all aspects of marine management that began in 2000. In any case, New Zealanders face important decisions regarding the tradeoffs between further resource utilisation and environmental protection. This article contributes to the discussion on integrated management to maintain a balance between utilisation and protection and does not reflect the view of the Ministry of Fisheries.

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1. Introduction

Population growth, increasing consumer demand and technological developments ensure that the world's oceans will be utilised further as sources of food and energy. At the same time, there is increasing awareness that the oceans' finite resources are held within fragile ecosystems that are increasingly threatened by the cumulative effects of utilisation [1]. Utilisation pressures have already degraded some sensitive biological and ecological areas, which have impaired the oceans' ability to produce the goods and services that are essential for sustaining life [2]. While there is widespread agreement that the oceans should be managed in ways that consider both food web linkages and effects of human uses, the concept of an ecosystem remains ambiguous and inscrutable [3]. Solving problems associated with an integrated system that covers all aspects of marine management requires at least a multidisciplinary approach, but how this should be implemented remains uncertain [4].

New Zealand's unique circumstances present opportunities to advance the development of an integrated system of marine management. New Zealand has a 12-nautical mile territorial sea

covering around 175,000 km². New Zealand's exclusive economic zone (EEZ) extends a further 188-nautical miles and covers around 3.9 million km², which is the fourth largest national jurisdiction. New Zealand has few and distant shared maritime boundaries, the eighth longest coastline of any nation, unexploited natural reserves, a unicameral government system and a relatively small population (4.4 million) within a landmass about the size of Great Britain. In addition, New Zealanders have been prepared to try the new and untested. Notable examples include the first comprehensive fisheries management system based on individual transferable quotas (ITQs) and enactment of the Resource Management Act 1991 (RMA), which was the first single piece of legislation to integrate the management of land, air and water.

The RMA applies to the foreshore (the distance between mean high water springs and mean low water springs) and extends to the outer edge of the territorial sea. However, the RMA has been widely acknowledged as having fallen short of its full potential. While the Oceans Policy was devised as an instrument for integrating oceans management, its progress was delayed in 2003 in response to a Court of Appeal determination that the first inhabitants' customary rights to the foreshore and seabed could exist as a matter of law. The consequences of this determination are still uncertain.

Despite the delay in the Oceans Policy, since 2006 a bioregional approach has been used to systematically plan for

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utilisation of fishstocks and protection of marine biodiversity within the territorial sea. This approach has highlighted the dearth of knowledge regarding land-based effects on estuarine and marine environments since humans first arrived between 800 and 1200AD. Since environmental degradation and loss generally occur slowly and incrementally, each generation has had quite a different view of what might be considered pristine and natural [5,6], which can seriously underestimate the scale of environmental change [7].

In order to understand the scale of change in New Zealand, this article begins with an account of the environmental effects caused by the first inhabitants and subsequent British settler expansion. The second section describes the evolving nature of land and oceans management, including initial development of the Oceans Policy and progress to date on establishing a network of marine protected areas (MPAs). This section also explains the recent extension of New Zealand's jurisdiction beyond the EEZ. The third section outlines initiatives to assist a primary sector export-led economic recovery by 'unlocking' New Zealand's reserves of oil, gas and minerals and undertaking a two-phase review of the RMA. The fourth section discusses these matters in light of a review of New Zealand's environmental performance by the Organisation for Economic Co-operation and Development (OECD).

2. New Zealand's historical context

2.1. First inhabitants

When the first Polynesians settled in New Zealand the land must have appeared to them as vast and varied in comparison to small South Pacific islands. This new land, referred to as Aotearoa (land of the long white cloud), comprises two large islands and numerous smaller islands covering 270,500 km². The landmass is over 1600 km in length and between latitudes 33 and 48 degrees south. The landmass has around 15,000 km of coastline, and at no point is the distance to the coast more than 120 km. Aotearoa is dominated by mountains extending the length of both major islands, and three-quarters of the landmass is more than 200 m above sea level. The landmass has a history of active tectonics. There are also active and dormant volcanoes, thermal regions in the north and glaciers in the southwest [8].

The isolation of the landmass from the rest of the Gondwanaland supercontinent for 80 million years supported the development of unique and diverse fauna and flora [9]. Much of the land was a mosaic of wetlands, bracken, tall tussock, scrub and forests [10]. The forest types often fluctuated due to disturbance, such as fires caused by lightning, droughts and major volcanic eruptions [7]. The isolation of the landmass precluded the presence of land mammals, except two species of bat. The uniqueness of the fauna is most apparent in the numerous species of birds that were either poorly adapted for flight or flightless, such as the species of moa that ranged from 1 to over 3 m in height and weighed between 20 and 250 kg. The forest dwelling Haast eagle (*Harpagornis moorei*) preyed on moa. It was the world's largest bird of prey, with wings spanning almost 3 m [11].

The first inhabitants settled along the coastal plains and near rivers and lakes [12]. Over the centuries the inhabitants developed a distinctive culture. These inhabitants, who are collectively referred to as Maori, retained the Polynesian communal structure based on kinship and residence. Interpersonal relations were characterised by generosity, personal honour and revenge, which were often defined and expressed through inter-tribal warfare [13]. Their traditions remained strongly rooted in a spiritual dimension and a sense of inter-relatedness with the natural world

[14]. While land and water belonged to a tribe collectively, each family had rights to areas to cultivate, snare or spear birds and to fish [15].

Within social rules for resource use, Maori were optimal foragers who exploited resources in ways that expended the least amount of effort for the greatest return and initially without much consideration for resource sustainability [16]. Some of the ways that Maori utilised resources had profound effects on ecosystems. Within a few hundred years there were sufficient numbers of Maori to cause the moa species to become extinct. There are sites in the South Island where more than 30,000 moa were killed and eggs destroyed. The enormous amount of meat that was wasted indicates that protein was available in surplus. The introduced Pacific rat (*Rattus exulans*) wreaked havoc on the smaller fauna, including frogs and some of the smaller bird species [9]. It is likely that all species of moa were extinct by 1500 along with around 40 other species of birds [16]. The Haast eagle, which posed a threat to Maori, also became extinct, but perhaps much later. In 1899 an explorer recorded having shot two 'large hawks' in the southwest of the South Island with wingspans of 8 ft 4 in (2.54 m) and 6 ft 9 in (2.06 m). It is likely that he had shot the last pair of Haast eagles, as none have been seen since [17].

Several marine species were also overexploited. The 500 kg sea lion (*Phocarctos hookeri*) experienced localised depletion, and the 200 kg fur seal (*Arctocephalus forsteri*) survived only in the southwest of the South Island. There is archaeological evidence that snapper (*Chrysophrys auratus*) was overexploited, with annual catch levels in the north of the North Island estimated at 1200 t. Maori also overexploited various shellfish species as they turned to less desirable food sources [9].

After the extinction of moa species and other large birds and the destruction of smaller fauna by the Pacific rat, the native forest and scrub provided Maori with few sources of food. Maori began to burn vast areas, which removed around half of the vegetation cover [18]. Most of the eastern side of the South Island was burnt between 1300 and 1450 [16]. The fires caused substantial amounts of soil and nutrient erosion that led to lowlands supporting certain edible plants, such as the bracken fern, as sources of food. By the 1700s Maori were facing economic and cultural crises. There are several recorded accounts of Maori in continuous and violent confrontations and prizing the bodies of those killed as a source of food [9]. In order to survive, Maori had to devise complex rules for allocation and management of the land and sea [19].

2.2. Settler expansion

The first non-Maori inhabitants of Aotearoa were whalers and sealers during the late 1700s. By the early 1800s British settlers were located mostly in the sub-tropical north of the North Island. Their settlements led to New Zealand being regarded as an integral part of commerce for Sydney and Hobart, Australia. New Zealand provided these markets with flax for making rope, timber, pigs and agricultural produce [20]. The kauri forests in the north were particularly prized for ship building [21]. Competition intensified for the land and marine resources as more settlers arrived as part of Britain's expansion of its economic interests throughout the world [22].

Official British colonial policy in the early 1800s was to protect the 'natives'; while the motive was humanitarian, the intent was to establish British sovereignty in its colonies [15]. In early 1840 Captain Hobson from the New South Wales territory in Australia arrived in the Bay of Islands in the north of the North Island. The purpose of Captain Hobson's transfer was to negotiate with Maori for recognition of British sovereignty. About that same time,

several hundred Maori gathered close by at Waitangi to discuss what they should do about the continued expansion of settlements. Some Maori chiefs longed to return to the time before settlers arrived for fear of becoming slaves, while others considered it was too late to turn them away. Some viewed settler presence as providing a better future through trade and tribal peace [23].

At that time, some 50 chiefs signed the Treaty of Waitangi along with Captain Hobson and his officials, and then missionaries and officials transported the Treaty around the country for others to sign. After much discussion, over five hundred Maori, mostly chiefs, signed the Treaty while others refused to sign it [23]. In the English version of the first article of the Treaty the chiefs ceded their sovereignty to the Queen of England. In return, the second article states the Queen guaranteed Maori 'the full exclusive and undisturbed possession of their Lands and Estates Forests Fisheries and other properties which they may collectively and individually possess ...' The chiefs ceded to the Queen the sole right of purchasing their land in return for all the rights and privileges of British citizenship. However, the Maori translation of the Treaty uses a term akin to self-government, not sovereignty; this difference in translation became the first step in subversion of Maori sovereignty and the loss of their land and marine resources [24].

In the intervening years New Zealand became a British colony. The ensuing settler-Maori engagements digressed from initial co-operation to increased competition for resources, and then to escalated conflicts and open skirmishes over land rights [13]. Maori eventually lived mostly on the fringe of the increasingly prosperous society, and at that time did not challenge the consensus view. Most New Zealanders viewed Maori more 'as a sideshow, bound for absorption into the mainstream value system where practicable ... or for extinction as inappropriate deviations' [25,12]

New Zealand's settler history is best described as progressive colonisation through explosive settlement and exploitation of resources. The settler population increased from 2000 in 1840 to 500,000 by 1882. The rapid pace of organised settlements drove the establishment of public authorities that built infrastructure, while private enterprises rapidly expanded to supply the settlers with necessary materials and agricultural produce [26]. Settlers expanded into the back country and converted extensive areas of hilly land from native forest into pasture for grazing livestock [12].

De-forestation further reduced the strength of the soil and substantially increased the susceptibility of slopes to land slides. Over time climatic events triggered thousands of land slides that caused major gully and channel erosions and high amounts of sediment yield to be deposited into the estuarine and marine environments [12]. In 1900 native forest covered around 25% of the land, a reduction from around 50% in 1840 and perhaps as much as 80% when Maori first arrived [28]. The demand for farmland also led to draining extensive areas of wetland on a scale that was unsurpassed elsewhere in the world [27]. By 1920 the biophysical environment had undergone widespread and often irreversible change as a consequence of human activities [28].

2.3. *The end of prosperity*

New Zealand's ties with Britain had led to dependence on its markets for virtually all primary product exports. The export earnings from primary products paid for manufactured goods and raw materials needed to build New Zealand's domestic manufacturing sector, which generated sufficient wealth to provide New Zealand's largely homogenous population with a promise of

a good life and a good society [25]. However, by the mid-1900s the emerging international economy demanded increased domestic and trade liberalisation. Dramatic changes occurred as many nations shifted from relatively centralised, government-controlled and isolated economic systems to more decentralised, market-based and outward-oriented economies that emphasised export promotion. The rapid increase in the trade of goods and services throughout the world made it increasingly difficult for nations to protect their domestic industries and employment [29].

The most significant change in New Zealand's trade relations came about in 1972 when Britain entered into the European Community. This ended New Zealand's assured trade access to Britain and forced New Zealand into the international trade arena. The percentage of New Zealand's overall exports destined for Britain declined from 51% in 1965 to 19% in 1976 [30]. New Zealand's exports had traditionally the highest concentration of primary products of all OECD nations, excluding Iceland [31].

By the early 1980s it became increasingly clear that New Zealand's continued reliance on agricultural exports, which were subsidised by the non-farming sectors, could not generate the earnings on world markets that were required to finance the nation's imports and the prices of protected domestic manufactured goods. In the three decades from 1950 to 1980 New Zealand's standard of living had declined from third highest in the world to twentieth position [32].

Beginning in the mid-1980s the government redefined its role from favouring certain sectors at the expense of others to ensuring that people get value for money from the nation's resources [33]. The government set about redesigning the economic and social structure of New Zealand [22]. Swift action reflected the government's view that the best solution was to head straight for the cause of the problem rather than try to paste over the symptoms [34]. By the late 1980s New Zealand's economy had begun to adjust to market forces and increased exposure to internal and external competition [35], and by the 1990s there were more buoyant economic conditions [36]. There were significant improvements in the performance of several primary sectors, including fishing, agriculture and forestry, while other sectors experienced sharp contractions [37].

3. Natural resource management

3.1. *Land management*

During the 1800s British colonial policy was to set aside land as reserves for various 'wise use' and preservation purposes. However, mining for a wide range of minerals, including coal and gold, was an exception. Early on there were few controls on mining, which led to rapid and large-scale changes to the New Zealand landscape [38]. The government began to pursue natural resource conservation guided by the notion of it being in the national interest. This notion led to the best land being made available for farming, while much of the less valuable land was set aside as forest reserves for soil and water protection, scenery preservation and commercial ventures. By 1919 there were 512 scenic reserves that totalled more than 1200 km². National parks totalled around 6700 km² and state forests also totalled around 6700 km² [28]. Early legislation often reflected pragmatic and ad hoc responses to environmental problems [39]. For example, the purpose of the Soil Conservation and Rivers Control Act 1941 was to stem erosion, sedimentation and flooding caused primarily by de-forestation [28].

By the late 1950s there was growing public support to protect scenery, including forests, lakes and waters from development [28]. The most striking example of public support for the

environment was in response to the government proposal to raise the level of Lake Manapouri by 8.2 m to harness the hydroelectric potential. Despite the remote location of the lake in the southwest of the South Island, the proposal elicited a nation-wide 'Save Manapouri' campaign. The campaign has been described as the 'birth of the modern conservation movement' in New Zealand [40]. The campaign raised awareness of the need for proposed activities to undergo assessment of their environmental effects [41].

By the 1980s three themes converged in natural resource management: market-based solutions to problems, increased public support for conservation and Maori values for the environment. Enactment of the RMA reflected these themes and was considered groundbreaking legislation. The purpose of the RMA is to promote the sustainable management of natural and physical resources. Decisions made under the RMA must have particular regard to a range of values, including the Maori concept of *kaitiakitanga* (guardianship). The RMA identifies several matters of national importance: protection of outstanding natural features and landscapes, areas of significant indigenous vegetation and significant habitats of indigenous fauna, and the relationship of Maori and their culture and traditions with their ancestral lands, waters, sites, *waahi tapu* (reserved ground) and other *taonga* (treasures).

The RMA addressed excessive bureaucratisation by reducing local government from over 700 authorities to 86 and revoking 167 statutes that had considerable conflicts, gaps and overlaps. The RMA provided for development of National Environmental Standards and National Policy Statements to be implemented by regional and district councils through the development of regional policy statements and regional plans and district plans. The RMA established a process for assessing the effects that proposed activities would have on the environment. The process for gaining 'resource consent' includes the 'user pay' principle, which was commonly implemented during the economic reform process [36].

3.2. Coastal management

National priorities for coastal management are stated in the RMA and the 1994 New Zealand Coastal Policy Statement. These priorities are to be implemented by way of regional coastal plans that apply to the coastal marine area, which is defined in the RMA as including the foreshore and extending to the outer edge of the territorial sea. The purpose of coastal plans is to assist in achieving the purpose of the RMA with respect to protecting the coastal environment from inappropriate subdivision, use and development. The Minister of Conservation has decision-making powers for approving coastal plans and resource consent applications for restricted coastal activities. The land–sea interface is intended to be managed by the incorporation of coastal plans into regional plans.

3.3. Fisheries management

New Zealand's fisheries management can be classified into three distinct approaches. From 1866 to 1962 there was a system that limited access to fisheries. From 1963 to 1982 there was a regulated open entry system that encouraged greater levels of domestic fishing effort, which led to overexploitation of inshore fisheries and overcapitalisation. By the 1980s, the climate of favouring market forces as the solution to economic problems strongly affected the options available for managing fisheries [42]. In 1986 the government enacted the Fisheries Amendment Bill, which gave effect to the quota management system (QMS). The

new and untested QMS promised sustainable management and economic efficiency through the allocation of ITQs. The Bill's radical nature was its attraction during this period of dramatic change [43].

New Zealand's relatively small commercial fishing sector has grown from a predominately domestic supplier to one of the leading exports. Most of the increase in export volume and value was first due to development of deepwater fisheries and then improved management of certain inshore species and more recently the growth in aquaculture [44]. Aquaculture is the fastest growing sector and accounts for 15% of seafood exports by value [45]. For the last decade, fish and shellfish products have been the fourth or fifth highest export by value, totalling almost NZ\$1.35 billion and 297,000 t in 2008 [46].

Implementation of the QMS did not address claims by Maori of having indigenous rights to fisheries resources guaranteed by the Treaty of Waitangi. In 1987 the High Court granted an injunction against any further ITQ allocations until Maori claims to fisheries resources could be settled [47]. Settlement of these claims included Maori receiving ITQs and other assets that ensure they will have a continued and growing presence in the commercial fishing sector [43]. Maori currently own around 50% of all ITQ [46]. Settlement of these claims also included the Crown acknowledging that Maori non-commercial customary fishing rights have not been extinguished. Fisheries resources taken for customary purposes are not subject to the same limits as recreational take. The estimated annual customary take is 5000 t [48]. The success Maori experienced in settlement of Treaty-based claims to fisheries and land contributed to a resurgence of their culture and language.

New Zealanders have been described as 'jealously guarding their birthright' to access the coastline for recreational pursuits [49]. Around one-third of the population fishes for recreational purposes. Recreational fishing is not subject to any licensing requirement, but there are daily bag limits for particular species and some area restrictions. Despite there being several self-funded regional- and local-level recreational lobbying organisations, there is very limited information on recreational take. The estimated annual recreational take is 25,000 t [48].

3.4. Oil, gas and minerals

Offshore hydrocarbon exploration and extraction began in the 1960s. There are several oil and gas deposits within New Zealand's marine jurisdiction, but the only commercial production has been in the Taranaki Basin located 35–50 km west of the lower North Island. Currently there is a bidding process for offshore exploration permits for 25,000 km² in the Raukumara Basin off the East Cape of the North Island and 120,000 km² in the Northland Basin located west of the upper North Island [50]. The majority of marine mining is for aggregates from shallow seabed sources and sand in the north of the North Island. Titanomagnetite ironsand deposits are also mined along the west coast of the North Island [51].

The Continental Shelf Act 1964 regulates the exploration and extraction of minerals other than oil and gas within the EEZ. Although the Act does not mention environmental matters, the Minister of Energy has discretion to impose environmental conditions when issuing a licence. The RMA consent process applies to applications for oil and gas exploration and extraction within the territorial sea. When applications are made for activities within the EEZ, they come under the Crown Minerals Act 1991, which does not include provisions for assessing environmental effects [52].

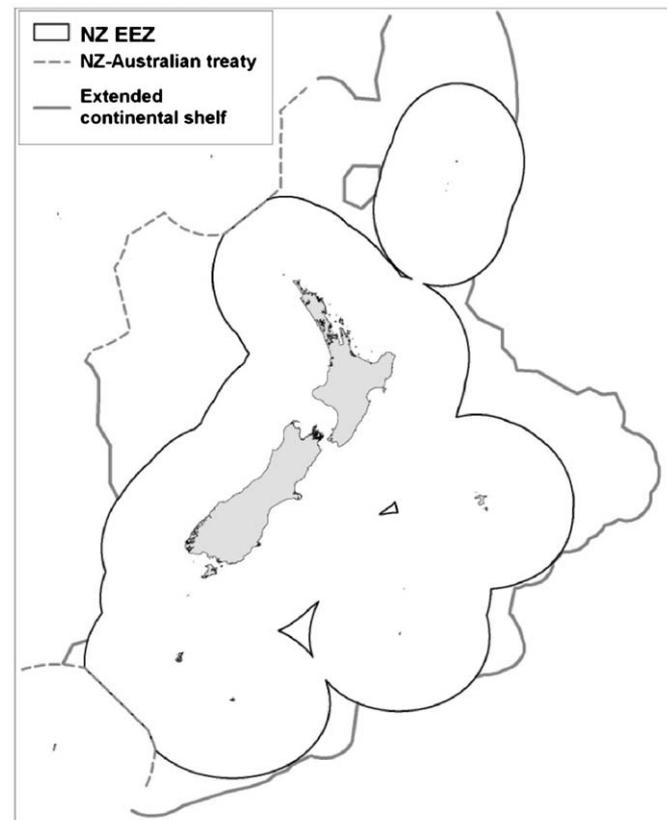
Article 76 of the United Nations Convention on the Law of the Sea 1982 includes provisions for a coastal nation to establish the outer boundary of its continental shelf where it extends beyond its EEZ on the basis of the recommendation by the Commission on the Limits of the Continental Shelf (CLCS). The nation then possesses sovereign rights over the extended continental shelf to explore and exploit natural resources (e.g. petroleum and minerals) and the living resources on the seabed. A boundary established on the CLCS recommendation is binding on other nations.

In 2006 the New Zealand government submitted proposed coordinates for the outer limits of its continental shelf. In 2008 the CLCS issued its recommendation that confirmed New Zealand's right over 1.7 million km² of seabed outside the EEZ. Since New Zealand's continental shelf overlaps with the continental shelves of Australia, Fiji, Tonga and perhaps France, with respect to New Caledonia, New Zealand must reach agreement on maritime boundaries with these nations. New Zealand and Australia had already reached agreement on a two-part maritime boundary [53]. New Zealand retains the option of presenting a submission for the continental shelf off the Ross Dependency in Antarctica [54].

In late 2009 the new government, since the 2008 general election, decided to establish New Zealand's outer limits of its continental shelf based on the CLCS recommendation. The outer limits to the north will remain provisional until agreements are reached with Fiji, Tonga and perhaps France (refer Map 1).

3.5. Marine protection

Soon after public support increased for the 'Save Manapouri' campaign, the 'Save the Whales' campaign focused on New



Map 1. New Zealand's EEZ, extended continental shelf boundary and New Zealand-Australia delimitation treaty.

Zealand's past having been 'steeped in the blood of whales and seals' [55,20]. The last shore-based whaling station ceased operation in 1964. Public support helped to enact the Marine Reserves Act 1971, which provides for areas within the territorial sea to be set aside in their natural state for scientific study, and the Marine Mammals Protection Act 1978, which provides protection for marine mammals, including seals, whales and dolphins and provisions to establish marine mammal sanctuaries.

New Zealand does not have legislation for the purpose of protecting marine biodiversity. The Marine Reserves Bill proposes to change the purpose of establishing marine reserves from scientific study to biodiversity protection. However, for several years the Bill has remained before a parliamentary select committee, and so it is uncertain when the Bill will be enacted. The Fisheries Act 1996 requires decision makers to take into account non-harvested species or those otherwise affected by the take of any harvested species. The Act also requires decision makers to take into account biological diversity and habitats of particular significance that should be protected for fisheries management purposes [56].

During the late 1990s the Parliamentary Commissioner for the Environment, which is a role independent of government, undertook an investigation of the management systems for the marine environment. The investigation raised public awareness of these systems, which were found to be complicated and having at least 18 overlapping, fragmented and conflicting pieces of legislation. None effectively protect the marine environment outside the territorial sea. Enactment of protective legislation was considered unduly hampered by the lack of an overarching strategy and goals for oceans management [57].

In 2000 the government released the New Zealand Biodiversity Strategy (NZBS) that reflects the commitment, through ratification of the International Convention on Biological Diversity to help stem the loss of biodiversity worldwide [58]. The NZBS includes the target of having around 10% of New Zealand waters to the outer edge of the EEZ in some form of protection by 2010 [59]. Currently around 7.3% of the territorial sea is fully protected with 34 marine reserves [56].

In addition, in 2001 around 81,000 km² of the EEZ were closed to trawling to protect certain seamounts and their biota. In 2007 a commercial fishing sector proposal was enacted to prohibit bottom trawling and dredging methods in 1.1 million km² of deepwater habitat where these methods had been used very little, if at all. These 'benthic protection areas' cover around 28% of the EEZ. There is no estimate of the area where bottom trawling has occurred. However, the total area trawled by both bottom and mid-water methods is estimated to be 335,000 km², which is around 8.5% of the EEZ [60].

3.5.1. MPA policy

One of the key actions to achieve the objective of the NZBS was to develop and implement a policy for establishing a network of MPAs. In 2006 the government launched the Marine Protected Areas Policy and Implementation Plan (MPA Policy). The MPA Policy outlines a non-legislative, coordinated approach for planning and establishing an MPA network that is representative of New Zealand's marine habitats and ecosystems. The MPA network is intended to include marine reserves and management controls available under the Fisheries Act 1996 [61]. The MPA Policy specifies separate processes for implementation in coastal and deepwater environments, with the demarcation being the territorial sea. The MPA planning process for the deepwater environment is scheduled to commence in 2013 and will be implemented by an expert panel, including representation of those with non-extractive interests.

The MPA planning process requires a consistent basis for classifying and mapping marine habitats and ecosystems. In 2008 the Coastal Classification and Mapping Scheme was completed. This classification uses a hierarchical approach with the first tier subdividing the territorial sea into 14 bioregions. The MPA Policy envisions the development of MPA planning forums for each of the bioregions. These forums are to consist of representatives of commercial, recreational and customary fishing interests, environmental interests and, where relevant, local authorities and communities. The purpose of these forums is to make recommendations to the Ministers of Fisheries and Conservation on areas that warrant further protection and the most appropriate controls for protection. Where there is a choice of potential sites, the chosen site should minimise effects, including costs, on uses of the area and Treaty settlement obligations.

Implementation of the MPA Policy has commenced with two MPA planning forums. The first forum has a geographical scope extending along most of the west coast of the South Island and to the outer edge of the territorial sea [62]. This forum has 'grass roots' origins associated with the success of the Guardians of Fiordland, which comprised local sector representatives who devised an integrated strategy over an 8-year period for the management of waters within the Fiordland National Park in the southwest of the South Island [63]. The second forum's geographical scope includes the territorial sea around the sub-Antarctic Islands in the southern EEZ [64]. In mid-2009 both forums proposed a total of 10 no-take marine reserves and 3 other types of MPAs, though agreement was not unanimous. Both forums will make recommendations to respective Ministers after public consultation on the proposals. The forums have progressed at a slower rate than first expected and have been characterised by significant disagreement between participants.

3.6. Oceans policy

In 2000 the government agreed to develop the Oceans Policy to achieve an integrated system of management that would cover all aspects of oceans management [65]. Development of the Oceans Policy followed on from the work done in the late 1990s by the Parliamentary Commissioner for the Environment, which placed particular emphasis on the effects that land management has on marine coastal areas [57]. Development of the Oceans Policy was to be carried out in three stages. The first stage included nationwide consultation to determine the vision for meeting the challenges of integrated oceans management. The second stage pertained to development of the legal framework, and the last stage was intended to implement the framework.

However, in mid-2003 development of the Oceans Policy was delayed as the government addressed public access and customary rights to the foreshore and seabed [65]. This delay was prompted by the Court of Appeal determination that left open the prospect of Maori claiming customary rights to the foreshore and seabed. The government responded by enacting the Foreshore and Seabed Act 2004, which vested the full legal and beneficial ownership of the foreshore and seabed in the Crown. The Act drew strong responses by Maori, which led to the new government agreeing to review the Act with the results to be announced late 2009.

The government resumed development of the Oceans Policy by first focusing on the lack of regulatory controls for managing the environmental effects of certain activities within the EEZ. These activities include discharging ballast water from ships, constructing platforms and drilling, laying submarine cables, conducting non-biological scientific research and prospecting for minerals [57]. After public consultation on options for managing the

environmental effects of these activities, work began mid-2008 to draft the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Bill. The Bill is intended to 'fill the gaps' in existing legislation by devising certain activity categories regulated through rules that define 'effect thresholds' and a consent application process [66]. The Bill is not intended to apply to activities that are fully regulated under existing legislation, such as fishing under the Fisheries Act 1996, maritime transport under the Maritime Transport Act 1994 and maintenance and repairs undertaken under the Submarine Cables and Pipelines Protection Act 1996. However, the Bill proposes consequential amendments to existing legislation that will require decision makers to take account of the cumulative effects of all activities in a region.

4. Current developments

4.1. Export-led economic recovery

In response to the 2008 international financial crisis and low economic growth, the new government has reduced the forecasted core public expenditure while considering ways to assist an export-led economic recovery. New Zealand's economy remains highly dependent on the primary sector, with commodities accounting for around half of total exports [67].

The government has committed NZ\$1.9 million to assist further development of the aquaculture sector, which is projected to grow to NZ\$1 billion in annual exports by 2025 [45]. The aquaculture sector has also received a NZ\$600,000 contestable fund to encourage innovative market developments to help growth over the medium to long term [68].

The government is also committed to 'unlocking New Zealand's energy potential.' New Zealand's metallic mineral potential has been estimated to have a gross in-situ value of over NZ\$140 billion [69]. However, around 70% of minerals are in Crown land, with 40% of this land listed on schedule 4 of the Crown Minerals Act 1991. Land listed on schedule 4, which includes marine reserves and wildlife sanctuaries, precludes access to minerals. The land generally has high conservation values, which was often the purpose of listing it on schedule 4 [70]. It is possible, however, that the access prohibition for 'highly prospective' schedule 4 land could be removed [71].

In addition, there is the potential for hydrocarbons to be under 1.2 million km² of the seabed. The hydrocarbon potential is estimated to be equivalent to 24 billion barrels of oil [69]. The government has allocated NZ\$20 million for a seismic data acquisition programme for the administration and promotion of offshore oil and gas exploration [72]. A tax exemption for overseas companies undertaking exploration will be continued [73]. The Crown already receives in excess of \$100 million annually from royalties and energy resource levies related to non-living seabed resources. By 2011 the Crown's receipts of royalties and levies from both land-based and offshore activities are projected to rise to around NZ\$700 million [69]. At this time, little is known about the resources on the extended continental shelf or the economic feasibility of exploiting those resources [74].

New Zealand's natural endowment of fertile land ensures that land-based industries, particularly dairying and beef and sheep meat, will continue to make up a significant portion of the economy. However, in 2008 the value of oil exports alone increased 103% totalling NZ\$2.8 billion, making oil the third highest valued export behind dairy products and meat [75]. The value of oil exports in 2008 was more than twice the value of wild fishstock and aquaculture exports combined.

4.2. Review of the RMA

The RMA has been described as a 'dismal failure' in managing the cumulative effects on landscapes, water quality and urban development [76]. The integration of land–sea management is intended through the incorporation of regional coastal plans into regional plans. However, some regional councils have taken several years to develop regional plans, while others have been reluctant to take them up or make necessary changes. Of the plans developed, some provide little guidance regarding how and under what circumstances integrated decision making could be achieved, which has led to unnecessary costs in managing environmental matters. The lack of guidance has inclined regional councils to rely heavily on the resource consent application process to achieve sustainable management [77]. At the same time, the costs, length of time and opportunity to appeal the consent process have often stifled development, including aquaculture.

The new government is committed to reviewing the RMA so that it can 'live up to its potential' [78]. The RMA review has been a high priority given the strong economic dependence on natural resources and the current state of the economy [79]. The first phase of the RMA review focused on reducing the cost and timeframe for the resource consent process and improving the regional planning process. The Resource Management (Simplifying and Streamlining) Amendment Act 2009 sets out several amendments that make up the first phase of the RMA review. The Minister for the Environment considers this first phase improves the resource consent process by, amongst other things, restricting occasions for frivolous, vexatious and anti-competitive objections and by having projects of national significance considered at a national level. The Minister also considers the Act improves the regional planning process by reducing repetitive consultation processes and reporting requirements for both plan development and plan changes [78]. Work has begun on the more complex second phase of review, which aims to have central government provide better direction for regional councils and improved alignment of the RMA with existing legislation. The second phase also aims to improve the management of infrastructure, urban design, aquaculture, including improved allocation of coastal space, and water, including both quality and allocation [79].

5. Discussion

According to the OECD, New Zealand is not 'an Olympics in environmental performance' when compared to other OECD nations [80]. While the 2007 OECD review of New Zealand's environmental performance commends the ambitious approach taken towards the RMA, several recommendations address the need to strengthen central government support for RMA implementation and co-ordination and collaboration across all levels of government. The OECD review also recommends improving the effectiveness of the Parliamentary Commissioner for the Environment and placing more emphasis on mitigating the environmental effects of traditional forms of land use, particularly pastoral agriculture. The review suggests that freshwater managers and the agricultural sector should work together to address water quality problems caused by erosion from steep grazing lands and intensive agriculture that affects lowland streams, rivers and aquifers.

Moreover, the OECD review highlights the improvements needed in the land–sea management interface. Sedimentation deposits, suspended sediments and nutrient enrichment from livestock continue to affect several plant and animal species in both freshwater and marine habitats. Based on the current level of

knowledge, the scale of ongoing land-based effects on marine species cannot be determined [7]. While the review commends New Zealand for having one of the highest proportions of land area protected (30%), it recommends increased funding should be made available to protect coastal areas and marine resources and to establish adequate and representative samples of ecosystems as estuarine and marine protected areas.

Despite the ecological interrelationships between land and sea through the exchange of water, sediments, nutrients and biota, regional councils have had little incentive to develop regional and coastal plans that integrate decision making [77]. The first phase of the RMA review focused on the resource consent and regional planning processes, which should lead to more integrated land–sea management. The second phase addresses several other OECD recommendations that should also improve land–sea management, particularly clarification of the role of central government in relation to regional councils and improvements in aquaculture management with respect to the allocation of marine space.

The government has emphasised that biodiversity protection is its third highest priority, behind the challenge of climate change and freshwater management [79]. Establishment of the MPA network is continuing through the west coast and sub-Antarctic forums. The Ministers of Fisheries and Conservation will decide about the development of any further MPA planning forums once they have considered the national inventory of existing protected areas that contribute toward the MPA network. Although advanced tools in spatial prioritisation have been developed to assist MPA planning [81], the rate of progress on the MPA network to date is a reminder that decisions on biodiversity protection are political as well as technical [82,83]. The existing MPA forums have become the new venues for power struggles between competing interests vying to protect the status quo or where possible constrain existing utilisation and its expansion. That aside, the MPA forums could well provide low-cost habitat and ecosystem data that would benefit regional council coastal planning processes.

The government has also emphasised that oceans management is a high priority [79]. As part of the evolving movement towards an integrated system of management, it is likely that the Oceans Policy will be developed further, while marine legislation and government departments become consolidated. However, no decisions have yet been announced on this priority. The only recent development is the EEZ Bill designed to 'fill the gaps' so that the environmental effects of activities within the EEZ will be assessed and considered by decision makers. At the same time, the government is reviewing policies for oil and gas exploration, which may give further weight to the OECD recommendation to improve preparedness for an oil spill response. Beyond the territorial sea there are relatively few competing activities that give rise to spatial conflicts. The potential for conflicts will increase should enactment of the Marine Reserves Bill allow marine reserves to be established within the EEZ. Spatial conflicts will also depend on the extent and location of further seabed extractive activities.

6. Conclusion

The process of environmental degradation and loss since human habitation began in New Zealand is not unique in the world. In response to the environmental degradation and loss in New Zealand, the public is increasingly willing to examine the past and acknowledge the series of mistakes in natural resource management. This examination has engendered increasing public support for sustainable management practices and awareness of the 'one-off bonanza' that hydrocarbon and mineral extraction

provides [9]. While most New Zealanders consider the quality or condition of coastal waters and beaches to be good and adequately managed [84], there is increasing awareness that improvements need to be made to the management of the land–sea interface. New Zealanders readily acknowledge that pastoral agriculture has been the backbone of the economy and culture for the last 100 years, as well as a primary source of land-based effects on the estuarine and marine environments.

The government has signalled its support for economic growth opportunities, while mindful of public concerns about the environment, New Zealand's strong dependence on natural resources and the current state of the economy. Despite New Zealand's recognition as having devised some of the most appropriate fishstock management tools for rebuilding fisheries [85], there are few, if any, growth opportunities for wild fishstock fisheries. Aquaculture provides one of the best prospects for economic growth, which brings new challenges in the allocation of marine space. Other growth opportunities signalled by the government include increased extraction of hydrocarbon and mineral reserves on land and under the seabed. Given public expectations, decisions about utilising these resources should be made along with decisions about the extent that areas should be protected and biodiversity maintained.

New Zealand's unique circumstances make these decisions achievable. Progress on the government's RMA initiatives demonstrates that necessary changes can be made with relative ease. New Zealanders are generally prepared to engage with government processes to devise feasible solutions to problems and to make them work. Public engagement often demonstrates practical perspectives to natural resource management problems, which may be due, in part, to the settler history and Maori understanding of the natural world.

James [86] reminds us that New Zealand has undergone two significant shifts that may be described as revolutions. The first occurred around 1840 when settlers wanted land and opportunity and Maori wanted the benefits of British technology and capitalism. Although this revolution 'stripped Aotearoa of independence', Maori have kept intact much of their heritage. The demand for indigenous rights has led to the second revolution of 'reindigenisation' whereby the settler culture is now being modified by Maori culture [87]. The second revolution was also prompted by New Zealand having been rejected by the 'Motherland' when Great Britain entered into the European Community [23]. New Zealand has subsequently become a Pacific nation that is changing the way New Zealanders think about themselves and their role in the world. However, a defining characteristic that has remained intact is the connectedness to the forest–land–sea that is embedded in Maori whakapapa (genealogical connections) and New Zealand's clean-green image [86]. This forest–land–sea connectedness will remain central to future decisions regarding resources utilisation and environmental protection on land and in the sea.

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