

CHAPTER 4

INTRODUCTION

For over 500 years the international law of the sea has developed as a consequence of "the interplay between two opposing fundamental principles of international law, the principle of sovereignty and the principle of the freedom of the high seas".¹ As Anand has noted "the history of the law of the sea is to a large extent the story of the development of the "freedom of the seas" doctrine and the vicissitudes through which it has passed over the years".² Krueger has argued that the development of international law of the sea has also been influenced by a third factor, namely developments in technology.³ This is because claims for extensions in sovereignty over ocean space, and therefore challenges to freedom of the high seas have been the direct result of a greater understanding of ocean resources, due to advances in technology. LOSC is therefore the most recent attempt at reconciling conflicting principles of freedom of the seas and claims for extended sovereignty over ocean space by coastal states, as the nature of ocean space was understood in light of the technology of the late 1960s to the early 1980s.

However, as discussions in preceding chapters have highlighted, despite the range of issues that have been resolved, LOSC appears ill equipped to deal with the challenges

¹ E B Brown, 'Freedom of the High Seas Versus the Common Heritage of Mankind: Fundamental Principles in Conflict' (1983) 20(3) *San Diego Law Review* 521.

² R P Anand, 'Changing Concepts of Freedom of the Seas: A Historical Perspective in J Van Dyke, D Zaelke and G Hewison (eds), *Freedom for the Seas in the 21st Century* (1993), 72.

³ R B Krueger, 'The Convention of the Continental Shelf and the Need for its Revision and Some Comments Regarding the Regime for the Land Beyond' (1968) 1(3) *Natural Resources Lawyer* 1.

that new technology has brought to our recent understanding of the deep-sea, its biodiversity and the threats posed to it by human activities. This chapter explores the origins of the uncertainty that surrounds the applicability of the sedentary species provisions under the Continental Shelf Regime to hydrothermal vent species. In large part much of the discussion contained in this chapter has already been canvassed in the existing literature. While much of the material presented is not new, given many scholars today were born years after the publication of this literature, it is useful for the origins of the continental shelf regime to be revisited, so that in formulating a legal regime for the future we learn from the mistakes of the past and understand why they have arisen. An understanding of the origins of these provisions will assist in reaching conclusions as to whether changes to the law are warranted in light of changes in technology.

MARE CLAUSUM VS MARE LIBERUM

The origins of the conflict between claims to sovereignty over ocean space and freedom of the high seas can be traced back to the emergence of European colonialism in the America's and East Indies in the fifteenth century. As Anand notes

"In the absence of any rules in fifteenth century Europe about relations with the extra-European world and new continents, and continuously engaged in religious wars against Muslims, some of the frontal European states, like Portugal and Spain, adopted the convenient doctrine that the Christian states had the right to occupy and possess the lands of the heathen [sic] and the infidel [sic] without regard to the rights of the native peoples concerned. They also claimed that, as the head of the Christian Church, the Pope had the right to allot temporal sovereignty to any lands not possessed by a Christian ruler"⁴.

On May 4 1493 Pope Alexander VI divided the world between Spain and Portugal and "defined a line of demarcation running 100 leagues west of the Azores and Cape

⁴ R P Anand, *Origin and Development of the Law of the Sea*, (1983), 43.

Verde Islands and granted to Spain all lands west of it, and to Portugal all lands of its east".⁵ Thus Spain was given jurisdiction over the Pacific Ocean and the Gulf of Mexico and Portugal the Atlantic south of Morocco and the Indian Ocean.⁶ This arrangement was subsequently confirmed in 1494 by the *Treaty of Tordesillas*.⁷

This division of the oceans between Spain and Portugal did not go unchallenged especially by the Dutch and the English. Most famously in 1609 Hugo Grotius published *Mare Liberum* in which he disputed the Portuguese claim to sovereignty over the East Indies. Grotius also questioned the division of the world's oceans between the Spanish and the Portuguese.⁸ In doing so he formulated his famous doctrine of "freedom of the seas".⁹ Appealing to Roman law and the works of philosophers such as Cicero, Grotius argued

"Nature has made neither sun nor air nor waves private property; they are public gifts...they are by nature things open to the use of all, both because in the first place they are produced by nature, and have never yet come under the sovereignty of any one....; and in the second place because, as Cicero says, they seem to have been created by nature for common use....the common property of all, and the private property of none."¹⁰

⁵ Above, n 4.

⁶ Ibid.

⁷ C J Colombos, *The International Law of the Sea*, (1972), 49.

⁸ The division of the world's oceans amongst Spain and Portugal was not the first time sovereignty was claimed over entire oceans or seas. For example, by the end of the thirteenth century Venice claimed sovereignty over the whole of the Adriatic, while the Republic of Genoa advanced a similar claim to dominium over the Ligurian Sea. Similarly Denmark, Sweden and later Poland raised competing claims to portions of the Baltic. Just as significant were the claims of successive English Monarchs from the eleventh century onwards to jurisdiction over the so-called "Sea of England". For a detailed account of these claims see T W Fulton, *The Sovereignty of the Sea. An Historical Account of the Claims of England to the Dominion of the British Seas, and of the Evolution of the Territorial Waters: with special reference to the Rights of Fishing and the Naval Salute* (1911).

⁹ Anand, above n 4, 82.

¹⁰ H Grotius, *The Freedom of the Seas or the right which belongs to the Dutch to take part in the East Indian Trade*, (first published 1633, 1916 English Translation of the Latin text translated by Ralph Van Deman Magoffin), 28.

As the sea was not capable of becoming private property

"Hence it follows, to speak strictly, that no part of the sea can be considered as the territory of any people whatsoever".¹¹

In addition to denying the right of the Portuguese and the Spanish to claim sovereignty over ocean space, significantly Grotius asserted that "navigation on the sea is open to anyone".¹² The seas were free for all to use and for all to exploit.

Grotius's views on the freedom of the seas was controversial and was refuted by the likes of British scholar and diplomat John Seldon in his *Mare Clausem* published in 1635, by Welwood in his *A Scottish Abridgement* published in 1613 and *De Dominio Maris* published in 1615, and by Seraphin de Freitas, who published *De Justo Imperio* in 1625.¹³ Of these scholars, over the following 200 years it was Seldon whose ideas came to be viewed as the most authoritative.¹⁴ Seldon argued that countries could control as much sea territory as they could dominate militarily.¹⁵

Grotius restricted the application of his general argument for *mare liberum* to the open sea.¹⁶ However, Grotius did recognise State jurisdiction in a narrow band of sea directly off the coast.¹⁷ Over time the recognition of the coastal State's rights in

¹¹ Grotius, above n 10.

¹² Grotius, above n 10, 44.

¹³ R L Friedheim, *Negotiating the New Ocean Regime*, (1993), 13.

¹⁴ R P Anand, 'Changing Concepts of the Sea: A Historical Perspective' in J Van Dyke, D Zaelke and G Hewison (eds), *Freedom for the Seas in the 21st Century* (1993), 75.

¹⁵ J M Van Dyke, 'Sharing Ocean Resources in a time of scarcity and selfishness', in H N Scheiber, *Law of the Sea. The Common Heritage and Emerging Challenges*, (2000), 3.

¹⁶ Fulton above n 8, 347.

¹⁷ Friedheim, above n 13, 11.

relation to that narrow band of water hardened into a three mile zone, which eventually became known as the territorial sea.¹⁸ By the early nineteenth century the notion of the territorial sea was firmly entrenched in international law.¹⁹ Controversy still lingered on into the early twentieth century in relation to a number of questions, such as the width of the territorial sea and the extent of rights of innocent passage through the territorial sea.²⁰ Outside the territorial sea, however, the Grotian idea of freedom of the high seas had firmly taken hold.

EMERGENCE OF SOVEREIGN RIGHTS IN SEDENTARY SPECIES BEYOND THE TERRITORIAL SEA

From the mid nineteenth century onwards a number of coastal states also began to assert claims to the sedentary species of the sea floor beyond the narrow coastal strip of the territorial sea. In a comprehensive review of State practice Auguste notes numerous examples of claims to jurisdiction over sedentary species. These included the Tunisian regulation of a sponge fishery, regulations excluding aliens from pearl banks in French territories in Oceania and from the coral of Algeria, English and Irish claims to oysters on the east coast of Ireland, regulation of pearl and mother of pearl fishing of Panama, Libyan claims to "sedentary fisheries of any kind" located on Libya's continental shelf, the Ethiopian claims to pearl and other sedentary fisheries,

¹⁸ Friedheim, above n 13.

¹⁹ R R Churchill and A V Lowe, *The law of the sea*, (1999), 72.

²⁰ Ibid.

and Norwegian claims to jurisdiction to regulate the taking of crustaceans and molluscs.²¹

Perhaps more widely known were the claims of the British in Ceylon (now Sri Lanka) and in the colonies of Queensland and Western Australia. Writing in 1911 Fulton notes that access to the pearl fisheries in Ceylon

"have been treated from time immemorial by the successive rulers of the island as subjects of property and jurisdiction".²²

Since 1811 colonial legislation had regulated access to and navigation around pearl-fisheries located between six to twenty-one miles off the coast.²³ Similarly, the colonial legislatures of Queensland and Western Australia sought to regulate access to pearl fisheries in the Timor and Arafura seas in the later half of the nineteenth century.²⁴ Doubts about the competence of colonial legislatures to legislate extra-territorially effectively limited the operation of such legislation to pearling conducted in territorial waters, or to persons operating outside territorial waters but ordinarily domiciled in the colony.²⁵ However, in 1885 the Imperial Parliament delegated power to the Federal Council of Australasia to "legislate in Australian waters beyond territorial limits" with respect to such fisheries. Eventually the *Queensland Pearl Shell and Bêche-de-mer Fisheries (Extra-Territorial) Act* 1888 and the *Western*

²¹ B B L Auguste, *The Continental Shelf: The Practice and Policy of the Latin American States with Special Reference to Chile, Ecuador and Peru*, (1960), 51-56.

²² Fulton, above n 8, 697.

²³ Ibid.

²⁴ D P O'Connell, 'Sedentary Fisheries and the Australian Continental Shelf', (1955) 49 *American Journal of International Law* 185.

²⁵ Ibid.

Australian Pearl Shell and Bêche-de-mer Fisheries (Extra-Territorial) Act 1889 extended to the activities of deep-sea divers from Singapore and other British colonies in waters around Queensland and Western Australia.²⁶

This legislation remained in force after federation of the Australian colonies in 1901 pursuant to the Commonwealth Constitution.²⁷ Section 51(x) of the Commonwealth Constitution granted the Commonwealth parliament power to make laws with respect to "fisheries in Australian waters beyond territorial limits". It was not until 1952 that the colonial legislation was repealed and replaced by the *Fisheries Act 1952 (Cth)*, and the *Pearl Fisheries Act 1952 (Cth)* which applied to both high seas and sedentary fisheries in waters to be proclaimed "Australian waters".²⁸ This legislation made provision for the regulation of sedentary fisheries within the proclaimed waters. It specifically authorised the Minister to prohibit the conduct of sedentary fishing operations in specified areas of the proclaimed waters at specified times, as well as proscribing minimum sizes of pearl shell, bêche-de-mer and green snail, together with maximum size of catches.²⁹ The overriding intention of this legislation was "to prevent, by schemes of licensing and conservation, unbridled competition and reckless wastage in the exploitation of this valuable resource".³⁰

²⁶ O'Connell, above n 24, 186.

²⁷ *Ibid.*

²⁸ *Ibid.*

²⁹ L F E Goldie, 'Australia's Continental Shelf: Legislation and Proclamations', (1954) 3 *The International and Comparative Law Quarterly* 535, 542.

³⁰ *Ibid.*

Over time a body of opinion emerged that claims to sedentary fisheries such as those of Ceylon, Australia and other countries were an exception to the notion of the freedom of the high seas.³¹ However the rights recognised with respect to sedentary species did not totally deprive the areas in which they were found of their high seas status. As Hurst observed in 1923

"It cannot be too strongly emphasised that the recognition of special property rights in particular areas of the bed of the sea outside the marginal belt for the purpose of sedentary fisheries does not conflict in any way with the common enjoyment by all mankind [sic] of the right of navigation of the waters lying over those beds or banks. Nor does it entail the recognition of any special or exclusive right to the capture of swimming fish over or around these beds or banks... The claim to the exclusive ownership of a portion of the bed of the sea and to the wealth which it produces in the form of pearl oysters, chanks, coral, sponges or other fructus of the soil is not inconsistent with the universal right of navigation in the open sea or with the common right of the public to fish in the high seas."³²

Such areas remained high seas even though international law recognised rights of the coastal State to regulate access to sedentary fisheries. Some argued these rights appeared to give rise to sovereign claims to the seabed, although such claims were often disputed. Thus in an often cited extract from the same publication in 1923 Hurst also argued

"Wherever it can be shown that particular oyster beds, pearl banks, chank fisheries, sponge fisheries or whatever may be the particular form of sedentary fishery in question outside the three-mile limit have always been kept in occupation by the Sovereign of the adjacent land, ownership of the soil of the bed of the sea where the fishery was situated may be presumed, and the exclusive right to the produce to be obtained from these fisheries may be based on their being the produce of the soil. Ownership of the soil by the Sovereign of the country under such circumstances must carry with it the right to legislate for the soil so owned and for the protection of the wealth to be derived from it, and no doubt need be felt as to the binding force of the various enactments which have been issued for the protection of these sedentary fisheries outside the three-mile limit".³³

³¹ R Young, 'Sedentary Fisheries and the Convention on the Continental Shelf' (1961) 55 *American Journal of International Law* 359, 360.

³² C J B Hurst, 'Whose is the bed of the sea?', (1923-4) 4 *British Yearbook of International Law* 34, 42-43.

³³ Hurst, above n 32, 40.

Despite what appeared arguably to be recognition of rights in relation to sedentary species and the surrounding seabed by State practice, there is little evidence to support any suggestion that the origin of what we now know as the doctrine of the continental shelf lies in such State practice. Scholars such as Waldock³⁴ have been able to identify some connection between sedentary fisheries and the notion of the continental shelf in the works of jurists in the early part of the twentieth century. However, it is generally accepted that the origins of the legal notion of the continental shelf lie in other quite separate developments in State practice in the 1940s.³⁵

EMERGENCE OF THE LEGAL NOTION OF THE CONTINENTAL SHELF

Writing in 1956 when the legal notion of the continental shelf was less than eleven years old Kunz observed

"The doctrine of the continental shelf is the outcome of the fact that petroleum is highly needed, that geologists have located great resources of petroleum below the waters of the continental shelf and that engineering progress has made possible the extraction of this oil."³⁶

³⁴ For example, Waldock notes that at a fisheries conference in Madrid in 1916 the Spaniard, de Bruen, proposed that territorial waters should be extended to include the continental shelf because it was the main habitat of an important edible species of fish. Similar ideas were also proposed in 1916 by Storni and again in 1918 by Suarez. Waldock notes the "abortive Report of the League of Nations Committee of Experts on the Exploitation of the Products of the Sea, drafted by Suarez in 1925, proposed that, for conservation of fisheries, uniform fisheries regulations should be established by international action over all the continental shelf". See C H M Waldock, 'The Legal Basis of claims to the Continental Shelf' (1962) 36 *The Grotius Society* 115, 122. For more detailed discussion of the work of the League of Nations and the alleged link between the continental shelf and fisheries see also M W Mouton, *The Continental Shelf* (1952), especially Chapter II.

³⁵ There are, however, some isolated examples of State practice linking the concept of Continental Shelf and fisheries, such as a Portuguese decree issued in 1910, which sought to regulate deep-sea trawling by fishing vessels within the limits of the Portuguese Continental Shelf. See Auguste, above n 21, 57-58.

³⁶ J L Kunz, 'Continental Shelf and International Law: Confusion and Abuse' (1956) 50 *American Journal of International Law* 828, 829.

Thus the legal notion of the continental shelf is the result of the needs of the coastal State to access the mineral resources of the continental shelf, and the fact that technology by this time had made such mineral resources accessible.

The first signs of this emerging concept and its link to mineral resources emerged in 1942 with the negotiation of the Anglo-Venezuelan Treaty in relation to the Gulf of Paria.³⁷ The United Kingdom wished to exploit the off-shore oil reserves of the Gulf of Paria located beneath the sea-bed of the high seas outside the territorial waters of Trinidad.³⁸ The main obstacle to the exploitation of these resources lay in the inability of any State to assert title to areas of the seabed beyond the territorial sea.³⁹ This was clearly impossible given the state of international law at this time. At least until 1945 it was clear that international law recognised no right of appropriation in relation to submarine areas outside of a nation's territorial sea.⁴⁰

The way that the *Gulf of Paria Treaty* got around this problem was by dividing

"the submarine areas of the Gulf of Paria into two spheres of interest, each party undertaking not to make claims in the other's sphere and "to recognise any rights of sovereignty or control" lawfully acquired by the other party in his [sic] own sphere. In other words the Treaty looked forward to the legal occupation of parts of the sea-bed and meanwhile guarded against quarrels by a political agreement concerning spheres of interest. The unexplored marine territory of the Gulf was treated much as had been the unexplored jungle lands of Africa.⁴¹

³⁷ Great Britain-Venezuela. Treaty relating to the Submarine Areas of the Gulf of Paria, opened for signature 26 February 1942, 205 *LNTS* 121 (entered in force 22 September 1942), hereinafter *Gulf of Paria Treaty*.

³⁸ Research Centre for International Law, University of Cambridge, *International Boundary Cases: The Continental Shelf*, (1992), 5.

³⁹ *Ibid.*

⁴⁰ Krueger, above n 3.

⁴¹ Waldock, above n 34, 131-132.

Immediately thereafter pursuant to the *Submarine Areas of the Gulf of Paria (Annexation) Order 1942* Great Britain annexed to Trinidad and Tobago the submarine area allotted to it to under the treaty.⁴²

Lauterpacht was so bold as to observe that this act of annexation marked the starting point in the development of the doctrine of the continental shelf under international law.⁴³ Although the *Gulf of Paria Treaty* was one of the first international legal instruments to expressly lay claims to the mineral resources of a continental shelf area, it made no claim to the continental shelf per se. It was instead the Truman Proclamation⁴⁴ of 28 September 1945 that gave birth to the doctrine of the continental shelf. It was, as the International Court of Justice⁴⁵ recognised in the *North Sea Continental Shelf cases*,⁴⁶ "the starting point of the positive law on the subject".⁴⁷ As Judge Fouad Ammoun observed, the Truman Proclamation

"deliberately cut the Gordian knot of the question whether the immense resources discovered under the high seas would remain, on the model of the high seas themselves, at the disposal of the international community, or would become the property of the coastal States".⁴⁸

The Truman Proclamation, was a unilateral claim to the oil and other mineral resources of the continental shelf. Even where the expression "natural resources" was

⁴² Waldock, above n 34, 132.

⁴³ H Lauterpacht, 'Sovereignty over Submarine Areas' (1950) 27 *British Yearbook of International Law* 376, 380.

⁴⁴ Discussed below.

⁴⁵ Hereinafter ICJ.

⁴⁶ *Federal Republic of Germany v Denmark; Federal Republic of Germany v The Netherlands ('North Sea Continental Shelf cases')* [1969] ICJ Rep 1.

⁴⁷ *Federal Republic of Germany v Denmark; Federal Republic of Germany v The Netherlands ('North Sea Continental Shelf cases')* [1969] ICJ Rep 1, 33.

⁴⁸ *Federal Republic of Germany v Denmark; Federal Republic of Germany v The Netherlands ('North Sea Continental Shelf cases')* [1969] ICJ Rep 1 per Judge Fouad Ammoun, 105-106.

used in the Truman Proclamation, this was clearly a reference to mineral resources. The Truman Proclamation was not a claim to the living natural resources of the continental shelf. It was not a claim to the sedentary species of the continental shelf.

If the origin of the doctrine of the continental shelf lies in the Truman Proclamation, as most jurists accept, then it is clear from the outset that claims to the continental shelf were essentially claims to mineral resources. The legal notion of the continental shelf therefore was essentially about claims to the mineral resources of the continental shelf. It was not until several years later that the concept of the continental shelf became intertwined with that of the coastal State's right to sedentary species.

The Truman proclamation asserted the claim to the mineral resources was not intended to derogate from the high seas nature of the waters above the continental shelf. As Oda notes

"The Truman Proclamation was not concerned with the regime of the continental shelf as a space but only made a moderate claim to the control and jurisdiction over the mineral resources contained in the continental shelf"⁴⁹

To an extent the Grotian heritage of freedom of navigation and exploitation of the superjacent waters remained intact. In fact this was later recognised in both the 1958 *Continental Shelf Convention*⁵⁰ and in LOSC.

⁴⁹ S Oda, 'The Continental Shelf' (1957-58) 1 *Japanese Annual of International Law* 15, 35.

⁵⁰ *Convention on the Continental Shelf*, opened for signature 29 April 1958. 499 UNTS 311 (entered into force 10 June 1964).

The Truman Proclamation was largely accepted by the international community and was followed shortly thereafter by many more unilateral declarations by other countries. These included claims of Latin American States such as Mexico (29 October 1945), Argentina (9 October 1946), Chile (June 1947), Peru (1 August 1947) and Costa Rica (27 July 1948). On 26 November 1947 by Orders in Council Great Britain also issued similar claims in the Bahamas and Jamaica.⁵¹ Claims were also subsequently made by countries such as Iceland (5 April 1948), while in the Middle East a series of proclamations were issued by Saudi Arabia (28 May 1949), and other Arab States (then still formally under the protection of the United Kingdom) including Abu Dhabi (10 June 1949), Ajman (20 June 1949), Bahrain (5 June 1949), Dubai (14 June 1949), Kuwait (12 June 1949), and Qatar (8 June 1949).⁵² Numerous other States followed shortly thereafter and over following years.⁵³

The Truman Proclamation opened the floodgates to numerous other claims to the mineral resources of the continental shelf. As the ICJ subsequently affirmed in the *North Sea Continental Shelf Cases*, what commenced as a unilateral declaration by one State rapidly developed into a right of the coastal State under international

⁵¹ Lauterpacht, above n 43, 380-381.

⁵² Auguste, above n 21, 66-70.

⁵³ Detailed discussion of these claims is beyond the scope of this chapter. In any event, the nature and extent of these claims has been discussed extensively in the existing literature. For more detailed discussion see publications such as Auguste, above n 21, Lauterpacht, above n 43, Mouton, above n 34, S Oda, above n 49, and P C L Anninos, *The Continental Shelf and Public International Law* (1953).

customary law, which was subsequently codified (albeit in amended form)⁵⁴ in the 1958 *Convention on the Continental Shelf*⁵⁵ and more recently in LOSC.

THE 1958 GENEVA CONVENTION ON THE CONTINENTAL SHELF

From February 24 to April 27, 1958 representatives of 86 countries met at the United Nations Conference on the Law of the Sea in Geneva.⁵⁶ The outcome of that conference of plenipotentiaries was four new international treaties: the *Convention on the Territorial Sea and Contiguous Zone*;⁵⁷ the *Convention on the High Seas*;⁵⁸ the *Convention on Fishing and Conservation of the Living resources of the High Seas*;⁵⁹ and the *Continental Shelf Convention*.

For present purposes the most important of these treaties was the *Continental Shelf Convention*. Article 2 of that convention provides

- "1. The coastal State exercises over the continental shelf sovereign rights for the purposes of exploring it and exploiting its natural resources.
2. The rights referred to in paragraph 1 of this article are exclusive in the sense that if the coastal State does not explore the continental shelf or exploit its natural resources, no one may undertake these activities, or make a claim to the continental shelf, without the express consent of the coastal State.
3. The rights of the coastal State over the continental shelf do not depend on occupation, effective or notional, or any express proclamation.
4. The natural resources referred to in these articles consist of the mineral and other non-living resources of the sea-bed and subsoil together with living organisms belonging to sedentary species, that is to say, organisms which, at the harvestable

⁵⁴ See discussion below.

⁵⁵ *Convention on the Continental Shelf*, Geneva, 29 April 1958, entered into force 10 June 1964. 499 UNTS 311, hereinafter *Continental Shelf Convention*.

⁵⁶ Marjorie M. Whiteman, 'Conference on the Law of the Sea: Convention on the Continental Shelf', (1958) 52 *The American Journal of International Law* 629.

⁵⁷ *Convention on the Territorial Sea and the Contiguous Zone*, opened for signature 29 April 1958. 516 UNTS 205 (entered in force 10 September 1964).

⁵⁸ *Convention on the High Seas*, opened for signature 29 April 1958. 450 UNTS 11 (entered into force 30 September 1962).

⁵⁹ *Convention on Fishing and Conservation of the Living Resources of the High Seas*, opened for signature 29 April 1958. 559 UNTS 285, (entered into force 20 March 1966).

stage, either are immobile on or under the sea-bed or are unable to move except in constant physical contact with the sea-bed or the subsoil."

The effect of article 2 was to recognise "sovereign rights" in relation to the "natural resources" of the continental shelf. Given the way "natural resources" was defined in article 2(4), this meant the rights exercised by the coastal State extended beyond the mineral resources claimed by the Truman Proclamation and subsequent claims to the continental shelf. It now included rights in relation to the sedentary species.

How did the intertwining of the legal notion of continental shelf and the rights of the coastal State to sedentary species occur? It occurred because of the fusion of the two concepts during the controversial work of the International Law Commission.⁶⁰

The 1958 *Continental Shelf Convention* grew out of draft articles prepared by the ILC during the period 1950 to 1956.⁶¹ At its first session held in 1949, Mr J P A François was elected special rapporteur by the ILC to study the regime of the high seas. At its sessions held in 1950 and 1951 the ILC received reports submitted by Mr François and considered issues associated with the regime of the high seas, including nationality of ships, safety of life at sea, slave trade, submarine telegraph cables, resources of the high seas, the right of hot pursuit, right of approach, contiguous zones, sedentary species and the continental shelf.⁶²

⁶⁰ Hereinafter ILC.

⁶¹ Krueger, above n 3, 3.

⁶² United Nations, International Law Commission, *Report of the International Law Commission Covering the work of its Fifth Session*, June 1- August 14, 1953, 8 UN GAOR A/2456 reproduced in (1954) 48 *American Journal of International Law*, Supp. 1.

The position initially adopted by the ILC in relation to the continental shelf was unambiguously clear. The rights of the coastal State in relation to the continental shelf extended only to mineral resources. By a convincing vote of eleven to one the ILC initially resolved that the issue of the mineral resources of the continental shelf should be considered separately from that of sedentary fisheries.⁶³ As the ILC observed in its report to the United Nation General Assembly in relation to the work of its third session, the ILC considered that

"sedentary fisheries should be regulated independently of the problem of the continental shelf. The proposals relating to the continental shelf are concerned with the exploitation of the mineral resources of the subsoil, whereas, in the case of sedentary fisheries, the proposals refer to fisheries regarded as sedentary because of the species caught or the equipment used eg the stakes embedded in the sea floor. This distinction justifies a division of the two problems."⁶⁴

The proposals the ILC was referring to were its proposed draft articles. Thus draft Part I, Article 2 provided

"The continental shelf is subject to the exercise by the coastal State of control and jurisdiction for the purpose of exploring it and exploiting its natural resources".⁶⁵

The control and jurisdiction over the "natural resources" was clearly confined only to mineral resources. In relation to sedentary species the ILC proposed a separate draft article as follows

⁶³ D P O'Connell, 'Sedentary Fisheries and the Australian Continental Shelf', (1955) 49 *American Journal of International Law* 185, 203.

⁶⁴ United Nations, International Law Commission, *Report of the International Law Commission covering its Third Session, May 16-July 27, 1951*, 6 UN GAOR, Supp 9, A/1858 reproduced in (1951) 45 *American Journal of International Law*, Supp, 103.

⁶⁵ Part I, Article 1, Draft Articles on the Continental Shelf and Related Subjects, Annex to United Nations, International Law Commission, *Report of the International Law Commission covering its Third Session, May 16-July 27, 1951*, 6 UN GAOR, Supp 9, A/1858 reproduced in (1951) 45 *American Journal of International Law*, Supp, 103.

"The regulation of sedentary fisheries may be undertaken by a State in areas of the high seas contiguous to its territorial waters, where such fisheries have long been maintained and conducted by nationals of the State, provided that non-nationals are permitted to participate in the fishing activities on equal footing with nationals. Such regulation will, however, not affect the general status of the areas as high seas".⁶⁶

This draft article was essentially declarative of the existing law with respect to sedentary species discussed earlier in this chapter.

It is also worth noting that the nature of the coastal State's rights were defined as "control and jurisdiction". As the ILC observed

"[draft] Article 2 avoids any reference to "Sovereignty" of the coastal State over the submarine areas of the continental shelf. As control and jurisdiction by the coastal State would be exclusively for exploration and exploitation purposes, they cannot be placed on the same footing as the general powers exercised by a State over its territory and its territorial waters".⁶⁷

While in 1951 the ILC was prepared to accept the existing law that clearly recognised a separation of the issue of sedentary fisheries from that of the continental shelf and its mineral resources, by 1953 the ILC completely reversed its position. After a long and contentious debate over several days the ILC eventually agreed on significant changes to draft Article 2 which was now amended to read

"The coastal state exercises over the continental shelf sovereign rights for the purpose of exploring and exploiting its natural resources"⁶⁸

⁶⁶ Part II, Article 3, Draft Articles on the Continental Shelf and Related Subjects, Annex to United Nations, International Law Commission, *Report of the International Law Commission covering its Third Session, May 16-July 27, 1951*, 6 UN GAOR, Supp 9, A/1858 reproduced in (1951) 45 *American Journal of International Law*, Supp, 103.

⁶⁷ *Report of the International Law Commission covering its Third Session, May 16-July 27, 1951*, 6 UN GAOR, Supp 9, A/1858 reproduced in (1951) 45 *American Journal of International Law*, Supp, 103, 142.

⁶⁸ Article 2, Draft Articles on the continental shelf, United Nations, International Law Commission, *Report of the International Law Commission covering the work of its fifth session 1 August, 1953*, reproduced in (1954) 48 *American Journal of International Law*, Supp, 1, 28.

In adopting the term "sovereign rights" the ILC was deliberately seeking to

"avoid language lending itself to interpretation alien to an object which the Commission considers to be of decisive importance, namely, safeguarding the principle of the freedom of the superjacent sea and the airspace above it."⁶⁹

This was a compromise between Sovereignty and "control and jurisdiction".

Although the term "natural resources" remained, this cloaked a far more dramatic change in the legal notion of the continental shelf. The ILC had before it a recommendation by the Special Rapporteur that the rights of the coastal State be limited only to the "mineral resources" of the continental shelf. This proposal was consistent with the position previously adopted by the ILC. However, some members of the ILC were of a different opinion. Mr Lauterpacht for example argued

"The Commission had now to decide whether it wished to limit the exclusive right of exploration and exploitation to the mineral resources which were to be found on the sea-bed and in the subsoil, or whether it should be extended to cover the pearl and oyster beds, sponge deposits and other natural resources which would be included under the term "natural" resources. He saw no good reason why mineral and non-mineral resources should be treated differently... [provided] that ""natural resources" did not include swimming fish or bottom fish"⁷⁰.

Other members of the ILC opposed such a proposal. Mr Scelle for example was unable to agree with the views expressed by several members of the Commission. For

⁶⁹ United Nations, International Law Commission, *Report of the International Law Commission covering the work of its Fifth Session 1 August, 1953*, reproduced in (1954) 48 *American Journal of International Law*, Supp, 1, 31.

⁷⁰ Comments of Mr Lauterpacht reported in United Nations, International Law Commission, (1953) *Yearbook of the International Law Commission*, Volume 1 Summary of records of the 5th Session, UN Doc No. A/CN.4/SER.A/1953, 135.

if sovereign rights over the continental shelf were to be extended to include sedentary fisheries

"What would be left of the principle of the freedom of the high seas at the end of that process of extension? He feared that so little would be left of the high seas as would not suffice to drown a celebrated little book, the author of which was one named Grotius."⁷¹

In the end that "little book" did not drown, although it was to become decidedly soggy. After deferring debate on this issue several times, after a final lengthy debate, the ILC reversed its position and resolved to bring the sedentary species within the sovereign rights the coastal State enjoyed under proposed draft Article 2. As the ILC noted in its report to the General Assembly

"The Commission decided, after considerable discussion, to retain the term "natural resources" as distinguished from the more limited term "mineral resources". In its previous draft the Commission only considered mineral resources, and certain members proposed adhering to that course. The Commission, however, came to the conclusion that the products of sedentary fisheries, in particular to the extent that they were natural resources permanently attached to the bed of the sea, should not be outside the scope of the regime adopted and that this aim could be achieved by using the term "natural resources". It is clearly understood, however, that the rights in question do not cover so-called bottom-fish and other fish which, although living in the sea, occasionally have their habitat at the bottom of the sea or are bred there. Nor do these rights cover objects such as wrecked ships and their cargoes (including bullion) lying on the sea bed or covered by the sand of the subsoil....

Neither, in the view of the Commission, can the exclusive rights of the coastal state be exercised in a manner inconsistent with existing rights of nationals of other states with regard to sedentary fisheries. Any interference with such rights, when unavoidably necessitated by the requirements of exploration and exploitation of natural resources is subject to rules of international law ensuring respect of the rights of aliens. However, apart from the case of such existing rights, the sovereign rights of the coastal state over its continental shelf cover also sedentary fisheries. It may be added that this was the reason why the Commission did not think it necessary to retain, among the articles devoted to the resources of the sea, an article on sedentary fisheries."⁷²

⁷¹Comments of Mr Scelle, reported in United Nations, International Law Commission, (1953) *Yearbook of the International Law Commission*, Volume 1 Summary of records of the 5th Session, UN Doc No. A/CN.4/SER.A/1953, 146.

⁷²United Nations, International Law Commission, *Report of the International Law Commission covering the work of its Fifth Session 1 June- 14 August, 1953*, 8 GAOR, Supp No.9, A/2456 reproduced in (1954) 48 *American Journal of International Law* Supp, 1, 32.

Thus the doctrine of the continental shelf was fused with the rights of the coastal State in relation to sedentary fisheries. However, as the above discussion illustrates and as Goldie was to subsequently to observe, this fusion from the beginning was

"an artificial graft upon a regime whose main purposes and policies were formulated and directed for the purpose of regulating the exploration for and exploitation of mineral resources. The graft was camouflaged by a legal fiction, namely, the pretence of an untrue state of facts (sessile sea animals are growths of the soil as crops are) to reach a legal conclusion whose propriety depends on the acceptability of the erroneous premise (sessile animals are legally classifiable as crops)".⁷³

There were attempts to reverse this decision in subsequent debate of the ILC, but the recommendation of the ILC remained unchanged. This fusion was reflected in Article 68 of further draft article prepared by the ILC, and ultimately in Article 2 of the 1958 *Convention on the Continental Shelf*. Even though mineral resources and sedentary fisheries had been fused into "natural resources" controversy remained. Some States (for example the Federal Republic of Germany) still argued that the Continental shelf provisions should only apply to mineral resources.⁷⁴ Controversy also remained as to the precise meaning of the expression "natural resources" well into the negotiations of the 1958 *Convention on the Continental Shelf*, including whether it should extend to shrimp and crustaceans. As Dean observed

"In the commentary to the International Law Commission's draft resolution on the continental shelf, the Commission stated that attempts to further define the term "natural resources" to make it specifically include such resources permanently attached to the bed of the sea or to make it include all marine life living in constant physical and biological relationship with the seabed were rejected. The Commission did not, therefore, take a stand in its draft as to whether the term "natural resources" would include shrimp and other such crustaceans."⁷⁵

⁷³ L F E Goldie, 'Sedentary Fisheries and Article 2(4) of the Convention on the Continental Shelf-A plea for a separate regime' (1969) 63 *The American Journal of International Law* 86, 90.

⁷⁴ M M Whiteman, 'Conference on the Law of The Sea: Convention on the Continental Shelf, (1958) 52 *American Journal of International Law* 629, 636.

⁷⁵ A H Dean, 'The Geneva Conference on the Law of the Sea: What was accomplished.' (1958) 52 *American Journal of International Law* 607, 621.

Ultimately "natural resources" were defined in Article 2(4) of the 1958 *Convention on the Continental Shelf* as consisting of

"the mineral and other non-living resources of the seabed and subsoil together with living organisms belonging to the sedentary species, that is to say, organisms which, at the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or the subsoil."

This provision clearly carries the mark of the interests of countries that have claimed historic rights in relation to sedentary species. It is no co-incidence therefore that it was the result of a joint proposal introduced into the negotiations by countries that had claimed such rights, including Australia and Ceylon, as well as the Federation of Malaya, India, Norway and the United Kingdom.⁷⁶ Australia in particular was influential in the negotiation of this provision.⁷⁷

Thus what began as two completely separate concepts of international law were fused together under the 1958 *Continental Shelf Convention*. That fusion was carried forward into Article 77 of LOSC with little opposition. The notable exception to this was Japan, which had never signed the 1958 *Continental Shelf Convention*.⁷⁸ Japan subsequently introduced a draft proposal dealing with the continental shelf at the Caracas sessions of the LOSC negotiations in 1974. If accepted this proposal would

⁷⁶ M M. Whiteman, above n 74, 638.

⁷⁷ The Australian position was heavily influenced by its ongoing dispute with Japan in relation to Japanese pearling off the Australian coast. For a detailed overview of this dispute and its influence on the Australian position in relation to the continental shelf negotiations see S V Scott, 'The inclusion of sedentary fisheries within the continental shelf doctrine' (1992) 41 *International & Comparative Law Quarterly* 788.

⁷⁸ J C F Wang, *Handbook On Ocean Politics & Law* (1992), 458.

have confined the continental shelf regime to the mineral resources of the continental shelf.⁷⁹ However, this proposal received little support.⁸⁰

SHOULD WE SEVER THE LINK BETWEEN SEDENTARY SPECIES AND THE CONTINENTAL SHELF?

As the discussion above illustrates, the rights of the coastal State over sedentary species and the legal notion of the continental shelf have quite independent origins. These two very separate legal concepts were fused in controversial circumstances. Despite attempts to revive the issue by the time LOSC entered into force, it was clear that the fusion was now accepted by the international community. The link between sedentary species and the continental shelf is now firmly entrenched in international law.

As noted in Chapter 2, more recent developments in technology present new problems, which the fusion of rights in relation to sedentary fisheries and the legal notion of the continental shelf do not contemplate. It is not clear what hydrothermal vents species fall within the continental shelf regime because of the uncertainty surrounding the applicability of the sedentary species definition to many hydrothermal vent species.

The obvious solution might be to do away with the existing provisions on the Continental shelf and sedentary fisheries and replace them with another regime.

⁷⁹ See Document A/CONF.62/C.2/L.31/Rev. 1 reproduced in Wang, above n 78, 458.

⁸⁰ Wang, above n 79, 459.

Given the great mineral wealth to be found on the continental shelf, it is highly unrealistic to expect any State to give up such resources. Similarly the States that had previously claimed historic rights to sedentary fisheries, and that argued so strongly for their fusion with the legal notion of the continental shelf are unlikely to give up such claims.

Given the origins of the current continental shelf regime (including the sedentary species provisions), it is arguable that any future legal regime will need to maintain the existing rights that have been recognised in relation to the continental shelf, while providing separately for the regulation of activities at hydrothermal vents. The two regimes will need to be complementary.

It is clear that the sedentary species definition was never intended to apply to species such as those associated with hydrothermal vents. It would seem appropriate that any future regime for the sustainable management of hydrothermal vents operate separately from that of the continental shelf. Beyond the EEZ it would appear appropriate for a common regime to apply to hydrothermal vents sites on the continental shelf and in the Area.

CHAPTER 5

THE COMMON HERITAGE OF MANKIND AND THE HYDROTHERMAL VENT ECOSYSTEM

While the 1958 *Convention on the Continental Shelf* clearly resolved the debate as to whether sedentary species should be linked to the legal notion of continental shelf, that treaty, together with the other 1958 Geneva Conventions, left two major questions unresolved in relation to the deep seabed. Firstly, the extent to which a coastal State could exploit the "natural resources" of the continental shelf was unclear. Article 1 of the 1958 *Continental Shelf Convention* defined the term "continental shelf" as

"referring (a) to the seabed and subsoil of the submarine areas adjacent to the coast but outside the area of the territorial sea, to a depth of 200 metres or, beyond that limit, to where the depth of the superjacent waters admits of the exploitation of the natural resources of the said areas; (b) to the seabed and subsoil of similar submarine areas adjacent to the coasts of islands".

For many the exploitability criteria in Article 1 introduced unnecessary uncertainty into the law, especially given that rapid advances in technology were extending the area of ocean space that States could claim further and further into the ocean. This uncertainty was ultimately removed by Article 76 of LOSC, which provides for a more certain definition of the Continental shelf, now defined in terms of the baselines from which the territorial sea is measured.

The second and perhaps more significant issued left unresolved by the 1958 Geneva Conventions was the status of the deep seabed.¹ The differing interpretations of the legal status of the seabed, together with the response of the international community in Part XI of LOSC, have already been referred to in Chapter 2. One of the most important aspects of the response was the declaration in article 136 that

"The Area and its resources are the common heritage of mankind [sic]".

The central elements of the common heritage of mankind as reflected in LOSC are non-appropriation of the deep seabed beyond national jurisdiction, common management of the mineral resources of the deep seabed beyond national jurisdiction and benefit sharing of the deep seabed mineral resources.² It is unclear to what extent the designation of the Area and its resources as the common heritage of mankind goes beyond these central elements, or to what extent the common heritage of mankind is recognised by international law outside of LOSC. As one author has noted, its application is a source of international controversy, its source and conceptualisation a topic of scholarly debate.³

¹ L M Alexander, 'Future Regimes: A Survey of Proposals' in R Churchill, K R Simmonds and J Welch (eds), *New Directions in the Law of the Sea-Collected Papers*, Volume 3, (1973), 119.

² J Frakes, 'Notes and comments: The Common Heritage of Mankind Principle and the Deep Seabed, Outer Space, and Antarctica: Will developed and developing nations reach a compromise?' (2003) 21 *Wisconsin International Law Journal* 409, 410.

³ Ibid.

The extent of this controversy and uncertainty can be clearly demonstrated by referring to a recent and impressive study of the common heritage of mankind in international law by Baslar. In his introductory remarks he observes

"Although the concept has been intensively discussed since the late 1960s, international lawyers still find themselves in a quandry as to what the common heritage of mankind really means in international law. They have failed until now to give a satisfactory, comprehensive and widely-agreed definition encompassing the whole scope of the common heritage of mankind. Aside from a comprehensive universal definition to start with, there is no single descriptive term to which international lawyers and academics adhere.

International lawyers so far have used different terms to describe the common heritage of mankind phenomenon. Joyner, for instance, uses five different terms in his oft-quoted article to refer to the common heritage of mankind- concept, notion, doctrine, regime and ideal. A number of writers label the common heritage of mankind with other terms such as a theory, principle, right, rule and a legal "term of art".⁴

A detailed analysis of Baslar's study is beyond the scope of this thesis. However, as these comments by Baslar highlight, in considering the common heritage of mankind we are confronted with a major problem. The common heritage of mankind has no agreed definition beyond that stated in LOSC. There have been numerous attempts to apply the label common heritage of mankind to other resources apart from the mineral resources of the Area. Thus

"In 1982 Antarctica was proposed to be proclaimed as another common heritage of mankind. There have also been many aspiring attempts up to now to also declare, among others, various resources as belonging to mankind. These include outer space resources such as meteors, the geostationary orbit, the spectrum of radio-frequencies used for space communication, solar energy, low earth orbits, La Grange spots, various environmental resources such as endangered species, genetic resources, tropical rain forests, the atmosphere, all food resources, marine living resources and cultural heritages. Moreover, intentions have been expressed also to use the common heritage philosophy in regard to the transfer of technology and trade commodities".⁵

⁴ K Baslar, *The Concept of the Common Heritage of Mankind in International Law*, 1998, 1-2.

⁵ Baslar, above n 4, xx.

Significantly despite the calls of some developing countries in particular, the common heritage of mankind concept was not incorporated in the CBD.

Not only is there no agreed definition of the common heritage of mankind, there is also a wide divergence of views as to precisely what should be labelled the common heritage of mankind. A review of each of the resources that have been nominated for designation as the common heritage of mankind and the strong arguments that can be made that they *should* be designated the common heritage of mankind is beyond the scope of this thesis. But we cannot escape from the fact that no matter how passionate and how justifiable some arguments may be that resources such as these *should* be designated as the common heritage of mankind, we need clearly to distinguish between the common heritage of mankind as rhetoric (as a political and aspirational statement) and the common heritage of mankind as it is currently reflected in international law.

Despite the wide range of resources that have been put forward as the common heritage of mankind, apart from LOSC, only one other treaty has ever formally included reference to the Common Heritage of Mankind, namely the 1979 *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*.⁶ Article 11(1) of the 1979 Moon Treaty declares

"The moon and its natural resources are the common heritage of mankind, which finds its expression in the provisions of this Agreement and in particular in paragraph 5 of this article."

⁶ *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*, 18 December, 1979, 18 I L M 1434, (entered into force 11 July 1984), hereinafter referred to as the Moon Treaty.

However, as Smith observes, the Moon Treaty

"is worded broadly enough to permit varying definitions of its [common heritage of mankind] concept. The [common heritage of mankind] concept of the Moon Agreement ultimately is to find its expression from within the provisions of the Agreement itself when an international regime is established. The Agreement calls for Parties to "undertake to establish" this international regime when exploitation "is about to become feasible". The Agreement does not define the details and procedures of the regime, but it does set out the main purposes. Those purposes include the orderly and safe development of natural resources, their rational management, and expansion of opportunities for their use. The regime is also to provide for an "equitable sharing" by all Parties in the benefits derived from the natural resources. In this sharing, two groups are to be given special consideration: developing countries and countries that contributed in some fashion to the exploration of the Moon. Apart from these main purposes, little is known about the particular [common heritage of mankind] concept of the Moon Agreement".⁷

Even though the Moon Treaty includes reference to the common heritage of mankind, its precise legal meaning is unclear and still largely to be defined. In a strict legal sense, the common heritage of mankind has a very narrow meaning and scope of operation. To the extent that the common heritage of mankind has been reflected in international law, (as opposed to international politics) the only clear articulation of that concept is as outlined in LOSC. Even within the context of LOSC its meaning is far from settled. During the negotiations of LOSC the precise meaning of the common heritage of mankind changed dramatically over time, influenced in large part by economic and diplomatic events of the time, coinciding with the rise and fall of the New International Economic Order.⁸

⁷ M L Smith, 'The Commercial exploitation of mineral resources in outer space' in T C Zwaan et al (eds), *Space Law: Views of the Future*, (1988), 52.

⁸ New International Economic Order is hereinafter referred to as NIEO. See M Koskeniemi and M Lehto, 'The Privilege of Universality. International Law, Economic Ideology and Seabed Resources' (1996) 65 *Nordic Journal of International Law* 533. For a more detailed overviews of the negotiation of the common heritage regime under LOSC see for example M G Schmidt, *Common Heritage or Common Burden? The United States Position on the Development of a Regime for Deep [sic] Sea-Bed Mining in the law of the Sea Convention*, (1989); J B Morell, *The Law of the Sea. An Historical Analysis of the 1982 Treaty and Its rejection by the United States*, (1992).

Since LOSC was negotiated the world has also moved beyond the struggles over the NIEO. While poverty, disease malnutrition other "cries of the sea"⁹ which gave rise to the claims of the NIEO are still with us, the nature of international politics, international rhetoric and indeed international law has changed dramatically. It is unlikely that we will see the likes of the NIEO agenda pursued so vigorously or successfully again. As Martti Koskenniemi has observed

"Formal decolonization did not turn out to create a just international system. Initiatives within the United Nations, such as the New International Economic Order, failed to bring about a noticeable transformation in the global distribution of resources. On the contrary, when the regulative objectives of the 1982 UN Convention on the Law of the Sea were watered down in a 1994 implementation agreement, this was done under the language of "securing the universality of the Convention" that in fact underwrote the Western policy of creating a cost-effective market for private enterprise in the deep seabed. Receiving the benefit of sovereignty did not do away with conflict in the Third World, though it may have localized much of it as civil war. The end of the Cold War did bring about a significant expansion of the electoral process. Yet, today's democratic melancholy suggests that progressive transformation requires more than the export of a determined set of public institutions-but just what this might require and what role international law might play in the future remains obscure. Whatever globalization may mean, it has certainly not strengthened international public policy...The acceptance by the developed States of a legal obligation to eradicate poverty in the Third World is no longer seriously expected. Indeed, the very idea that economic injustice might be usefully dealt with by States, and public law, may now seem altogether old-fashioned, and politically ambivalent. Legal internationalism always hovered insecurely between cosmopolitan humanism and imperial apology, revealing itself as either one or the other the moment it was enlisted to support a particular institutional or normative arrangement. In the conditions of the Cold War, it may still have been possible to think that this resulted from the political interpretations that the protagonists in that struggle projected on to the law. Today, it has become much harder to believe that there is a rationality embedded in international law that is independent from the political perspectives from which it is seen."¹⁰

One need not take such a bleak view of where international law and international relations are today as Koskenniemi does. But he is right to the extent that he

⁹ P B Payoyo, *Cries of the Sea. World Inequality, sustainable development and the common heritage of humanity*, (1997).

¹⁰ M Koskenniemi, *The Gentle Civilizer of Nations: The Rise and Fall of International Law 1870-1960*, (2001), 512-513.

recognises the world has changed since the days of the NIEO. The rhetoric of the free market and free trade dominate international affairs, and, increasingly, the institutions of international law. It is hard to envisage how a concept like the common heritage of mankind, connected as it is to a particularly cumbersome political structure such as the ISA, could ever stand much chance of emerging today.

It is not just developments such as end of the cold war and the triumph of the neo-liberal ideas such as free trade and emergence of new neo-liberal institutions such as the World Trade Organisation¹¹ that would suggest the time of the common heritage of mankind has passed. An argument might even be made that common heritage of mankind was at odds with developments in international environmental law and the principles enunciated at Stockholm, Rio and more recently Johannesburg. The principles reflected in treaties such as the CBD and in Soft Law instruments since Stockholm speak of the importance of conserving biodiversity and the need for a precautionary approach. They would appear to be at odds with a concept which at its core is about the sharing in the fruits of exploitation of resources. Does expanding the resources which must be shared in part mean that we put exploitation before conservation or sustainable development?

Some would argue that there is no contradiction here, that the common heritage of mankind and sustainable development involve common goals. For example Kiss argues

¹¹ Hereinafter WTO.

"that the common heritage of mankind is mainly a concept of conservation and of transmission of a heritage to the future generations".¹²

To an extent this may be true, but not all would agree. The argument of just what the common heritage of mankind means was in part what paralysed the negotiations of LOSC and lead to the wholesale renegotiation of key parts of Part XI of LOSC. The form which the common heritage of mankind eventually took in LOSC and the so called 1994 implementation agreement were very different from the goals of the NIEO. Just how different is illustrated by the frank assessment of the common heritage of mankind contained in LOSC by its leading proponent Dr Arvid Pardo, who shortly after the negotiations of LOSC, described the common heritage regime as embodied in LOSC and Part XI as "little short of a disaster."¹³

Since the common heritage of mankind is an unclearly defined concept in international law, the adoption of which was contentious and stalled negotiations on a comprehensive oceans regime, is it worthwhile to embark on this debate again for another ocean resource, the genetic resources of hydrothermal vents? I think not. The point is that if we waste time arguing whether or not hydrothermal vents and their genetic resources are the common heritage of mankind we risk re-opening old debates that, in light of changes in world politics and international law, are perhaps now pointless.

¹² A Kiss, 'Conserving the Common Heritage of Mankind', (1990) 59 *Revista Juridica de la Universidad de Puerto Rico* 773, 776.

¹³ A Pardo, 'The Convention on the Law of the Sea: A Preliminary Appraisal', (1983) 20 *San Diego Law Review* 489, 499.

Unlike the now laughable predictions¹⁴ made as to the future wealth that might come from deep-sea minerals during the debates leading up to LOSC, bioprospecting in the deep-sea is occurring now and is a commercial proposition. The extent and nature of bioprospecting at hydrothermal vents is discussed in Chapter 7. If we are to embark on the rather pointless debate of whether hydrothermal vent genetic resources are the common heritage of mankind, we may delay the creation of a new legal regime for decades. By that time the extent of the already existing commercial activities in the deep-sea may have grown to a point where design and implementation of any legal regime will be that much harder. Vested commercial interests and therefore national interests will have become firmly entrenched.

Instead we must move on immediately to consider what form the regime should take, rather than be diverted by what name we give to such a regime, the common heritage of mankind or otherwise. What matters is that exploitation of these resources is sustainably managed.

In initially considering the status of hydrothermal vents under international law Glowka observed that

¹⁴ For example, in calling for the establishment of the international agency that would ultimately become the international seabed authority, Dr Arvid Pardo calculated that, if established in 1970, the agency would after five years or in 1975 have a gross annual income "conservatively" estimated at US\$6 billion and a net profit of US\$5 billion. See G Weissberg, 'International law meets the short term national interest: The Maltese proposal on the sea-bed and ocean floor-its fate in two cities', (1969) 18 *International and Comparative Law Quarterly* 41, 52.

"[w]hile it may be worthwhile to create a legal and institutional regime for the Area's genetic resources, it is difficult to determine conclusively without further study whether it is useful, or even necessary, to declare the Area's genetic resources a common heritage of mankind".¹⁵

This chapter has shown that the Common Heritage of Mankind has no legal meaning (as opposed to its rhetorical meaning) or at best a disputed meaning when divorced from the deep-sea mining regime under Part XI of LOSC. It is largely the product of another and now past era of international relations.

That is not to say that there should not be sharing of the benefits associated with the commercialisation of hydrothermal vent genetic resources. This is another issue altogether, taken up in Chapter 7. It is quite a separate issue from whether or not such resources should be regarded as the common heritage of mankind.

We start to see here a hint of what the future regime may look like. Some old ideas must be discarded, and perhaps as later chapters will show, new ideas may be required. Before moving to consider what form those new ideas may take, it is first necessary to consider how individual States have approached this issue without the need to resort to the common heritage of mankind

¹⁵ L Glowka, 'The Deepest of Ironies: Genetic Resources, Marine Scientific Research, and the Area' (1996) 12 *Ocean Yearbook* 154, 170.

CHAPTER 6

INTRODUCTION

In complete contrast to the position under international law, a number of States are either in the process of designing policies and legal regimes to regulate access to hydrothermal vents within their territorial waters and EEZs, or they have begun implementing such policies and laws. These states include Canada, New Zealand, Portugal, Papua New Guinea¹, Fiji, the Cook Islands² and Russia. Due to the difficulty in accessing information and materials on these regimes only the first four are considered in this chapter.

To varying degrees each of these policy and legal regimes is grounded upon the rights and obligations of States under both LOSC and the CBD as discussed in Chapter 2. However, their structure and content vary from State to State. This chapter seeks to outline the nature and extent of these regimes. Examination of the policy and legal regimes adopted or under development by each State provides some guidance on the range of tools and issues to consider in designing a regime to provide for the sustainable management of hydrothermal vents on the high seas.

Discussion in this chapter is broken into two parts. The first part of the chapter outlines the main features of the policy and legal regimes in the four States noted above. Discussion of each State's regime commences with an outline of the location and main features of the particular hydrothermal vents within their territorial sea, EEZ, or continental shelf, and the main stakeholders who have an

¹ Hereinafter PNG.

² The Cook Islands is a self governing territory of New Zealand.

interest in the regimes under development. This is followed by an examination of the key features of each regime. The second part of the chapter then goes on to consider what lessons can be drawn from the domestic experience.

Three of these regimes, Canada, New Zealand and PNG, have an impact on the rights of indigenous communities. As issues associated with indigenous rights do not arise on the high seas, a detailed consideration of the impact of these regimes on indigenous communities is beyond the scope of this thesis.

CANADA-THE ENDEAVOUR HYDROTHERMAL VENTS

Canada is surrounded by three oceans, the Arctic, the Atlantic and the Pacific. The latter is home to some of the most intensely studied hydrothermal vent fields in the world. The Endeavour hydrothermal vents form part of the Juan de Fuca Ridge system and lie in water 2,250 metres deep some 256 kilometres southwest of Vancouver Island, off Canada's Pacific Coast and within Canada's EEZ.³ The location of the Endeavour hydrothermal vent fields is shown in Figure 6 below. They are four fields of large black smoker structures surrounded by lower temperature venting.⁴ The four fields are the Main Endeavour Field, the Mothra Field, the High Rise Field and the Sawlty Dawg Field.

³ Canada, Department of Fisheries and Oceans: *Backgrounder: The Endeavour Hydrothermal Vents Area*, (2001).

⁴ V Tunnicliffe and R Thomson, *Oceans Background Report. The Endeavour Hot Vents Area: A Pilot Marine Protected Area In Canada's Pacific Ocean* (1999), 2.

They represent a unique habitat that is considered the most biologically productive and diverse hydrothermal vent site along the Juan de Fuca Ridge.⁵ Like all known hydrothermal vent areas, the Endeavour ecosystem fosters numerous unique species, many found nowhere else in the world.⁶ At least 60 distinct species are native to the Juan de Fuca Ridge and the Endeavour area,⁷ and at least 12 of those species do not exist anywhere else in the world.⁸ The surrounding deep ocean normally only supports sparse life of about twenty worms and brittlestars per square metre. However, the area immediately surrounding the diffuse hydrothermal vent flows of Endeavour support an abundant web of life that is estimated to range up to half a million animals per square metre.⁹ Like many hydrothermal vent sites, one of the most important species in this ecosystem is the vestimentiferan tubeworm, *Ridgeia*.¹⁰ Within tubeworm bushes about 40 species of invertebrates forage.¹¹ Other bottom dwelling fauna found include clams, crabs, snails, polychaete worms, octopus, deep-sea grenadier, squat lobsters and brittlestars.¹² At the same level as the plumes emitted from the hydrothermal vents, 100 to 200 metres above the seafloor, macrozooplankton in various stages

⁵ Canada, Minister of Public Works and Government Services 'Endeavour Hydrothermal Vents Marine Protected Area Regulations, Regulatory Impact Analysis Statement', (2001) 135 (23) *Canada Gazette* 1941.

⁶ Ibid.

⁷ Ibid.

⁸ Canada, Department of Fisheries and Oceans: *Background: The Endeavour Hydrothermal Vents Area* (2001).

⁹ Canada, Department of Fisheries and Oceans: *Endeavour Hydrothermal Vents Marine Protected Area Management Plan* (2001), 5.

¹⁰ Tunnicliffe and Thomson, above n 4, 4.

¹¹ Tunnicliffe and Thomson, above n 4, 4.

¹² V Tunnicliffe, 'Partial Bottom Dwelling Fauna List (Endeavour Hot Vents Area)' in Fisheries and Oceans Canada. (1999). *The Endeavour Hot Vents Area in Canada's Pacific Ocean. An ecosystem Overview*, CD Rom copy held by author.

of their life cycle aggregate in large numbers.¹³ This zooplankton in turn attracts large numbers of predators such as mictophids, jelly-fish and snipe eels.¹⁴

The vent structures of Endeavour are also impressive. Typically each vent field has dozens of sulphide structures of coalescing chimneys topped by spires of black smokers, rising to tens of metres in height.¹⁵ One of the tallest vent structures found to date, named “Godzilla”, is found in the High Rise Vent field. Until it collapsed in 1994 this huge structure was as tall as a 15 storey building in height.¹⁶

Activities and stakeholders

The first of the Endeavour fields to be discovered, the Main field, was only discovered as recently as 1982.¹⁷ However, this area has been of intense interest to scientists since the mid 1950s. Historically, the Juan de Fuca Ridge played a major role in the development of the modern theory of plate tectonics, with some of the earliest detailed magnetic surveys of the deep ocean floor conducted in this area.¹⁸ Due to their close proximity to Canadian and US ports, the Endeavour hydrothermal vents have been one of the most heavily studied hydrothermal vent sites in the world. The submersibles *Alvin* and *Jason* have completed over a dozen missions to the Endeavour hydrothermal vents, while both US and Canadian

¹³ Tunnicliffe and Thomson, above 4, 5.

¹⁴ Ibid.

¹⁵ Tunnicliffe and Thomson, above n 4, 4.

¹⁶ Ibid.

¹⁷ Tunnicliffe and Thomson, above n 4, 1.

¹⁸ H P Johnson and M L Holmes, ‘Evolution in plate tectonics; the Juan de Fuca Ridge’ in *The Geology of North America*, Vol N, *The Eastern Pacific Ocean and Hawaii* (1989), 73.

universities have jointly undertaken four expeditions using the Canadian Remotely Operated Platform for Ocean Studies.¹⁹

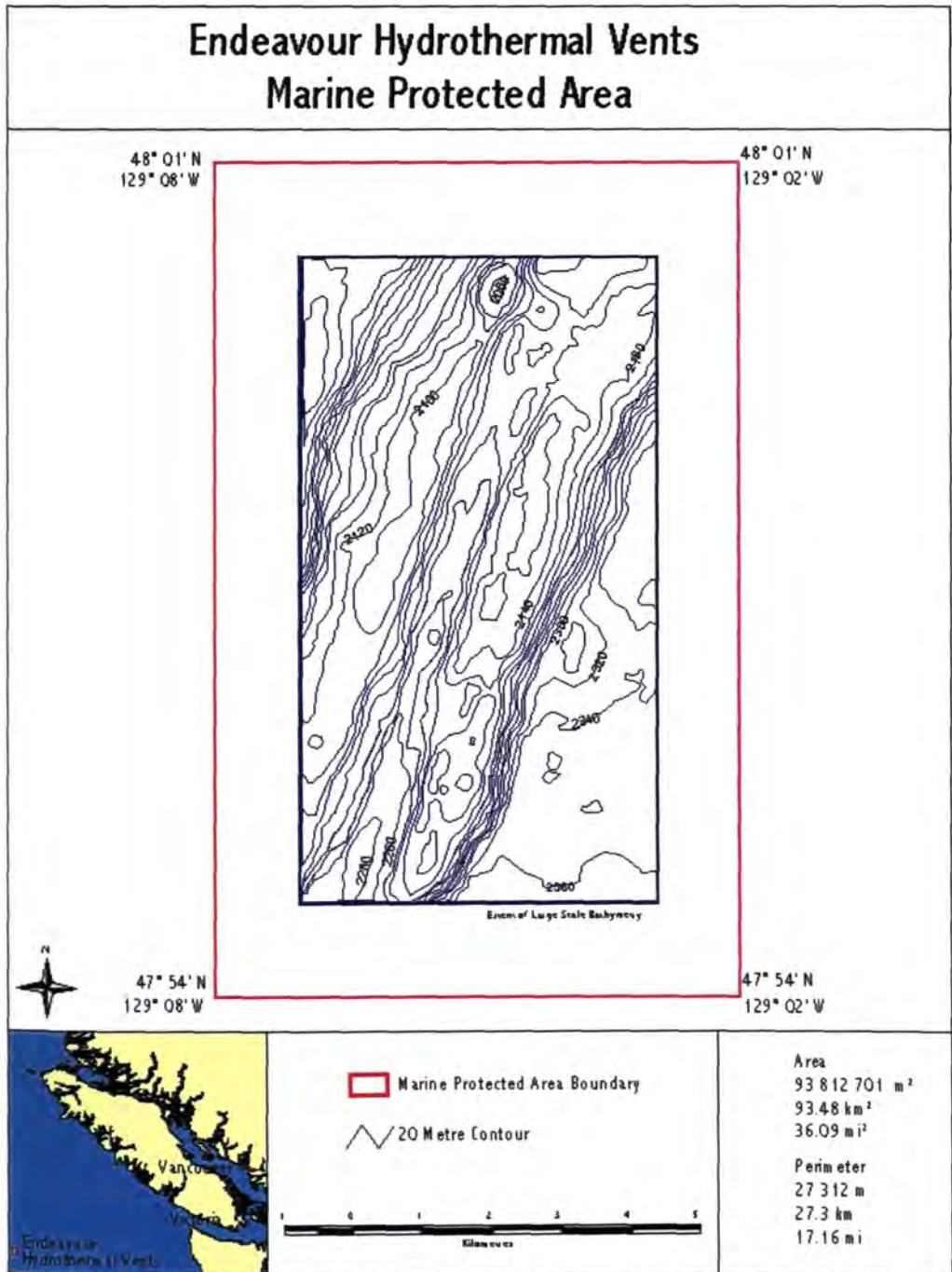


Figure 6 Boundary and location map of the Endeavour hydrothermal vent Marine Protected Area²⁰

¹⁹ Hereinafter ROPOS. Tunnicliffe and Thomson, above n 4, 5.

Research at Endeavour vent fields has yielded many significant scientific discoveries. These include:

- “the first vents discovered on the Juan de Fuca Ridge (1982);
- the first extensive seafloor ore deposits explored (1984);
- the first discovery of “glowing vents” (1989);
- the highest natural water temperatures known on Earth (1990);
- the first extensive uses of robotic vehicles (1991 and 1994);
- site from which the microbe with the highest temperature tolerance has been isolated (113°C);
- the first direct measurement of currents within the main vent field;
- the first evidence that hydrothermal plumes were zones of greatly enhanced zooplankton aggregation;
- the first measurements of both upward and downward fluxes of biomass associated with hydrothermal plumes.”²¹

With such an impressive record of scientific discovery it is not surprising that research interest continues to this day. Endeavour continues to attract the interest of a range of scientists including geophysicists, who seek to understand its underlying structure and its relation to the rest of the Juan de Fuca Ridge; geologists, who are interested in describing and analysing its geological features; physicists interested in the properties of its thermal plumes and their influence on the surrounding ocean waters; chemists who analyse the vent fluids; biologists interested in Endeavour’s unique fauna, their physiology and their relationship with the vents and water column; and microbiologists interested in the relationships between water chemistry, bacteria and higher life forms.²²

²⁰ Reproduced from Fisheries and Oceans Canada web site http://www.pac.dfo-mpo.gc.ca/oceans/Endeavour/Maps/endeavour_en.jpg accessed 12 January 2005.

²¹ Tunnicliffe and Thomson, above n 4, 6.

²² P H LeBlond, ‘The Endeavour Hot Vents-A Short Scientific Overview’ in Fisheries and Oceans Canada, above n 12.

Apart from scientists another stakeholder worth noting is the mining industry. The discovery of polymetallic sulphide deposits on both the Juan de Fuca ridge and the Galapagos rift in the early 1980s initially sparked interest in the potential for the mining of offshore minerals in both the Canadian and U.S. EEZs and continental shelves. There was especially keen interest in these minerals within the U.S. Department of Interior and the U.S. National Oceanic and Atmospheric Administration,²³ which enthusiastically embraced the potential of these deposits as an “enormous new frontier”.²⁴ While the enthusiasm of the mining industry and policy makers is now much more subdued, there is still some interest in both Canada and the U.S. in relation to mining hydrothermal vent mineral deposits.

The Canadian fishing industry is another stakeholder, although the only fisheries of note are the albacore tuna troll jig fishery and the neon flying squid fishery,²⁵ Although these fisheries occur at a depth no greater than 100 metres.²⁶

One final stakeholder worth noting is the military forces of Canada and the USA. With significant naval forces, especially submarines, operating off the Pacific west coast of North America, the military forces have an interest in any regulation of activities in the deep-sea along the Juan de Fuca ridge.

²³ Hereinafter NOAA.

²⁴ U.S. Deputy Assistant Secretary of the Interior William Pendley quoted in M G Schmidt, *Common Heritage or Common Burden? The United States position on the development of a regime for deep sea-bed mining in the law of the sea convention*. (1989), 275.

²⁵ Letter, William Shaw, Operations Branch, Department of Fisheries and Oceans Canada to Dr Paul La [sic] Blond, 22 March, 1999 reproduced in Fisheries and Oceans Canada, above n 12.

²⁶ Ibid.

Canadian Oceans and Biodiversity Policies

Canada is a party to both the CBD and to LOSC.²⁷ Policies Canada has developed or is in the process of developing (as discussed below) are consistent with Canada's international obligations under both treaties.

Canada had traditionally suffered from a fragmented approach in formulation and implementation of its Oceans Policy, which resulted in conflict among political, economic, social and environmental objectives.²⁸ The development of policies and laws to implement Canada's obligations under international law were complicated by the myriad of conflicting or overlapping policies and laws adopted at different jurisdictional levels throughout Canada. For example, in 1995 when Canada prepared its initial Biodiversity Strategy in response to its obligations under the CBD, some 36 Federal Acts and at least 20 provincial and territorial Acts related to protection and use Canada's various aquatic environments, including its marine areas.²⁹

A number of policy reviews in the early 1990s identified the need for change in the way Canada's oceans were managed. *Canada's Biodiversity Strategy*³⁰ identified the need for enabling legislation and policy to provide for protected areas "to conserve aquatic³¹ biodiversity"³² in accordance with Article 8 of the CBD. A report in 1994 by the Committee on Oceans and Coasts of the Canadian

²⁷ Canada ratified the CBD on the 4th December 1992 and the LOSC on 7 November 2003.

²⁸ F J Berkes et al, 'The Canadian Arctic and the Oceans Act: the development of participatory environmental research and management' (2001) 44 *Ocean & Coastal Management* 451, 453.

²⁹ Canada, Minister of Supply and Services Canada, *Canadian Biodiversity Strategy. Canada's Response to the Convention on Biological Diversity* (1995).

³⁰ Ibid.

³¹ Including marine biodiversity.

³² Canada, Minister of Supply and Services Canada, above n 29, para 1.17 and para 1.56.

National Advisory Board on Science and Technology, *Opportunities from Our Coast*, which was critical of the fragmented regulatory approach, picked up on recommendations from an earlier review in 1987, and recommended a national oceans policy and supporting legislation in the form of an Oceans Act.³³

In response to these recommendations, in November 1994 the Minister for Fisheries and Oceans released a discussion paper, *A Vision for Oceans Management*, endorsing the concept of an Oceans Act and recommending the development of a national oceans management strategy.³⁴ This lead ultimately to the adoption of Canada's *Oceans Act*, which was promulgated on 31st January 1997, some 10 years after defects in Canada's existing policy and legislation had first been identified.

Canada's Oceans Act

The Canadian government's overall objective in enacting the *Oceans Act* was to consolidate existing federal responsibilities and legislation in relation to the oceans into a single legislative framework that promotes an integrated approach to ocean management.³⁵ The legislation does this by defining Canada's claims to its maritime jurisdiction, providing a framework for development of Oceans policy, providing overriding goals for the development of that policy, and by providing the Minister for Fisheries and Oceans with the tools (such as MPAs) to implement that policy. Each of these components of the *Oceans Act* is examined below.

³³ Berkes et al, above n 28, 453-454.

³⁴ Berkes et al, above n 28, 454.

³⁵ Ibid.

Defining Canada's Maritime Jurisdiction

Consistent with Canada's rights under LOSC and international law more generally, Part 1 of the *Oceans Act* sets out Canada's claims to a 12 nautical mile territorial sea (under section 4(a)) and a 24 nautical mile contiguous zone for the enforcement of federal customs, immigration and sanitary laws (under section 10). Under section 13(1) of the *Oceans Act* Canada also claims an EEZ of 200 nautical miles beyond and adjacent to the territorial sea except where other outer limits of the EEZ are proclaimed.³⁶ Pursuant to section 14 of the *Oceans Act* Canada claims:

- “(a) sovereign rights in the [EEZ] for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the [EEZ], such as the production of energy from the water, currents and winds;
- (b) jurisdiction in the [EEZ] with regard to:
 - (i) the establishment and use of artificial islands, installations and structures
 - (ii) marine scientific research, and
 - (iii) the protection and preservation of the marine environment; and
 - (iv) other rights and duties in the [EEZ] provided for under international law.”

Section 14 largely mirrors Article 56 of LOSC discussed in Chapter 2. The only exception to this is that section 14(c) of the *Oceans Act* refers to other rights and duties under “international law”, whereas LOSC speaks only of other rights provided for under LOSC. It is not clear whether Canada asserts rights and duties beyond those recognised under LOSC.

Under section 17 of the *Oceans Act* Canada also claims a continental shelf consistent with its rights under LOSC, ie a continental shelf to the outer edge of

³⁶ See discussion of section 25 below.

the continental margin or 200 nautical miles from the baselines of the territorial sea which ever is the lesser.

Canada shares maritime borders with three countries, the USA, France and Denmark.³⁷ Canada's claims to maritime jurisdiction overlap with the claims of some of these neighbouring states.³⁸ Section 25(a) (iii) of the *Oceans Act* provides a mechanism to amend Canada's claimed jurisdictional zones in the event they overlap with those asserted under the *Oceans Act*. The Governor in Council, on the recommendation of the Minister for Foreign Affairs, may make regulations prescribing an outer limit line of the EEZ or continental shelf, where there is a conflict with the claimed territorial sea of another state or other area of the sea in which another state has sovereign rights.

The Oceans Act and the Development of an Oceans Management Strategy and Integrated Management Plans for Canada

The *Oceans Act* empowers the Canadian Minister for Fisheries and Oceans to lead and facilitate the development and implementation of a national strategy for the management of estuarine, coastal and marine ecosystems in waters that form part of Canada, or in which Canada has sovereign rights under international law.³⁹ The *Oceans Act* proscribes that the Oceans Management Strategy will be based on three principles. Section 30 provides that those principles are:

- “(a) sustainable development, that is, development that meets the needs of the present without compromising the ability of future generations to meet their own needs;

³⁷ D H Gray, 'Canada's Unresolved Maritime Boundaries' (1994) 48(2) *Geomatica* 131.

³⁸ Overlapping claims to jurisdiction occur off the mouth of the Juan de Fuca Strait, in and seaward of Dixon Entrance on the Pacific coast, and in the Beaufort and Lincoln Seas in the Arctic. Issues also remain unresolved with respect to the negotiated or arbitrated boundaries in Baffin Bay and Nares Strait and in the Gulf of Maine. Jurisdiction in relation to two islands in the Kennedy Channel is also disputed. See Gray, above n 37.

³⁹ *Oceans Act, 1996* (Canada), section 29.

- (b) the integrated management of activities in estuaries, coastal waters and marine waters that form part of Canada or in which Canada has sovereign rights under international law; and
- (c) the precautionary approach, that is, erring on the side of caution.”

Section 31 of the *Oceans Act* also requires the Minister to lead and facilitate the development and implementation of plans for the integrated management of all activities or measures in or affecting estuaries, coastal waters, and marine waters that form part of Canada or in which Canada has sovereign rights under international law.

In response to the specific requirements of the *Oceans Act* the Department of Fisheries and Oceans⁴⁰ has developed Canada’s *Oceans Strategy*⁴¹ and the associated *Policy and Operational Framework for Integrated Management of Estuarine, Coastal and Marine Environments in Canada*.⁴² Development of these policies was not completed until 2002, some five years after the *Oceans Act* came into effect. While it is understandable that policies such as these are complex and would involve extensive consultation with stakeholders, it is unclear why these policies took so long to be developed. Two possible reasons for the delay are a lack of resources allocated by the Canadian government to the process, and the fact that development of this policy was undertaken by a department whose previous expertise was limited to the regulation of fisheries rather than conservation more generally.

⁴⁰ Hereinafter CDFO.

⁴¹ See Canada, Department of Fisheries and Oceans, *Canada’s Oceans Strategy*, (2002) reproduced at http://www.gc.ca/oceanscanada/newenglsih/htmdocs/cos/publications_e.htm accessed 8 August 2002.

⁴² Canada, Department of Fisheries and Oceans, *Policy and Operational Framework for Integrated Management of Estuarine, Coastal and Marine Environments in Canada* (2002), reproduced at

Nonetheless, both policies have now been developed. For present purposes the most relevant policy document is the *Oceans Strategy*. The overarching goal of the *Oceans Strategy* “is to ensure healthy, safe and prosperous oceans for the benefit of current and future generations of Canadians”. This goal is based on three key principles of sustainable development, integrated management and the precautionary approach. These principles are to guide all ocean management decision making.⁴³ None of these key principles are clearly defined in the strategy. The term “sustainable development” as used in the strategy seems to suggest a balance between “social, economic and environmental aspects [sic] of decision making”,⁴⁴ without providing any clear guidance as to which “aspect [sic]” is to prevail in the event of conflict.

As a principle, Integrated Management is defined as

“a commitment to planning and managing human activities in a comprehensive manner while considering all factors necessary for the conservation and sustainable management and use of marine resources and the shared uses of ocean spaces”.⁴⁵

This definition lacks a statement as to what factors should be given priority in decision making. Similarly, the principle of the precautionary approach defined

http://www.gc.ca/oceanscanada/newenglsih/htmdocs/cos/publications_e.htm accessed 8 August 2002.

⁴³ Canada, Department of Fisheries and Oceans, *Canada's Oceans Strategy*, (2002) reproduced at http://www.gc.ca/oceanscanada/newenglsih/htmdocs/cos/publications_e.htm accessed 8 August 2002, 10.

⁴⁴ Ibid.

⁴⁵ Canada, Department of Fisheries and Oceans, *Canada's Oceans Strategy*, (2002) reproduced at http://www.gc.ca/oceanscanada/newenglsih/htmdocs/cos/publications_e.htm accessed 8 August 2002, 11.

simplistically as “erring on the side of caution”⁴⁶ merely mirrors the vague definition of the same principle in the *Oceans Act*.

While definitions of key principles are ambiguous, the Strategy does outline three key policy objectives or outcomes for the management of activities in Canada’s oceans strategy, namely:

- Understanding and Protecting the Marine Environment;
- Supporting Sustainable Economic Opportunities; and
- International Leadership.⁴⁷

It is also clear that both the strategy and the legislation seek to enhance stakeholder involvement in oceans management.⁴⁸

Understanding the marine environment is “predicated on solid science.”⁴⁹ Science is clearly recognised as having a significant role to play in oceans management including in

“delineating ecosystem boundaries, identifying key ecosystem functions and components, developing predictive models and risk assessment techniques, developing ecosystem-based management objectives, developing performance indicators, and assessing the state of ecosystem health”.⁵⁰

⁴⁶ Ibid.

⁴⁷ Canada, Department of Fisheries and Oceans (2002) *Canada’s Oceans Strategy* (2002) reproduced at http://www.gc.ca/oceanscanada/newenglish/htmdocs/cos/publications_e.htm accessed 8 August 2002, 12.

⁴⁸ Berkes et al, above n 28 argue that this is one of four key goals of the *Oceans Strategy*, although this is indicated by the terms of the *Oceans Strategy* it is not explicitly stated as a policy objective or outcome in the final *Oceans Strategy* released in 2002.

⁴⁹ Canada, Department of Fisheries and Oceans, *Canada’s Oceans Strategy* (2002), reproduced at http://www.gc.ca/oceanscanada/newenglish/htmdocs/cos/publications_e.htm accessed 8 August 2002, 12.

⁵⁰ Ibid.

While recognising the primary role of science in oceans management, the *Oceans Strategy* also acknowledges a role for the fishing industry, the community and specifically, the traditional ecological knowledge shared by Aboriginal peoples.⁵¹

The *Oceans Strategy* defines protecting the marine environment as a “stewardship responsibility” designed to ensure that resources of the oceans are managed wisely, respecting the principles as stated above and protecting the oceans for the benefit and enjoyment of future generations.⁵² It recognises pollution, especially from land based sources, as a major concern and the need for remediation and other measures. Particular prominence is given to MPAs as a tool for oceans management consistent with the provisions of the Oceans Act. The role of MPAs is discussed in more detail below.

The second key objective of the *Oceans Strategy* is supporting sustainable economic opportunities in Canada’s oceans, which are estimated to contribute over C\$20 billion per year to the Canadian economy.⁵³ Specific industries identified by the *Oceans Strategy* include the fishing industry, aquaculture, offshore energy (oil and gas) and mineral resource development, shipping (including cruise ships), shipbuilding and the industrial marine industry, sea-bed

⁵¹ Canada, Department of Fisheries and Oceans, *Canada’s Oceans Strategy* (2002) reproduced at http://www.gc.ca/oceanscanada/newenglish/htmldocs/cos/publications_e.htm accessed 8 August 2002, 13.

⁵² Ibid.

⁵³ Canada, Department of Fisheries and Oceans, *Canada’s Oceans Strategy* (2002) reproduced at http://www.gc.ca/oceanscanada/newenglish/htmldocs/cos/publications_e.htm accessed 8 August 2002 14.

mapping, marine communications and data management, eco-tourism operations and waterfront developments.⁵⁴

The third policy objective articulated in the *Oceans Strategy* is international leadership to advance Canadian and global ocean-related interests.⁵⁵ The aim is to ensure Canada's sovereignty and security and the sustainable use of ocean resources.⁵⁶ This involves measures such as aid to developing countries and proactive participation in international institutions relevant to the oceans.⁵⁷ Significantly, the *Oceans Strategy* includes a commitment to ratify LOSC and the UN Fish Stocks Agreement.⁵⁸

To give effect to the three broad policy goals the *Oceans Strategy* specifically commits the Canadian government to several activities over a four year period. For present purposes the most significant commitments is to develop a strategy for a national network of MPAs.

⁵⁴ Canada, Department of Fisheries and Oceans *Canada's Oceans Strategy* (2002) reproduced at http://www.gc.ca/oceanscanada/newenglish/htmldocs/cos/publications_e.htm accessed 8 August 2002, 14-16.

⁵⁵ Canada, Department of Fisheries and Oceans *Canada's Oceans Strategy* (2002) reproduced at http://www.gc.ca/oceanscanada/newenglish/htmldocs/cos/publications_e.htm accessed 8 August 2002, 16.

⁵⁶ Ibid.

⁵⁷ These include the United Nations Informal Consultative Process on Oceans and Law of the Sea [sic], the International Maritime Organisation and regional fisheries bodies such as the North Atlantic Fisheries Organization, the International Commission for the Conservation of Atlantic Tuna, the North Atlantic Salmon Commission, the North Pacific Anadromous Fisheries Commission and the North-East Atlantic Fisheries Commission.

⁵⁸ *Agreement for the implementation of the provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the conservation and management of straddling fish stocks and highly migratory fish stocks*, UN Doc A/CONF. 164/3. This commitment is subject to the qualification that ratification will occur after "an effective UNFA enforcement regime has been established". See Canada, Department of Fisheries and Oceans (2002) *Canada's Oceans Strategy*, reproduced at http://www.gc.ca/oceanscanada/newenglish/htmldocs/cos/publications_e.htm accessed 8 August 2002, 16-17. Subsequent to these commitments Canada has ratified the LOSC and the UN Fish Stocks Agreement. See above n 27.

Oceans Act and Marine Protected Areas

Section 35(1) of the *Oceans Act* defines a marine protected area as:

“an area of the sea that forms part of the internal waters of Canada, the territorial sea of Canada or the exclusive economic zone of Canada and has been designated...for special protection for one or more of the following reasons:

- (a) the conservation and protection of commercial and non-commercial fishery resources, including marine mammals, and their habitats;
- (b) the conservation and protection of endangered or threatened marine species, and their habitats;
- (c) the conservation and protection of unique habitats;
- (d) the conservation and protection of marine areas of high biodiversity or biological productivity; and
- (e) the conservation and protection of any other marine resources or habitat as is necessary to fulfil the mandate of the Minister.”⁵⁹

Pursuant to section 35(3) the Governor in Council, on the recommendation of the Minister, may make regulations designating areas as MPAs, prescribing measures such as the zoning of MPAs and the prohibiting classes of activities within MPAs.

It is worth noting that, despite a clear legislative mandate, it took nearly 7 years before the first MPA was proclaimed. This was the Endeavour MPA. Environmental NGO's have been critical of this delay.⁶⁰ This criticism was noted in a recent review of the *Oceans Act* by the Canadian House of Commons Standing Committee on Fisheries and Oceans which, prior to the proclamation of the regulations for the Endeavour MPA recommended:

“That the Department of Fisheries and Oceans, in consultation with the provinces, territories and stakeholders, immediately draft regulations in accordance with the intent of the *Oceans Act*.”⁶¹

⁵⁹ *Oceans Act, 1996, section 35(1)*.

⁶⁰ See, for example, evidence given by Ms Sabine Jessen Executive Director, British Columbia Chapter, Canadian Parks and Wilderness Society, on the implementation of the *Oceans Act* to the Canadian House of Commons Standing Committee on Fisheries and Oceans, 21 February, 2000 reproduced at <http://www.parl.gc.ca/committee/CommitteeHome> accessed 22 March 2005

⁶¹ Canada, House of Commons, Standing committee on Fisheries and Oceans (2001) *Report on the Oceans Act*, Ottawa, Recommendation 1.

While there has been delay in formally proclaiming MPAs, a considerable amount of work has been done in developing policies relevant to creation of MPAs under the *Oceans Act* and on specific proposals for MPAs. As at 6 January 2004 there are three candidate marine protected areas on Canada's pacific coast⁶² in addition to Endeavour.

Two key policy documents were released in 1999 after considerable stakeholder consultation, namely the *National Framework for Establishing and Managing Marine Protected Areas*⁶³ and the *Marine Protected Areas Policy*⁶⁴. These clearly set out the way in which designation of MPAs is to proceed. Discussion of the steps in establishing the Endeavour hydrothermal MPA below highlights the key features of these policies.

Steps towards the establishment of the Endeavour MPA.

The process in establishing MPAs under the *Oceans Act* is essentially a six step process, although some parts (such as the development of a management plan for a proposed MPA and drafting of regulations to establish an MPA) can occur simultaneously. The process is quite straight forward and similar to processes elsewhere in the world.⁶⁵ Potential MPAs are identified, evaluated, selected, established, and managed.⁶⁶

⁶² These three candidate marine protected areas are the Bowie Seamount, Race Rocks and the Gabriola Passage. See http://www.pac.dfo-mpo.gc.ca/oceans/mpa/pilots_e.htm accessed 6 January 2004.

⁶³ Fisheries and Oceans Canada *National Framework for Establishing and Managing Marine Protected Areas* (1999).

⁶⁴ Fisheries and Oceans Canada, *Marine Protected Areas Policy* (1999).

⁶⁵ Canada, Department of Fisheries and Oceans, *An Approach to the Establishment and Management of Marine Protected Areas Under the Oceans Act, A discussion Paper*, (1997), copy on file with author, 16.

⁶⁶ *Ibid.*

The process for Endeavour began with the identification and initial screening of Areas of Interest⁶⁷ performed by the Canadian Department of Fisheries and Oceans.⁶⁸ Shortly after this the Endeavour area was designated as a pilot marine protected area under the *Oceans Act*. This pilot designation was purely symbolic as the *Oceans Act* does not formally recognise pilot MPAs. Following designation as a pilot MPA, in 1999 a planning team was established to study the feasibility of an MPA at the Endeavour site, to develop recommendations and an action plan and to develop and implement a consultation plan for the MPA.⁶⁹ An advisory team was also established to support the planning team as required.⁷⁰

Experience with MPAs to date suggests that a key factor in their successful establishment and the implementation of their associated management plans, zoning arrangements, enforcement, etc is stakeholder involvement.⁷¹ A significant characteristic of the process leading to the establishment of the Endeavour MPA has been the consultation process, which has engaged a wide range of stakeholders. Importantly key stakeholders, scientists, have been heavily involved in the establishment of the MPA and will be involved in its ongoing management. The planning team included a range of interested stakeholders, including representatives from the CDFO, Natural Resources Canada, the Université du Québec à Montréal, The University of Washington, Canadian Non-Government

⁶⁷ Hereinafter AOI.

⁶⁸ Hereinafter CDFO.

⁶⁹ Canada, Minister of Public Works and Government Services, above n 5, 1947.

⁷⁰ Ibid.

⁷¹ S Gubbay, 'Marine protected areas-past, present and future' in S Gubbay (ed), *Marine Protected Areas: Principles and techniques for management*, (1995), 6.

Science, the international scientific community and bodies such as InterRidge⁷² and RIDGE.⁷³ The advisory team included representation from CDFO, the University of Victoria, and St. Michael's University School.⁷⁴

The advisory and planning teams determined that an MPA was feasible and developed a Recommendations Document. This involved consultation with members of the scientific community, representatives of the mining industry, deep-sea fishing industry⁷⁵ and from a broad range of interested parties including representatives from Heritage Canada, the Canadian Parks and Wilderness Society and the Sierra Club.⁷⁶ This consultation was facilitated by several different means including tele-conference calls, meetings and bilateral discussions.⁷⁷

A significant part of the process was the preparation of the Area of Interest Evaluation.⁷⁸ Preparation of the AOI Evaluation was subcontracted by the CDFO to the Institute for Pacific Ocean Science and Technology, Diversified Scientific Solutions Inc. and Madeira Research and Associates. The AOI Evaluation process involved collecting and compiling an Ecosystem Overview. The Ecosystem Overview brought together information on the Endeavour Vents area including:

⁷² InterRidge is an international scientific research initiative concerned with facilitating international and multi-disciplinary research associated with mid-ocean ridges currently based in Germany. See www.intridge.org. InterRidges role is discussed in more detail in Chapter 8.

⁷³ Canada, Minister of Public Works and Government Services, above n 5, 1947.

⁷⁴ Ibid.

⁷⁵ Canada, Fisheries and Oceans Canada, *Endeavour Hydrothermal Vents Marine Protected Area Management Plan*, (2001), 4.

⁷⁶ Canada, Minister of Public Works and Government Services, above n 5, 1948.

⁷⁷ Ibid.

⁷⁸ Hereinafter AOI Evaluation.

1. an ecological assessment, documenting what is known about aspects of the natural environment of the proposed MPA including geology, physics, chemistry and biology of the area;
2. a technical assessment, covering factors relevant to the establishment of the MPA, such as jurisdiction and enforceability;
3. a socio-economic assessment, which explored issues arising from human activities and interests in the area, such as fishing, mining and scientific research.⁷⁹

A draft of the Ecosystem Overview was subjected to further scrutiny by stakeholders who participated in a workshop in March 1999. The workshop presented and gathered feedback on the Ecosystem Overview and other management issues.⁸⁰ It drew upon the expertise and knowledge of a wide cross section of stakeholders. Participants included representatives of Federal and provincial governments (Parks Canada Agency, Natural Resources Canada, British Columbia Ministries of Energy and Mines, of Environment, Lands and Parks, and of Fisheries and the Information, Science and Technology Agency), NOAA, academic institutions (such as Universities of Victoria, Washington, and Québec à Montréal, Lester B. Pearson College, Oregon State and Pennsylvania State Universities), museums (such as the Canadian Museum of Nature, and the

⁷⁹ Institute for Pacific Ocean Science and Technology et al, *Endeavour Hot Vents Area. A pilot marine protected area in Canada's Pacific Waters: Ecosystems Overview: Ecological, Social and Economic Components, Summary Report*, (1999), 4, reproduced in Canada, Department of Fisheries and Oceans, above n 8.

⁸⁰ Canada, Minister of Public Works and Government Services (2001), above n 5, 1948.

Royal British Columbia Museum), oceanographic groups,⁸¹ and the mining industry.⁸²

The major concerns raised by participants in the workshop were: (1) continued access to the area by Canadian and foreign scientists; (2) the need for a management regime that would allow scientific research to continue and public awareness activities; (3) the need for an assessment of the mineral resources to be alienated by designation as an MPA; and (4) boundary delimitation.⁸³

The most significant concern that was raised and that appears to have been addressed was the impact on ongoing Canadian and foreign scientific research within the MPA. Scientists from the USA in particular were concerned about the possible impacts of the proposed MPA on funding for their research. Concerns were raised that restrictions on access to the MPA and a “complicated bureaucratic” permit process might make it difficult to attract funding for ongoing scientific research.⁸⁴ With limited funding available for this type of scientific research, the point was made that competitors for funding would inevitably ask the question “Why should research be funded in an area where continued access is uncertain and where the Canadians may raise all kinds of obstacles to foreign scientists?”⁸⁵

⁸¹ Ibid.

⁸² Institute for Pacific Ocean Science and Technology et al, above n 79, 7.

⁸³ Institute for Pacific Ocean Science and Technology et al, above n 79, 3.

⁸⁴ Institute for Pacific Ocean Science and Technology et al, above n 79, 7.

⁸⁵ Institute for Pacific Ocean Science and technology et al, above n 79, 11.

Significantly these concerns appear to have been recognised in both the regulations establishing the MPA and the proposed management plan. Those aspects are dealt with in more detail below.

The issue of access to mineral resources was resolved. The mining industry had argued that before an area of Canada's territory [sic] "is alienated forever from public access an assessment of lost economic opportunities should be made."⁸⁶ A technical and economic feasibility assessment conducted in the area in February/March 2001 by Natural Resources Canada concluded that estimates of mineral tonnage in the area are too small to be economically viable.⁸⁷ There were no economic opportunities to be lost. This conclusion is challenged for different reasons later in this chapter.

While it was recognised that the issues of access and management regimes had to be addressed, it was concluded that there was "no major obstacle found in the way of designating the Endeavour Hot Vents as an MPA."⁸⁸ Accordingly work was undertaken on designing regulations to establish the MPA, and in preparing a management plan for the MPA.

The Endeavour hydrothermal vent marine protected area regulations

The *Endeavour Hydrothermal Vent Marine Protected Area Regulations* under the *Oceans Act* were formally proclaimed on 4 March 2003. These regulations are read in conjunction with the proposed Management Plan for the MPA. The

⁸⁶ Submission by Mining Industry Representative, Mr Ben Ainsworth, noted in Institute for Pacific Ocean Science and Technology et al, above n 79, 9.

⁸⁷ Canada, Minister of Public Works and Government Services (2001), above n 5, 1949.

⁸⁸ Institute for Pacific Ocean Science and Technology et al, above n 79, 3

Management Plan provides that the principal objective in establishing the Endeavour Hydrothermal Vent MPA is to contribute toward

“the protection and conservation of a representative portion of the Endeavour segment of the Juan de Fuca Ridge, its dynamic submarine ecosystems, unusual hydrothermal features, specialised biota and habitats, high biodiversity and enhanced biological productivity.”⁸⁹

The designation of the MPA has been justified under three of the criteria listed in section 35 of the *Oceans Act*:

- (1) the conservation and protection of a unique habitat in terms of section 35(1)(c);
- (2) conservation and protection of a marine area of high biodiversity in terms of section 35(1)(d);
- (3) conservation and protection of a marine habitat necessary to fulfil the mandate of the Minister of Fisheries and Oceans under section 35(1)(e).

The designation as an MPA under the third criterium would appear to be unnecessary. No explanation was given as to why the MPA falls within this criterium. Given that the Endeavour hydrothermal vents already clearly fall within other provisions of section 35, it seems odd that this “catch all” section has been invoked.

Under Regulation 1 the MPA officially known as the “Endeavour Hydrothermal Vents Marine Protected Area” is defined as:

“The area of the Pacific Ocean... the seabed, the subsoil and the waters superjacent to the seabed...that is bounded by a line drawn from a point at 47°54’N, 129°02’W, from there west to a point at 47°54’N, 129°08’W, from there north to a point at 48°01’N, 129°02’W, and from there south to the point of beginning.”⁹⁰

⁸⁹ Fisheries and Oceans Canada, *Endeavour Hydrothermal Vents Marine Protected Area Management Plan*, (2001), 7.

⁹⁰ Regulation 2, *Endeavour Hydrothermal Vents Marine Protected Area Regulations* (2003) (Canada).

For the purposes of the Regulations this is defined as the “Area”.⁹¹ In all the total size of the Area is 93.48km².

Regulation 2 prohibits certain activities within the Area as follows:

“No person shall:

- (a) disturb, damage or destroy, in the Area, or remove from the Area, any part of the seabed, including a venting structure, or any part of the subsoil, or any living marine organism or any part of its habitat; or
- (b) carry out any underwater activity in the Area that is likely to result in the disturbance, damage, destruction or removal of anything referred to in paragraph (a)”.

Of the activities that have been identified as threatening hydrothermal vent ecosystems it would appear that only deep-sea mining is prohibited. Deep-sea tourism would appear to be unaffected provided that it did not involve any of the activities prohibited under regulation 2. Existing fishing activities in the waters above also appear unaffected.

MSR is still permitted. This is because the prohibition on activity in the Area under regulation 2 is qualified by exceptions noted in regulation 3(1), which provides:

“No person contravenes section 2 if:

- (a) the disturbance, damage, destruction or removal is for scientific research for the conservation, protection and understanding of the Area;
- (b) subject to subsection (3), a research plan described in sub-section (2) is submitted to the Minister at least 90 days before the start of the scientific research in the Area; and
- (c) all licences, authorizations or consents required under the Oceans Act, the Coastal Fisheries Protection Act, the Coasting Trade Act or the Fisheries Act in respect of the scientific research have been obtained”.⁹²

⁹¹ Regulation 1, *Endeavour Hydrothermal Vents Marine Protected Area Regulations* (2003) (Canada).

⁹² Regulation 3(1), *Endeavour Hydrothermal Vents Marine Protected Area Regulations* (2003) (Canada).

Regulation 3(2) defines the information to be submitted in a research plan as required by Regulation 3(1) as follows:

- “(a) The name, nationality, overall length, maximum draught, net tonnage, propulsion type, call sign, registration number and port number of each ship to be involved in the scientific research in the Area, and the name of the captain of each ship;
- (b) the names and positions of the persons who are responsible for the development of the scientific research and the scientific research personnel who will be on board each ship;
- (c) the date on which the scientific research in the Area is to start, and the itinerary for each ship while it is involved in the research; and
- (d) a summary of the scientific research to be conducted in the Area, together with a detailed map of the research area, which summary shall specify:
 - (i) the data to be collected and sampling protocols to be used, the other techniques, if any, to be used, such as those involving explosives, radioactive labelling or remotely operated vehicles,
 - (ii) the equipment to be moored and the method of mooring, and
 - (iii) the substances, if any, that are intended to be discharged.”

There appears to be nothing onerous in the information required. This is all information that can easily be collated and would be compiled anyway as part of the normal planning process for such research programs.

In terms of procedures for issuing licences or permits, existing procedures will be maintained for foreign vessels. All foreign vessels wishing to conduct MSR in Canadian waters are already subject to the Foreign Vessel Clearance Request Process⁹³ pursuant to the *Coasting Trade Act, 1992* and the *Coastal Fisheries Protection Act 1985*. Under this process MSR within any area up to the edge of Canada’s continental shelf is subject to approval by the Canadian Minister of Foreign Affairs. The Canadian Department of Foreign Affairs and International Trade⁹⁴ forwards foreign vessel clearance requests to relevant government departments for their comment.⁹⁵ Under existing procedures these requests are

⁹³ Hereinafter FVCRP.

⁹⁴ Hereinafter CDFAIT.

⁹⁵ Canada, Minister of Public Works and Government Services, above n 5, 1945.

vetted by the CDFO on behalf of CDFAIT.⁹⁶ Section 44 of the *Oceans Act* now specifically authorises CDFO⁹⁷ to attach a condition to a foreign ships approval that it must supply CDFO with the results of the MSR. In addition CDFO usually requires the presence of a Canadian observer on board the ship while the research is being carried out.

The FVCRP procedure will continue in its existing form. Overall the procedures would not appear to involve any new measures for foreign researchers. As such U.S. scientists concerns to avoid a “complicated bureaucratic permit process” appear to have been met.

Research by Canadian scientists will possibly be subject to the grant of licenses under the *Fisheries Act 1985* and the *Coastal Fisheries Protection Act 1985*. However, it is questionable whether either of these pieces of legislation are applicable. Further amendment to these Acts or, alternately, additional regulations under the *Oceans Act* may be required. For the time being CDFO relies on voluntary submission of cruise plans by Canadian researchers.⁹⁸ The vast majority of Canadian researchers use research vessels of the Canadian Coast Guard, which is part of CDFO. Hence the department responsible for regulating MSR within the MPA also takes part in such research itself. Whether there is any conflict of interest is yet to be seen.

⁹⁶ Ibid.

⁹⁷ Formally through the Minister.

⁹⁸ Canadian Department of Fisheries and Oceans, personal correspondence, copy on file with the author.

Marine Protected Area Management Plan

The management plan for the MPA divides the MPA into four zoned management areas as follows:

1. *The Main Endeavour Field*: an area approximately 400m long by 150m wide;
2. *The Mothra Field*: a vent field approximately 500m long located on the Western wall of the Endeavour Segment;
3. *The High Rise Field*: an area 400m wide and 400m long located in the Axial Valley of the Endeavour Segment;
4. *The Salty Dawg Field*: an area of approximately several hundred square metres located in the Axial Valley of the Endeavour Segment.⁹⁹

Different types of activity are to be permitted in each of these zones, in large part reflecting past activities in these areas. Few activities have previously taken place in the area of the *Salty Dawg* vent field and as such management of this area “will prioritise activities using observation-based or other less intrusive study techniques” leaving it as a “relatively pristine portion of the Endeavour area”.¹⁰⁰

Activities in the Salty Dawg field will be limited to:

- in areas on or near the seafloor, infrequent water sampling and visits to monitoring instruments, not more than once a year;
- acoustic imaging of the field;

⁹⁹ Fisheries and Oceans Canada, *Endeavour Hydrothermal Vents Marine Protected Area Management Plan* (2001).

¹⁰⁰ Fisheries and Oceans Canada, *Endeavour Hydrothermal Vents Marine Protected Area Management Plan* (2001), 10.

- water column investigations that have no impact on the seafloor or benthic/near-bottom ecosystems; and
- activities in the area that otherwise contribute to the knowledge and understanding of environmental impacts of human activities on hydrothermal vent ecosystems.¹⁰¹

To date the *High Rise* vent field has only been of moderate interest for research activities.¹⁰² Its impressive and relatively unspoiled natural features makes it suitable for projects focussed on education.¹⁰³ The *High Rise* field will become a site for research associated with long term monitoring and an important component of the education and outreach strategy of the MPA.¹⁰⁴ The bulk of scientific research will be confined to the *Mothra* and *Main Endeavour* fields. To date most research has focussed on these fields. This has included most forms of research from purely observational to intensive sampling operations.¹⁰⁵ These activities will continue to be permitted “provided they are consistent with the regulations”.¹⁰⁶ Presumably all this means is that, provided that all authorisation procedures are adhered to, any type of scientific research, including the most invasive or destructive activities, will be permitted.

¹⁰¹ Ibid.

¹⁰² Fisheries and Oceans Canada, *Endeavour Hydrothermal Vents Marine Protected Area Management Plan* (2001), 11.

¹⁰³ Ibid.

¹⁰⁴ Ibid.

¹⁰⁵ Ibid.

¹⁰⁶ Fisheries and Oceans Canada, *Endeavour Hydrothermal Vents Marine Protected Area Management Plan* (2001), 12.

Enforcing compliance with the regulations

It has been argued that enforcement is an essential component in the management of MPAs.¹⁰⁷ While the policing of any MPA is often difficult (for example due to lack of resources such as personnel), enforcement or policing in the deep-sea presents unique difficulties, not the least of which is detection of a breach. The extremes of pressure and temperature in the deep-sea and the fact that activities in the area occur in total darkness mean that conventional measures such as regular patrols by fisheries officers or rangers are impossible. Nonetheless, the Management Plan for the Endeavour MPA does set out a number of measures that seek to ensure effective enforcement of the regulations. Firstly, throughout the MPA, particularly in the *High Rise* and *Salty Dawg* areas, marine environmental quality protocols and indicators will be developed and implemented to prevent and minimise anthropogenic impacts.¹⁰⁸

Specific policing measures relevant to detection of breach of the regulations include requirements that all research carrying out activities involving sampling take before and after photos of a sample site. The photographs are to be submitted with cruise reports.¹⁰⁹ Also all submersible and dive operations will be required to record and document complete, continuous videotapes of their entire period on the seafloor. These videos must be retained and may be subject to auditing by CDFO.¹¹⁰ In addition, all organisations conducting activities in the area will be required to submit cruise reports that account for all time at sea and that describe

¹⁰⁷ B D Causey, 'Enforcement in marine protected areas' in S Gubbay, above n 71, 119.

¹⁰⁸ Canada, Department of Fisheries and Oceans, *Endeavour Hydrothermal Vents Marine Protected Area Management Plan*, (2001), 14.

¹⁰⁹ *Ibid.*

¹¹⁰ *Ibid.*

the activities and procedures undertaken. These must be submitted within two months of completion of each cruise.¹¹¹ Finally, all vessels carrying out activities in the area will be required to reserve a berth for an observer.¹¹² In 2000 and 2001 CDFO sent two observers on different vessels and was planning to send at least one observer in 2002.¹¹³

Education and outreach

The Management Plan also proposes the development and implementation of an education and outreach strategy.¹¹⁴ It is anticipated that this outreach strategy will be developed and implemented to focus on agencies responsible for granting funding for research in both Canada and the USA, including an emphasis on building further co-operation between researchers and funding agencies already involved in research in the Endeavour area.¹¹⁵ This again appears to be recognition of the concerns raised by the scientific community.

The Management Plan also proposes encouraging interest in hydrothermal vents and the MPA through the development of education modules suitable for delivery in Canadian schools and the development of educational material for delivery via a variety of media such as videos and the World Wide Web.¹¹⁶

¹¹¹ Ibid.

¹¹² Ibid.

¹¹³ Personal communication, CDFO, copy on file with author.

¹¹⁴ Canada, Department of Fisheries and Oceans, *Endeavour Hydrothermal Vents Marine Protected Area Management Plan* (2001), 14.

¹¹⁵ Ibid.

¹¹⁶ Canada, Department of Fisheries and Oceans, *Endeavour Hydrothermal Vents Marine Protected Area Management Plan* (2001), 15.

Governance structure

Overall management of the MPA is to be executed through a management committee chaired by CDFO.¹¹⁷ The management committee will act as adviser to CDFO, which retains legislative responsibility for the MPA. The most important role of the management committee will be to review proposed plans for research and other activities within the MPA, including making recommendations to CDFO with regard to the appropriateness of the activities and any recommended conditions to be imposed as part of the approval process.¹¹⁸

Reflecting the inclusive attitude to stakeholders exhibited during the design of the MPA, it is proposed that the management committee will be composed of a cross section of stakeholders and representatives of national government agencies.¹¹⁹ This will include representatives from CDFO-Oceans Directorate, CDFO-Science Branch, Natural Resources Canada, Environmental NGO's, the Canadian Private Sector (one member each), Canadian Academic Science (three members), Foreign Science (two members: one US Ridge, one InterRidge), Public Education/Outreach (two members: one kindergarten to grade 12, one from a public awareness group).¹²⁰

Given the conclusion that there are no viable mineral resources within the MPA, it is somewhat curious that representatives from Natural Resources Canada and the Canadian Private Sector will be appointed to the management committee. The

¹¹⁷ Ibid.

¹¹⁸ Canada, Department of Fisheries and Oceans, *Endeavour Hydrothermal Vents Marine Protected Area Management Plan* (2001), 16.

¹¹⁹ Ibid.

¹²⁰ Ibid.

management committee is also weighted heavily in favour of the interests of stakeholders from the Canadian and foreign scientific community. This contrasts with the single representative of environmental NGO's. It will be interesting to see how this mix works in the future, particularly given the management committee's role in vetting plans for research within the MPA.

Hydrothermal Vents and National Security

Of all the interests that one might contemplate needed to be considered in designing an MPA in the deep-sea, national security would not appear at first to be a significant issue. However, in drafting the MPA regulations, it appears that the interests of Canadian (and probably USA) national security were given precedence over the protection of the marine environment. Regulation 5 of the Endeavour Regulations provides:

“No person contravenes section 2 by carrying out any movement or other activity of ships or submarines if:

- (a) the movement or other activity is carried out for the purpose of public safety, law enforcement or Canadian sovereignty or national security; and
- (b) the ships or submarines, as the case may be, are owned or operated by or on behalf of Her Majesty in right of Canada or by foreign military forces acting in cooperation with, or under the command or control of the Canadian Forces”

It is likely that the references to “foreign military forces” includes those of the USA, with which Canada shares extensive borders, and quite possibly members of the NATO alliance that would routinely be involved in military naval exercises in both Canadian and US waters. Thus it is not just Canadian national security that underlies this particular provision, but also that of its allies.

The term “national security” is of itself quite a subjective term. What activities causing environmental harm in the MPA will be exempt from liability on the grounds of national security is unclear. In a situation where a state of war might

have been declared the term might be given a very broad interpretation, but how broadly should the term be interpreted in peace time? What of situations like the current war on terrorism [sic]?

It might be possible to envisage a situation where the exemptions on the grounds of public safety or law enforcement may be invoked. However, it is difficult to see how the exemption on the grounds of Canadian sovereignty can apply. There are numerous actions that might constitute an act of Canadian sovereignty, but is unclear what acts give rise to an exemption under the regulations.

Perhaps all of the exemptions on the basis of “public safety”, “law enforcement” and “Canadian Sovereignty” need to be read as merely re-inforcing the national security exemption. The circumstances in which this particular provision was included would support such an interpretation. A draft of these regulations was published in the *Canada Gazette* on 9 June 2001. The draft regulations published at this time made no mention of any of exemptions on the grounds of “public safety”, “law enforcement”, “Canadian sovereignty” or “national security.” The Regulatory Impact Analysis Statement published in conjunction with draft regulations indicated that the Canadian Department of National Defence had been consulted prior to the draft regulations’ publication. In particular the Regulatory Impact Analysis Statement noted

“The Department of National Defence (DND) has been assured that the proposed MPA Regulations would not impact its ability to ensure national security. DND was also assured that the proposed Regulations would not interfere with future military activity, even though the proposed MPA is not currently used for routine military operations”.¹²¹

¹²¹ Endeavour Hydrothermal Vents Marine Protected Area Regulations Regulatory Impact Analysis Statement, 13(23) *Canada Gazette* Part 1, 9 June 2001, 1940.

Curiously, although the draft regulations published at this stage did not contain the national security exemption, in discussing a range of permitted activities within the proposed MPA, the Regulatory Impact Analysis Statement also noted that

“Military activities involving National Security will also supersede these Regulations”.¹²²

It is clear that the Canadian Department of National Defence had already had input into the drafting of the proposed regulations. In ordinary circumstances, if the Canadian Defence Department had significant concerns about national security issues, then these would have been addressed in the regulations prior to their publication in the Gazette. Unfortunately less than 3 months after the draft regulations were published national security and, in particular USA national security interests, have come to dominate all areas of public policy. The terrorist attacks on the World Trade Centre in New York, the Pentagon in Washington D.C. and in Pennsylvania USA on September 11 2001 have had a profound effect on law and policy around the world.

The introduction of the national security exemption under regulation 5 is not due to any possible terrorist threat. It is due to the significantly increased ability of the military and security services to influence public policy and legislation across a wide range of portfolios in this period of fear and paranoia. If nation states like the U.S., Canada and Australia are willing to surrender centuries old traditions of civil liberties, democracy and the rule of law in their self declared war against terrorism [sic], it is hardly surprising that a provision such as regulation 5 should end up in

¹²² Ibid.

the regulations governing a MPA at the bottom of the deep-sea. If U.S. policy makers can issue bizarre directions to international airlines such as prohibiting queues for toilets on 14 hour international flights to the USA¹²³ then it is not surprising that the Canadian military (no doubt under direction from the US military) would demand an exemption such as that contained in regulation 5. Perhaps we can now add the deep-sea (and incontinent international airline passengers) to the ever growing list of victims of the war against terrorism [sic], albeit ever so fanciful that that war could ever be played out on the bottom of the deep-sea.

Unresolved issue bioprospecting.

Bioprospecting and interest in biotechnology associated with hydrothermal vents are discussed in detail in chapter 7. However, at this point it is worth noting that the potential economic value of the genetic resources of hydrothermal vents appears not to have been considered in detail in the process leading up to the establishment of the Endeavour MPA. There is nothing in either the regulations or the management plan to regulate bioprospecting. There is no obligation on bioprospectors to share the proceeds of the commercialisation of the genetic resources of hydrothermal vents under Canadian law. Strictly speaking under international law Canada is only required to permit MSR (as distinct from bioprospecting) within its EEZ. If scientific research to be carried within Canada's EEZ has a commercial focus, then under the provisions of LOSC, Canada is not compelled to permit such activity. Similarly under the provisions of the CBD, to

¹²³ R Wainwright and J Kerr, 'Attention, passengers: queuing for the loo is forbidden for 14 hours' *Sydney Morning Herald*, Sydney, 7 January 2004, 1.

which Canada is a party, marine scientists and bioprospectors are required to obtain prior informed consent as a condition of access to these areas for the investigation of their genetic resources. Canada would be well within its rights to prohibit such activity or permit it on condition of benefit sharing such as through the payment of royalties, subject to it enacting enabling legislation under Canadian domestic law. Given the potential economic value of these resources, the conclusion reached early in the process that there was no economic interest at stake in designating the MPA seems to have been premature.

NEW ZEALAND

New Zealand has jurisdiction over the world's fourth largest EEZ.¹²⁴ These waters contain at least 16 active hydrothermal vents sites.¹²⁵ Although yet to be confirmed, at least one site (and possibly more) lie outside New Zealand's EEZ but on its continental shelf. All of these active hydrothermal vents lie on the southern Kermadec intra-oceanic arc. The southern Kermadec intra-oceanic arc trends north westward from New Zealand for 1,220 kilometres and is part of the continuous 2,500 kilometre Kermadec-Tonga arc created by the Pacific-Australian plate convergence.¹²⁶

¹²⁴ Hon P Hodgson M P, New Zealand Minister of Fisheries, In P. Batson, *Deep New Zealand. Blue water, black abyss.* (2003), 7.

¹²⁵ Interview Dr Cornel de Ronde, 25 November 2003.

¹²⁶ C E J de Ronde et al, 'Submarine Hydrothermal Venting Related Volcanic Arcs' In *Society of Economic Geologists Special Publication* 10. (2003), 92.

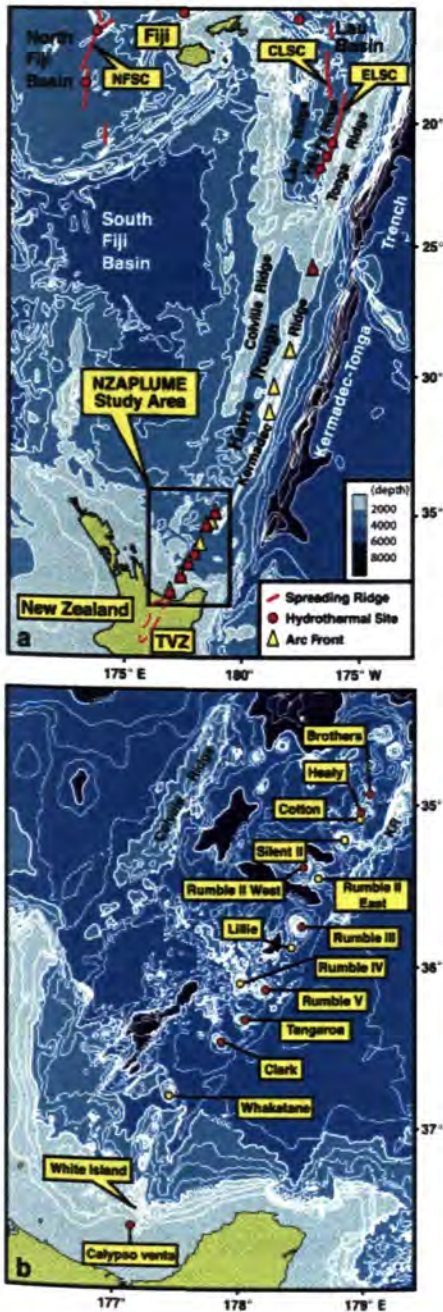


Figure 7 Location of New Zealand's Hydrothermal Vents.¹³⁰

In March 1999 the first 7 active hydrothermal vent sites were discovered as part of the NZAPLUME¹²⁷ expedition. This cruise surveyed volcanoes of the southern 260 kilometres of the Kermadec arc. Of 13 volcanoes surveyed 7 were found to host active hydrothermal vents. These are the Clark, Tangaroa, Rumble V, Rumble III, Rumble II West, Healy and Brothers hydrothermal vent fields.¹²⁸ The remaining sites were located in 2002 as part of NZPLUME II Cruise. All of these hydrothermal vents are found at a range of depths from 220 metres at Rumble III to 1,650 metres at Brothers.¹²⁹

¹²⁷ New Zealand American Plume Mapping Expedition.

¹²⁸ C E J de Ronde et al, above n 126, 94.

¹²⁹ Ibid.

¹³⁰ Image courtesy of Dr Cornel de Ronde, New Zealand Institute of Geological and Nuclear Sciences.

So far little work has been done in relation to the fauna of these vents. Work on the fauna of the Kermadec ridge was first undertaken in November 2000 and May 2001 by New Zealand's National Institute of Water and Atmospheric Research.¹³¹ Some 100 species have been identified including Crustacea, Mollusca and Echinodermata.¹³² These include 3 species of shrimp belonging to the genus *Alvinocaris*, 12 barnacle species, large gastropods,¹³³ and a new species of large apricot-coloured starfish found on beds of a new large species of deep-sea mussel, *Bathmodiolus*.¹³⁴

Activities and Stakeholders

Although only very recently discovered, there are already several stakeholders who have an interest in regulation of activities at these hydrothermal vent sites. These include scientists, the mining industry, the emerging deep-sea tourist industry, documentary makers, the biotechnology industry, the fishing industry and the indigenous people of New Zealand, the Maori.

There is significant scientific interest in the Kermadec ridge hydrothermal vents. Planning for several major research expeditions in the near future is underway. One such program is that of the New Zealand Institute of Geological and Nuclear Sciences,¹³⁵ which in December 2003 was allocated government funding of NZ\$4.7 million over the next 6 years to continue its research on New Zealand's offshore volcanoes, their hydrothermal vents and mineral deposits.¹³⁶ NIWA is

¹³¹ Hereinafter NIWA.

¹³² M.R. Clark and S. O'Shea, 'Hydrothermal vent and seamount fauna from the southern Kermadec Ridge, New Zealand' (2001) 10(2) *InterRidge News* 14.

¹³³ Ibid.

¹³⁴ Batson, above n 124, 144.

¹³⁵ Hereinafter GNS.

¹³⁶ Dr Cornel de Ronde, personal correspondence, copy on file with the author.

also in the process of planning future research, possibly as part of the Census of Marine Life.¹³⁷

Although there have been no reported tourist dives to the Kermadec hydrothermal vents so far, the main operator of tourist dives to hydrothermal vents, DOE has expressed interest in tourist dives to these hydrothermal vents, possibly in conjunction with scientific research expeditions planned under the Census of Marine Life. These dives may also involve the filming of a documentary.¹³⁸ The biotechnology industry may also have an interest in regulation of bioprospecting at the Kermadec sites. Although there are no reported cases of bioprospecting at these hydrothermal vents, given the history of extensive research on thermophiles associated with hot springs on land in New Zealand, it is likely that researchers and industry may eventually show some interest in bioprospecting at the Kermadec ridge hydrothermal vents. As the Kermadec hydrothermal vents are associated with seamounts, a prime fishing location, the commercial fishing industry also has an interest in regulation of activities at these sites. Finally, although consideration of the rights of indigenous communities in the marine environment is outside the scope of this thesis, it should be noted that Maori are major stakeholders in regulation of the marine environment in New Zealand waters.

¹³⁷ The Census of Marine Life is an ambitious cooperative international scientific and interdisciplinary research project involving more than 300 scientists from 53 countries which aims to assess and explain the diversity, distribution and abundance of life in the oceans. For further information on the census of marine life see www.coml.org and discussion in Chapter 8.

¹³⁸ Ms Belinda Sawyer, Operations Manager, Deep Ocean Expeditions, interview 5 December 2003.

The hydrothermal vents of the Kermadec arc are also of interest to the minerals industry. On 15 October 2002 the Sydney-based company Neptune Resources Pty Ltd was granted a prospecting licence to prospect for minerals in an area of 33,000 square kilometres covering a 600 kilometre long southern section of the Kermadec arc.¹³⁹ The terms of this licence and the relevant legislation are discussed in more detail below.

Oceans governance and New Zealand's Oceans Related Legislation

Oceans governance in New Zealand is currently undergoing major review with the development of a national oceans policy and major changes to existing legislation foreshadowed. This section reviews the range of existing legislation that is relevant to current regulation of activities at hydrothermal vents in waters over which New Zealand claims jurisdiction. This is then followed by a brief discussion of issues associated with the development of New Zealand's Oceans Policy and regulation of bioprospecting as relevant to hydrothermal vents.

For present purposes the relevant pieces of legislation are the *Territorial Sea and Exclusive Economic Zone Act 1977 (NZ)*, the *Continental Shelf Act, 1964 (NZ)*, the *Crown Minerals Act 1999 (NZ)* and the *Resource Management Act 1991 (NZ)*.¹⁴⁰ Pursuant to the *Territorial Sea and Exclusive Economic Zone Act 1977 (NZ)* and consistent with its rights under LOSC and international law more generally, New Zealand claims a 12 nautical mile territorial sea¹⁴¹ and a 200

¹³⁹ See New Zealand Ministry of Economic Development press release at <http://www.med.govt.nz> accessed 8 December 2003.

¹⁴⁰ One other significant piece of legislation in relation to the Oceans, although not relevant for present purposes is the *United Nations Convention on the Law of the Sea Act 1996 (NZ)*, which deals with implementation of New Zealand's obligations under LOSC relating to the ISA and the International Tribunal for the Law of the Sea.

¹⁴¹ *Territorial Sea and Exclusive Economic Zone Act 1977 (NZ)*, section 3.

nautical mile EEZ.¹⁴² Under the *Continental Shelf Act 1964*(NZ) New Zealand also asserts sovereign rights in relation to the natural resources¹⁴³ of its Continental shelf.¹⁴⁴

Section 5(1) of the *Continental Shelf Act 1964* (NZ) provides that

“No person shall prospect or mine for, or carry on any operations for the recovery of, minerals in the seabed or subsoil of the continental shelf except in pursuance of a licence issued under this section”.

Section 5(2) of the same Act also provides that

“The Minister of Energy may from time to time, on application in that behalf, grant to any person a licence authorising the licensee to prospect and mine for, and carry on operations for the recovery of minerals or of minerals of any specified kinds in any specified area of the continental shelf.”

Pursuant to section 5(2) of the *Continental Shelf Act 1964* (NZ) a prospecting licence was granted to Neptune Resources Pty Ltd¹⁴⁵ with respect to mineral deposits including those associated with hydrothermal vents located on the Kermadec arc. The terms of that licence are outlined below.

¹⁴² *Territorial Sea and Exclusive Economic Zone Act 1977* (NZ), section 9.

¹⁴³ Consistent with the definition contained in LOSC section 2 of the *Continental Shelf Act 1964* (NZ) defines natural resources as:

- “(a) the mineral and other natural non-living resources of the seabed and subsoil; and
- (b) living organisms belonging to sedentary species, that is to say, organisms which, at the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or subsoil”.

¹⁴⁴ Section 2 of the *Continental Shelf Act 1964* (NZ) defines New Zealand’s Continental shelf as: “the seabed and subsoil of those submarine areas that extend beyond the territorial limits of New Zealand, throughout the natural prolongation of the land territory of New Zealand, to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines from which the breadth of the territorial sea is measured (as described in sections 5 and 6 of the *Territorial Sea and Exclusive Economic Zone Act 1977*) where the outer edge of the continental margin does not extend to that distance”.

¹⁴⁵ Hereinafter Neptune Resources. The prospecting licence was initially incorrectly issued in the name of Neptune Resources Limited but the name of the licence holder was changed to Neptune Resources Pty Limited by Certificate of Correction dated 29 May 2003, copy on file with author.

Terms of the Neptune Resources Prospecting Licence

The licence granted to Neptune Resources applies to some 33,160 square kilometres of New Zealand's continental shelf for a period of four years expiring on 15 October 2006.¹⁴⁶ Subject to compliance with conditions set out in the licence, the licence grants Neptune resources

“exclusive rights to prospect for all metallic and non-metallic minerals in the area of the continental shelf described in [the] First Schedule of [the] licence and delineated on the plan [attached to the licence]”.¹⁴⁷

Prospecting is defined in the Second Schedule of the prospecting licence as

“any activity undertaken for the purpose of identifying mineral deposits or occurrences and evaluating the feasibility of mining particular deposits or occurrences of one or more minerals”.¹⁴⁸

Interestingly the licence also states

“this licence does not confer any right to conduct bioprospecting activities”.¹⁴⁹

There appears to be no law authorising the New Zealand government to impose such a prohibition. Licences under section 5 the *Continental Shelf Act 1964 (NZ)* can only be issued in relation to the mineral resources of the New Zealand continental shelf. There also appears to be no formal mechanism provided under the *Continental Shelf Act 1964 (NZ)* for the exploitation of resources other than minerals resources. Pursuant to section 6 of the *Continental Shelf Act 1964 (NZ)*

¹⁴⁶ New Zealand Prospecting Licence number 39195 granted pursuant to the *Continental Shelf Act 1964* to Neptune Resources Pty Ltd, dated 15 October 2002, First Schedule, copy on file with author.

¹⁴⁷ New Zealand Prospecting Licence number 39195 granted pursuant to the *Continental Shelf Act 1964* to Neptune Resources Pty Ltd, dated 15 October 2002, page 1, copy on file with author.

¹⁴⁸ New Zealand Prospecting Licence number 39195 granted pursuant to the *Continental Shelf Act 1964* to Neptune Resources Pty Ltd, dated 15 October 2002, Second Schedule, copy on file with author.

¹⁴⁹ New Zealand Prospecting Licence number 39195 granted pursuant to the *Continental Shelf Act 1964* to Neptune Resources Pty Ltd, dated 15 October 2002, page 1, copy on file with author.

living resources such as oysters, shellfish and sponges, all of which are sedentary species, were previously governed by the provisions of the Part I of the *Fisheries Act 1908 (NZ)* and Part I of the *Fisheries Amendment Act 1963 (NZ)*. However, these provisions were repealed by the *Fisheries Act 1996 (NZ)*, which does not operate beyond the limits of New Zealand's EEZ. More fundamentally, as discussed in Chapter 2, under international law New Zealand only has jurisdiction to regulate the exploitation of the sedentary species of the continental shelf beyond the EEZ, and the extent to which hydrothermal vent species are sedentary species is unclear. Thus there appears to be no legal basis for the New Zealand government's imposition of a prohibition on bioprospecting.

The licence also sets out a three stage programme of work that Neptune Resources is obliged to carry out during the term of the licence. In Stage 1 the licence holder is obliged to undertake a literature review of previous work undertaken in the southern section of the Kermadec Arc and Havre Trough.¹⁵⁰ On completion of Stage 1, Stage 2 of the programme of work obliges Neptune Resources to conduct a programme of multi-beam echo sounding and geochemical surveys to identify areas of further interest within the licence area. Stage 2 must be completed within two years of the date of grant of the licence.¹⁵¹ At this point Neptune Resources must make a written commitment to complete the work detailed in Stage 3 of the licence. Stage 3 of the work programme obliges Neptune Resources to

¹⁵⁰ New Zealand Prospecting Licence number 39195 granted pursuant to the *Continental Shelf Act 1964* to Neptune Resources Pty Ltd, dated 15 October 2002, Second Schedule, Work programme clause 1, copy on file with author.

¹⁵¹ New Zealand Prospecting Licence number 39195 granted pursuant to the *Continental Shelf Act 1964* to Neptune Resources Pty Ltd, dated 15 October 2002, Second Schedule, Work programme clause 2, copy on file with author.

“undertake a programme of sampling of volcanoes, seamounts and cross-basin structures and conduct a preliminary close-spaced sampling programme to determine their probable mineral extent and grade”.¹⁵²

Importantly clause 16 of the licence makes clear that New Zealand government entities are entitled to carry out scientific research in relation to the minerals in the area subject to the licence. Thus Clause 16 provides

“The licence does not preclude any minerals based scientific research programme from being undertaken in the licence area where the programme is wholly or partly funded by the New Zealand Government and has the consent of the Minister, and the data collected is made available to the Crown Minerals Resource Data Library available at the cost of dissemination within two years of collection.”¹⁵³

This provision was included at the specific request of scientists from GNS involved in ongoing research on the geology of the Kermadec Arc, who wanted to avoid any restriction on their ability to carry out research in the area covered by the licence.¹⁵⁴

Neptune Resources is obliged to pay an annual licence fee at the rate of NZ\$1.125 (GST inclusive) per sq km during the term of the licence. This equates to a licence fee of NZ \$37, 305 per annum.¹⁵⁵ The licence also grants Neptune Resources the “right in priority over any other person to apply for a subsequent mining licence in respect of any area within [the] licence.”¹⁵⁶

¹⁵² Ibid.

¹⁵³ New Zealand Prospecting Licence number 39195 granted pursuant to the *Continental Shelf Act 1964* to Neptune Resources Pty Ltd, dated 15 October 2002, Second Schedule, Work programme clause 16, copy on file with author

¹⁵⁴ Dr Cornel de Ronde, interview, 25 November 2003.

¹⁵⁵ New Zealand Prospecting Licence number 39195 granted pursuant to the *Continental Shelf Act 1964* to Neptune Resources Pty Ltd, Certificate of change of Conditions dated 25 June 2003, copy on file with author.

¹⁵⁶ New Zealand Prospecting Licence number 39195 granted pursuant to the *Continental Shelf Act 1964* to Neptune Resources Pty Ltd, dated 15 October 2002, clause 9, copy on file with author.

The licence holder is obliged to comply with a number of other requirements, including providing a berth for government observers on board all research vessels involved in prospecting, as well as obligations to comply with reporting obligations under section 90 of the *Crown Minerals Act 1999* (NZ) and the *Crown Minerals (Minerals and Coal) Regulations 1999*(NZ) (Part 3 sections 26 to 34).¹⁵⁷ Release of any of these reports to the public will be restricted in accordance with section 90 of the *Crown Minerals Act 1991* (NZ) and the *Official Information Act 1982* (NZ).¹⁵⁸

The *Crown Minerals Act 1991* (NZ) does not apply beyond the outer limits of the territorial sea.¹⁵⁹ Nonetheless, in issuing the licence the New Zealand Crown Minerals Office sought to model the licence on licences issued in accordance with the *Crown Minerals Act 1991* (NZ).¹⁶⁰ This appears to be consistent with the provisions of section 5(3) of the *Continental Shelf Act 1964* (NZ), which allows the Minister to grant licences “subject to such conditions as the Minister, when granting the licence, thinks fit to impose”.¹⁶¹

The licence does not include any conditions in relation to environmental impact assessment or obligations to avoid adverse impacts on the marine environment. This may be due in part to the fact that none of the relevant legislation dealing

¹⁵⁷ New Zealand Prospecting Licence number 39195 granted pursuant to the *Continental Shelf Act 1964* to Neptune Resources Pty Ltd, dated 15 October 2002, clause 5, copy on file with author.

¹⁵⁸ New Zealand Prospecting Licence number 39195 granted pursuant to the *Continental Shelf Act 1964* to Neptune Resources Pty Ltd, dated 15 October 2002, clause 6(b), copy on file with author

¹⁵⁹ The *Crown Minerals Act 1991* (NZ) applies only to “Land” which is defined in section 2 as including “land covered by water; and also includes the foreshore and seabed to the outer limits of the territorial sea”.

¹⁶⁰ Interview Mr Warren Player, Crown Minerals, New Zealand Ministry of Economic Development, 26 November 2003.

¹⁶¹ *Continental Shelf Act 1964* (NZ) section 5(3).

with activities in the marine environment currently applies to the continental shelf. For example, the main New Zealand legislation providing for measures such as environmental impact assessment of activities in the marine environment, the *Resource Management Act 1991 (NZ)*, does not apply beyond the limits of the territorial sea.¹⁶² The only legislation of relevance that appears to apply to the New Zealand continental shelf is the *Environment Act 1986 (NZ)*. However, this legislation is not a management statute in the regulatory or operational sense.¹⁶³ It merely provides for the creation of a parliamentary Commissioner for the Environment and a Ministry of the Environment to monitor and provide advice in relation to implementation of other legislation including the *Continental Shelf Act 1964 (NZ)*.¹⁶⁴

While no other legislation appears relevant, conditions could be imposed in relation to the protection of the marine environment, such as requirements for environmental impact assessment under section 5(3) of the *Continental Shelf Act (NZ) 1964* discussed above. A possible explanation for the absence of any such condition lies in the fact that this is the first such licence granted by New Zealand Crown Minerals, and the process for grant of such a licences is still under development.

¹⁶² Section 12 of the *Resource Management Act 1991 (NZ)* prohibits certain activities in the coastal marine area unless allowed by a regional coastal plan or a resource consent. The application process for resource consents does involve assessment of the effects of such activity on the environment. However, the term “coastal marine area” as defined in section 2 of the *Resource Management Act 1991 (NZ)* does not extend beyond the outer limits of the territorial sea and accordingly the *Resource Management Act* has no application on the continental shelf.

¹⁶³ Enfocus Ltd, Hill Young Cooper and URS NZ Ltd (2002) Oceans Policy Stocktake. Part 1-Legislation and Policy review, New Zealand Oceans Policy Secretariat, Appendix 3.

¹⁶⁴ The *Continental Shelf Act 1964* is listed in the *Environment Act 1986 (NZ)* as legislation to which the provisions of the later legislation apply.

It is worth noting that, subsequent to the grant of the licence, part of the area covered by the licence was closed to all forms of trawling pursuant to regulations under the *Fisheries Act 1996 (NZ)*. However, this appears to have no impact on the Neptune Resources exploration licence. It is unclear if Crown Minerals were consulted during the decision making process that lead to the closure.¹⁶⁵

Development of New Zealand's Oceans Policy

In July 2000 the New Zealand Cabinet agreed to the development of an Oceans Policy for New Zealand. The policy will seek to provide for an integrated and consistent management of oceans within New Zealand's jurisdiction. Development of the policy aims to be a cross-government exercise, covering all aspects of oceans management, and would extend out to the edge of the EEZ and the continental shelf.¹⁶⁶ It is anticipated that the review will be completed by 2005 and will probably lead to development of an Oceans Act for New Zealand.¹⁶⁷ As development of the Oceans Policy is still underway detailed examination of the likely policy is beyond the scope of this thesis, but for present purposes it is worth noting a number of points of relevance to hydrothermal vents.

One important part of the Oceans policy development process in New Zealand has been a review of existing legislation and policies undertaken for the Ocean Policy Secretariat by external consultants.¹⁶⁸ That review produced an *Oceans Policy Stocktake*,¹⁶⁹ which examines some of the strengths and weakness of existing

¹⁶⁵ Enfocus Ltd, Hill Young Cooper and URS NZ Ltd (2002) Oceans Policy Stocktake. Part 1- Legislation and Policy review, New Zealand Oceans Policy Secretariat, Appendix 4.

¹⁶⁶ <http://www.oceans.govt.nz> accessed 8 January 2004.

¹⁶⁷ Interview Brigit Stephenson, Oceans Policy Secretariat, New Zealand Ministry of the Environment, 26 November 2003.

¹⁶⁸ The Consultants were Enfocus Limited, Young Cooper Ltd and URS NZ Ltd.

¹⁶⁹ Enfocus Limited, Young Cooper Ltd and URS NZ Ltd, above n 163.

legislation and policies relating to oceans management. The strengths identified in New Zealand's existing legislative and policy landscape by the stocktake include:

- *Single uncontested jurisdiction*: the only boundary dispute New Zealand had was with Australia and related to the demarcation of the continental shelf boundaries.¹⁷⁰ There are also no complicated constitutional arrangements dividing domestic jurisdiction between different levels of government. New Zealand does not have the problems of a federal system like Australia.¹⁷¹
- *Comprehensive legal framework*: New Zealand has law in place to assert its rights under LOSC, although there are a few gaps in the legal ability for the executive to take management steps.¹⁷²
- *Some ability to create consistent regulatory regimes*: although management functions are fragmented across statutes, some opportunity exists to create seamless management regimes in respect of key issues.¹⁷³ Of particular note is the possibility of regulations under the *Territorial Sea, Contiguous Zone and Exclusive Economic Zone Act* and the *Continental Shelf Act*.¹⁷⁴
- *Integrated Coastal Zone Management*: exists under a single statute, the *Resource Management Act*, out to the limits of the territorial sea.¹⁷⁵

¹⁷⁰ This dispute has subsequently been resolved with the signing of the Treaty between the Government of Australia and the Government of New Zealand establishing Certain Exclusive Economic Zone and Continental Shelf Boundaries. See Australian Department of Foreign Affairs and Trade web site http://www.foreignminister.gov.au/releases/2004/fa112a_04_bg.html accessed 27 January 2005.

¹⁷¹ Enfocus Limited, Young Cooper Ltd and URS NZ Ltd *Oceans Policy Stocktake-Part 1-Legislation and Policy Review*, (2002), 1.

¹⁷² Enfocus Limited, Young Cooper Ltd and URS NZ Ltd, above n 163, 2.

¹⁷³ Ibid.

¹⁷⁴ Ibid.

¹⁷⁵ Ibid.

- *Treaty of Waitangi*: which acts as a formal framework for addressing and considering Maori rights and relationships with respect to the Crown's sovereignty and sovereign rights.¹⁷⁶
- *Relatively efficient allocation mechanisms for fisheries*.¹⁷⁷

The weaknesses identified include:

- *Absence of over-riding goal*: for example, no clearly articulated statement of “sustainability”, “wise use” or other formula. As such each agency is left to interpret and apply key international marine management goals articulated in instruments (such as LOSC, Agenda 21 etc) and non-statutory strategies such as *New Zealand's Biodiversity Strategy*.¹⁷⁸ This can lead to conflicting management decisions across agencies and government departments.¹⁷⁹
- *Inconsistent decision making structures and opportunities for participants*.¹⁸⁰
- *Inconsistent management of “like” activities (and potential effects), particularly beyond the territorial sea*: management of non-living resources outside the territorial sea is largely “reactive” and “ad hoc”, with little integration with management of living resources. There is an absence of key tools such as structured environmental impact assessment. There seems to be no mechanism to resolve conflicts between use of non living

¹⁷⁶ Ibid.

¹⁷⁷ Ibid.

¹⁷⁸ Discussed below.

¹⁷⁹ Enfocus Limited, Young Cooper Ltd and URS NZ Ltd, above n 163, 3.

¹⁸⁰ Ibid.

resources and management of living resources other than at Cabinet level.¹⁸¹

- *Treaty of Waitangi Act and aboriginal rights*: there is uncertainty as to rights in the oceans, which must await a future court decision.¹⁸²
- *Ecologically arbitrary spatial management units and a general lack of integrated management*: most management regimes reflect LOSC's geospatially concentric and geological boundaries rather than ecological boundaries, which can prevent a truly coherent ecosystem management approach.¹⁸³
- *Lack of information*: in relation to marine ecosystems. Even though there are principles, such as the precautionary principle, to deal with such situations, they are interpreted and applied inconsistently.¹⁸⁴

With respect to legislation applicable to hydrothermal vents within New Zealand waters, it is worth noting a few key comments contained in the *Oceans Stocktake*. Firstly the stocktake notes that only the *Resource Management Act* and the *Fisheries Act* (neither of which apply to the hydrothermal vents on New Zealand's continental shelf) explicitly refer to the principle of sustainability.¹⁸⁵ In that respect the stocktake notes

"There is a clear gap in the management of effects on the marine environment beyond the 12nm limit from activities not controlled by the Fisheries Act".¹⁸⁶

Although as the stocktake also points out this is not inconsistent with LOSC. Thus

¹⁸¹ Ibid.

¹⁸² Ibid.

¹⁸³ Enfocus Limited, Young Cooper Ltd and URS NZ Ltd, above n 163, 4

¹⁸⁴ Ibid.

¹⁸⁵ Enfocus Limited, Young Cooper Ltd and URS NZ Ltd, above n 163, 19.

“Minerals are not required to be managed “sustainably”, for the obvious reason of either non-regeneration or extremely slow regeneration. This mirrors the situation on land under the [Resource Management Act], and might be consistent with LOSC’s omission of non-living organisms from the “optimum utilisation” imperative.”¹⁸⁷

While minerals themselves need not be managed sustainably, the stocktake also recognised the absence of a mechanism for management of environmental effects of activities beyond the territorial sea. In relation specifically to the *Continental Shelf Act* the stocktake notes

“That Act does not provide for sustainability or (explicitly) environmental protection and the extent to which these objectives are promoted is at the discretion of the Minister. On the other hand the Act does not limit the minister’s ability to take into account environmental effects in granting licences, and in the one case where a licence for prospecting was issued, environmental impacts were part of the consideration and assessment”.¹⁸⁸

While there may have been some cursory examination of these issues in the process leading up to the grant of the prospecting licence to Neptune Resources, as noted earlier, there appears to have been no comprehensive assessment of the likely environmental effects of prospecting activities, notwithstanding the stocktake’s assertions to that effect.

The stocktake also identifies the lack of formal mechanisms for achieving integration across statutes.¹⁸⁹ Even where mechanisms exist, often a lack of statutory direction mandating integration and insufficient communication and collaboration between management agencies means integration is of limited effectiveness.¹⁹⁰ The stocktake in particular notes the existence of co-ordination of regulation under the *Fisheries Act* and *Continental Shelf Acts* through non-

¹⁸⁶ Ibid.

¹⁸⁷ Ibid.

¹⁸⁸ Enfocus Limited, Young Cooper Ltd and URS NZ Ltd, above n 163, 20.

¹⁸⁹ Enfocus Limited, Young Cooper Ltd and URS NZ Ltd, above n 163, 22-23.

¹⁹⁰ Enfocus Limited, Young Cooper Ltd and URS NZ Ltd, above n 163, 23.

statutory ministerial inter-departmental consultation. Even this example has sometimes failed to be effective. For example, as noted above, in issuing regulations under the *Fisheries Act* closing seamounts to trawling, it is unclear whether there was any consultation with Crown Minerals, the department responsible for issuing the prospecting permit to Neptune Resources.

Significantly the stocktake also highlights the absence of a process for the issuing of licences under the *Continental Shelf Act*.¹⁹¹ As noted earlier however, to a limited extent Crown Minerals has strived for consistency with regulation in other maritime zones. Finally the stocktake notes a lack of public participation in the process of granting licences under the *Continental Shelf Act*.¹⁹²

Later the stocktake goes on to summarise the combined effect of each of these gaps in terms of what lessons can be learnt for the development of Oceans policy.

In that respect the stocktake notes

“The construction and sophistication of the Act reflects LOSC and, perhaps the extent of historical pressure on resource use on the shelf seaward of the territorial sea. However, should pressure on the non-living resources of the continental shelf increase in the future it is doubtful whether the [Act] will be regarded as providing an adequate management regime.

The lack of opportunities for public participation, environmental assessment obligations, or monitoring requirements puts it at clear odds with the regime inside the territorial sea (notwithstanding that practice has been to provide for input by other government agencies).

The critical internal tensions of the Act are presented by:

- On the one hand, the purpose focusing on providing for resource exploitation but the absence of administrative or decision-making provisions that provide any certainty for business; and
- The assumption that may be taken that licences regulate for a purpose and the further assumption (based on LOSC) that this purpose includes environmental

¹⁹¹ Enfocus Limited, Young Cooper Ltd and URS NZ Ltd, above n 163, 33.

¹⁹² Enfocus Limited, Young Cooper Ltd and URS NZ Ltd, above n 163, 25-28 and 33.

protection, but the lack of tools and information to provide for that protection.”¹⁹³

Thus, in the course of its formulation of an Oceans policy, New Zealand has recognised tensions and problems with the existing regime. As the formulation of Oceans Policy is ongoing, it is difficult to predict to what extent the identified weakness will be rectified. Nonetheless, at least with respect to this part of the Oceans Policy process, the identification of these weaknesses can be regarded as a successful achievement for those involved in formulating New Zealand’s Oceans Policy.

Oceans Policy and economic opportunities presented by hydrothermal vents

A second component of the development of Oceans policy in New Zealand is the examination of economic opportunities available in New Zealand’s oceans. Interestingly this has included an examination of the various economic opportunities offered by hydrothermal vents.

A key document worth noting is a report prepared for the Oceans policy Secretariat by the Centre for Advanced Engineering of the University of Canterbury. This report, *Economic Opportunities in New Zealand’s Oceans*,¹⁹⁴ examines current economic activities and future opportunities in the oceans, as well as considering what policy framework may be necessary for realising the policy goal of providing “for economic return from New Zealand’s oceans.”¹⁹⁵ The report aims to contribute to “searching for the best ways to pursue economic

¹⁹³ Enfoc Limited, Young Cooper Ltd and URS NZ Ltd, above n 163, 33-34.

¹⁹⁴ Centre for Advanced Engineering, *Economic Opportunities in New Zealand’s Oceans. Informing the development of oceans policy*, (2003).

¹⁹⁵ Centre for Advanced Engineering, above n 194, 1.

opportunities within New Zealand's oceanic territory [sic], generally in accordance with accepted principles of sustainable development.”¹⁹⁶

A detailed review of this report is beyond the scope of this thesis but a number of salient points contained in the report are relevant for present purposes. Firstly, the report devotes considerable discussion to both potential mineral and biotechnology resources associated with hydrothermal vents along the Kermadec arc.

In relation to the mineral resources, the report is pessimistic as to the immediate economic benefits that such resources may offer. Thus the report notes

“There are currently substantial barriers to commercial mining of these deposits, including low commodity prices and the difficulties of operating in offshore environments. Nevertheless, it has been predicted that mining polymetallic massive sulphides from the oceans will become economically viable within 10-15 years”.¹⁹⁷

Interestingly, in the context of consideration of the potential of mineral resources, the report also notes

“Proposals have also been made for oceanic production of hydrogen fuel using vent systems.”

It is not clear whether this is referring to specific proposals in New Zealand or to the theoretical possibility noted in Chapter 1 of this thesis. In relation to biotechnology the report makes a number of key points. Firstly, concerning the biotechnology potential of hydrothermal vent species the report observes

“Biodiversity is a driver of bioproduct opportunity. Marine micro-organisms include microalgae, bacteria, archaea and extremophiles. The latter live in extreme environments such as hydrothermal vents, and have developed biochemical means to protect themselves from the effects of these environments. Extremophiles are potential sources of robust

¹⁹⁶ *Ibid.*

¹⁹⁷ Centre for Advanced Engineering, n 194, 7.

enzymes used as antivirals, antibiotics, and anti-cancer agents, thermoprotectants and osmoprotectants.”¹⁹⁸

Secondly, the report also recognises the long development process and cost involved in bringing marine bioproducts to the market.¹⁹⁹ As the report observes

“The development of marine bioproducts is characterised by a long and technologically challenging value chain from exploration for highly bioactive organisms (bioprospecting), through identification of candidate organisms, screening for valuable biochemicals, extraction of the target product, devising the method of supplying the product, the actual production of bioproducts....Development of a specific product from bioprospecting can take 10-15 years and require development costs of US\$300-500m.”²⁰⁰

The second part of the report makes a number of recommendations as to how the economic opportunities discussed in the first part of the report may be facilitated. In the case of hydrothermal vents there are clear recommendations as to the need to design and implement policies and appropriate legislation to provide for secure, freely tradeable property rights in relation to both the mineral resources, and any biotechnology that may be developed. This is justified on the grounds that it would provide a stable environment for the significant capital investment projected to be required in developing such resources. It is argued that this is perfectly consistent with LOSC. Thus the report observes

“[LOSC] implicitly recognises that there are net global economic gains where the technological capital of one country (a ‘maritime nation’) can be combined with the natural resources of another (‘coastal state’), and that the latter has the sovereign right to establish a fair means of sharing in the wealth so created. New Zealand statutes, including the Continental Shelf Act, the Crown Minerals Act and the Fisheries Act, all provide for such developments within the EEZ, and the participation of foreign and multi-national corporations....The development of new sectors, such as biotechnology or volcanic-related mineral deposits, will depend on similar frameworks that create secure and tradable property rights in respect of which capital investment can secure attractive returns.”²⁰¹

¹⁹⁸ Centre for Advanced Engineering, above n 194, 12-13.

¹⁹⁹ This is discussed in Chapter 7

²⁰⁰ Centre for Advanced Engineering, above n 194, 12-13.

²⁰¹ Centre for Advanced Engineering, above n 194, 23.

Finally, the report suggests that the existing framework for the development of these resources may need to be rethought. Although the report does not offer any suggestions on what this may involve, it observes

“The nature and allocation of rights to develop ‘new’ resources such as gas hydrate and volcanic vent-hosted minerals need to be considered very carefully, well in advance, to optimise the benefits to the nation. These opportunities are being led by public-funded research, mainly into resource characterisation. In the present framework, title in the form of an exclusive right to develop any discovery arising from commercial exploration is available to whichever visionary entrepreneur is first prepared to make an application. The potential leverage is tremendous but the probability of sustaining title until development proves commercial, and raising the required capital, is very low. The model has many precedents throughout the history of the oil industry and in many other sectors such as satellite broadcasting, but it does result in potential capture of a disproportionate share of the value by the visionary provider of high-risk capital. Without government intervention, this is unlikely to come from New Zealand.

Alternative approaches to title definition and allocation of ‘new’ resources should be examined with the specific goal of facilitating their commercialisation while securing an optimal return to the Crown.”²⁰²

New Zealand’s Biodiversity Strategy and Draft Bioprospecting Strategy

Finally, it is also worth noting that, independent of the Oceans Policy development, New Zealand is also in the process of developing a Bioprospecting Strategy in accordance with the terms of its Biodiversity Strategy, launched in 2000 in response to New Zealand’s obligation under the CBD.²⁰³ The implementation of New Zealand’s Biodiversity Strategy and development of New Zealand’s Bioprospecting Strategy are ongoing. Detailed examination of both documents is beyond the scope of this chapter. However a number of points are worth noting about developments to date.

²⁰² Centre for Advanced Engineering, above n 198, 25-26.

²⁰³ The New Zealand Biodiversity Strategy, available from <http://www.mfe.govt.nz/publications/biodiversity/nz-biodiversity-strategy-feb00.html> accessed 27 January 2005.

Firstly, a discussion paper on options for regulating bioprospecting was released in November 2002. This document, *Bioprospecting in New Zealand-discussing the options*,²⁰⁴ sets out what the New Zealand government defines as the “bioprospecting policy problem”

- the lack of an overarching framework for bioprospecting;
- uncertainty of the policy environment and lack of information; and
- ad hoc controls over access by foreign vessels.

The lack of an overarching framework for bioprospecting is a major element of the “bioprospecting problem.” As the options discussion paper notes

“The legal and policy frameworks governing access to biological resources are a fragmented system of rules, contained under legislation designed for other purposes. There is no overarching government bioprospecting policy to provide consistency in the implementation of different statutory functions.....In an institutional sense, there is no body to take a strategic view of bioprospecting activities, and no central point of contact for overseas investors and researchers. There is no systematic gathering of information on what bioprospecting activities are occurring in New Zealand, or on the outcomes and benefits of bioprospecting research....There is also no benefit-sharing framework to ensure individual cases of bioprospecting research maximise possible benefits to New Zealand.”²⁰⁵

These are the sort of issues New Zealand must address in the course of developing its bioprospecting policy and legislation.

For present purposes it is interesting to note that the Bioprospecting options discussion paper referred to above does mention hydrothermal vents in passing.²⁰⁶

²⁰⁴ New Zealand Ministry of Economic Development *Bioprospecting in New Zealand-discussing the options* (2002), available from <http://www.med.govt.nz/ers/nat-res/bioprospecting/review/discussion/> accessed 27 January 2005.

²⁰⁵ New Zealand Ministry of Economic Development, above n 204, 14.

²⁰⁶ Thus the paper notes

“Interest in bioprospecting in New Zealand’s resources is partly driven by the nature of the country’s biodiversity. As a group of isolated islands, our indigenous biodiversity has developed in a particular way. New Zealand also has a large Exclusive Economic Zone, providing a rich source of marine biodiversity. For example, the large number of hydrothermic [sic] vents in New Zealand’s Exclusive Economic Zone offers an opportunity to study micro-organisms that

It is not clear however to what extent bioprospecting at hydrothermal vents will subsequently be regulated as these policies are implemented.

PORTUGAL-LUCKY STRIKE AND MENEZ GWEN

The archipelago of the Azores, located in the middle of the Atlantic ocean, was colonised by the Portuguese in the 15th century and to this day remains a Portuguese territory with its own regional government.²⁰⁷ The Archipelago consists of nine volcanic islands and several small islets forming three groups running WNW-ESE between 37° and 47° N latitude, 25° and 32°W longitude.²⁰⁸ Its surrounding EEZ covers more than 1 million square kilometres of ocean.²⁰⁹

The marine environment of the Mid Atlantic, and the Azores in particular, has been of intense interest to scientists since the 1880's.²¹⁰ With the discovery of hydrothermal vents in the Pacific ocean in the late 1970s and early 1980s, exploration for hydrothermal vents on the mid-Atlantic ridge began shortly thereafter.²¹¹ The first active hydrothermal vents on the mid-Atlantic ridge were those found at the TAG²¹² site in 1985.²¹³

have developed in extreme environments." See New Zealand Ministry of Economic Development, above n 208, 7.

²⁰⁷ R S Santos et al, 'Marine research and conservation in the Azores' (1995) 5 *Aquatic Conservation: Marine and Freshwater Ecosystems* 311.

²⁰⁸ Ibid.

²⁰⁹ Santos et al, above n 207, 312.

²¹⁰ Santos, et al, above n 207, 313.

²¹¹ K L Von Damm, A M Bray, L G Buttermore and S E Oosting, 'The geochemical controls on vent fluids from the Lucky Strike vent fields, Mid-Atlantic Ridge' (1998) 160 *Earth and Planetary Science Letters* 521, 522.

²¹² TAG stands for Trans Atlantic Geotraverse.

²¹³ P A Rona et al, 'Black smokers, massive sulphides and vent biota at the Mid-Atlantic Ridge', (1986) 321 *Nature* 33.

Since then several other active sites have been found on the Mid-Atlantic Ridge including the Lucky Strike and Menez Gwen hydrothermal vent sites,²¹⁴ which the Azores Regional Government are proposing to shortly designate as MPAs. Although these are not the only hydrothermal vent sites on the Mid-Atlantic ridge to be proposed as MPAs,²¹⁵ they are the first sites on the Mid-Atlantic ridge to receive government backing for formal designation, and will probably be the first deep-sea MPAs in the Northeast Atlantic.²¹⁶

The “Lucky Strike”²¹⁷ hydrothermal vents were first discovered during the FAZAR²¹⁸ expedition in 1992.²¹⁹ Menez Gwen was discovered in 1994.²²⁰ The Lucky Strike vents, located at 37°17'N and 32°20'W,²²¹ are found over an area 700 metres by 300 metres at depths ranging from 1618 metres in the north to 1730 metres in the south.²²² These include a number of impressive vent structures such as the Statue of Liberty, a 3 metre tall active flange structure with inactive

²¹⁴ Other sites include Broken Spur, Logatchev Field and the Rainbow site. See Von Damm, Bray, Buttermore, and Oosting, above n 211, 522.

²¹⁵ For example the Logatchev site located in international waters has been proposed as a high seas MPA. See K M Gjerde and C Breide, *Towards a Strategy for High Seas Marine Protected Areas: Proceedings of the IUCN, WCPA and WWF Experts Workshop on High Seas Marine Protected Areas* (2003).

²¹⁶ WWF ‘Lucky Strike and Menez Gwen, Azores. The first deep sea Marine Protected Areas in the Northeast Atlantic’, pamphlet available from <http://www.ngo.grida.no/wwfneap/Whatsnew/Azores.htm> accessed 26 November 2004.

²¹⁷ This hydrothermal vent site was called “Lucky Strike” because it was quite literally found by accident. The active hydrothermal vent was found accidentally by scientists dredging at this site. When the dredge was brought to the surface it contained fresh sulphides and live vent mussels. See P Asimov, ‘Lucky Strike Smokers are different’ (2002) 3 *Engineering & Science* 9,15 and C Langmuir et al, ‘Hydrothermal vents near mantle hot spot: the Lucky Strike vent field at 37°N on the Mid-Atlantic Ridge’ (1997) 148 *Earth and Planetary Science Letters* 69, 71.

²¹⁸ FAZAR stands for French American ZAPS and Rocks. ZAPS stands for Zero Angle Photon Spectrometer. See P Asimov, above n 217.

²¹⁹ Von Damm, Bray, Buttermore and Oosting, above n 211, 522.

²²⁰ J P Donval et al, ‘Compared chemistry of hydrothermal fluids collected with the Nautilie at Lucky Strike (37°17'N) and the new Menez Gwen (37°50'N) sites on the Mid-Atlantic Ridge (DIVA 1 cruise, May 1994)’ (1994) 75 *Eos* 309.

²²¹ Von Damm, Bray, Buttermore, and Oosting, above n 211, 522.

²²² C Langmuir et al, above n 217, 75.

chimney spires, Sintra, a 5 metre tall spire, in the north, and a number of structures such as the Eiffel Tower, a 20 metre tapered spire “black smoker”, in the south.²²³ The temperatures of fluids emitted from these vents ranges from 200°C at the Statue of Liberty to 333°C at Eiffel Tower.²²⁴ One vent, Crystal vent, is a unique example of a high temperature vent that emits clear fluid due to low concentrations of Fe, Mn and Zn.²²⁵ High temperature clear fluid vents like this are quite rare.

The Menez Gwen hydrothermal vent site is located on a volcano at 37°50'N²²⁶ at a depth of 840-870 metres.²²⁷ Several active hydrothermal vents have been found on the southeast and east slopes of the volcano. Vent chimneys at this site are typically small and composed of white anhydrite, although some small mounds with hot water diffusing through all surfaces are also to be found at Menez Gwen.²²⁸ Menez Gwen vents typically exhibit temperatures between 265°C and 281°C.²²⁹

The Lucky Strike fauna is biogeographically distinct from other hydrothermal vent sites found on the mid-Atlantic ridge and may possibly represent a fifth

²²³ Langmuir et al, above n 217, 75-79.

²²⁴ Ibid.

²²⁵ Von Damm, Bray, Buttermore and Oosting, above n 211, 527.

²²⁶ J L Charlou et al, ‘Compared geochemical signatures and the evolution of Menez Gwen 37°50'N and the Lucky Strike (37°17'N) hydrothermal fluids south of the Azores Triple Junction on the Mid-Atlantic Ridge’ (2000) 171 *Chemical Geology* 49, 52.

²²⁷ R S Santos, A Colaço and S Christiansen (eds), ‘Management of Deep-sea Hydrothermal Vent Fields MPA in the Azores Triple Junction. Proceedings of the workshop’ (2003) *Arquipélago-Life and Marine Science*, Supplement 4, 31.

²²⁸ Ibid.

²²⁹ Ibid.

biogeographic hydrothermal province.²³⁰ Fauna found at the Lucky Strike vents are dominated by dense mussel beds.²³¹ Other fauna includes at least two new gastropods, polychaete such as the blood-red *Branchiopolynoe seepensis*, two new species of halacarid mites, a new species of bresiliid shrimp and small white amphipods.²³² Fish species identified at Lucky Strike include Chimaerids, such as *Hydrolagus pallidus*, and bythtid fish, such as *Cataetys laticeps*, as well as several sharks.²³³ There are two quite unusual elements of the Lucky Strike faunal community. The first one is the presence of a new species of sea urchin.²³⁴ Secondly, and perhaps more significantly, unlike most other known hydrothermal vent sites, both the Lucky Strike and Menez Gwen fields are characterised by a total absence of vestimentiferan tubeworms and vesicomysid clams.²³⁵

Like Lucky Strike, fauna at Menez Gwen is dominated by mussel beds.²³⁶ Other fauna identified at Menez Gwen includes small limpets and deep sea scavengers such as crabs,²³⁷ gastropods, mytilids and several species of fish.²³⁸

Activities and stakeholders

As noted above, there is a long history of MSR in and around the Azores, and more recently at hydrothermal vents within the Portuguese EEZ surrounding the Azores and elsewhere in the Mid-Atlantic. Due to the proximity of Lucky Strike

²³⁰ Other provinces identified include the eastern Pacific (east Pacific Rise and Galapagos Spreading Centre), northeastern Pacific (Gorda, Juan de Fuca, Explorer Ridges), western Pacific (Back-Arc) and Mid-Atlantic (TAG and Snake Pit). See C Van Dover et al, 'Biology of the Lucky Strike hydrothermal field' (1996) 43(9) *Deep-Sea Research I* 1509, 1524.

²³¹ Van Dover et al., above n 230, 1512.

²³² Van Dover et al, above n 230, 1512-1518.

²³³ Van Dover et al, above n 230, 1518.

²³⁴ Ibid.

²³⁵ C L Van Dover, *The Ecology of Deep-Sea Hydrothermal Vents* (2000), 337.

²³⁶ Santos, Colaço and Christiansen (eds) above n 227, 13.

²³⁷ Ibid.

²³⁸ Santos, Colaço and Christiansen (eds) above n 227, 32-33.

to staging areas in the Azores and because of international interest in time-series observations of hydrothermal communities, Lucky Strike may become the principal area of ridge crest hydrothermal research.²³⁹ Similarly, due to their close proximity to each other, to other hydrothermal vent sites such as the João Castro seamount and at São Miguel, Lucky Strike and Menez Gwen offer the best potential for studying shallow and deep water hydrothermal vents in the Mid-Atlantic.²⁴⁰ In addition to work of individual research institutions such as IFREMER, Bremen University, and the University of the Azores, a number of international collaborative research projects have been undertaken along the Mid Atlantic Ridge near the Azores in recent years as part of programs funded by the European Commission and the US National Science Foundation.²⁴¹ Further international collaborative research, such as MOMAR II and a Deep-Sea Observatory, part of the European Unions European Research Area programme,²⁴² is also planned for the near future. The scientific community therefore is a major stakeholder in regulation of activities at Lucky Strike and Menez Gwen.

Another stakeholder of relevance is the emerging deep-sea tourist industry. As noted in Chapter 1, DOE, has conducted a number of tourist dives to Lucky Strike.²⁴³ It is also worth noting the existence of a substantial fishing industry in and around the Azores.²⁴⁴ The extent of fishing activities in the MPAs proposed for the Lucky Strike and Menez Gwen sites is unclear.

²³⁹ See Van Dover, Desbruyères and Segonzac et. al, above n 230, 1526

²⁴⁰ Santos et al, above n 207, 344.

²⁴¹ Santos, Colaço, and Christiansen (eds), above n 227, 13.

²⁴² Santos, Colaço, and Christiansen (eds), above n 227, 6.

²⁴³ Interview Belinda Sawyer, Operations Manager, Deep Ocean Expeditions, 5 December 2003.

²⁴⁴ A detailed discussion of the fishing industry which is of only marginal relevance to the proposed MPAs for Lucky Strike and Menez Gwen is beyond the scope of this chapter. For a

Finally, although the writer has been unable to locate any evidence of any company expressing interest in the mineral resources of Lucky Strike or Menez Gwen, it is worth noting that the potential of mining has been considered in the process leading up to the creation of the MPA.

Proposed Lucky Strike and Menez Gwen Marine Protected Areas

The first MPA in the Azores, Monte da Guia, was established in 1980.²⁴⁵ There are now 9 marine protected areas that have been designated by the Regional Government of the Azores and 7 sites designated as sites of community interest under the E.C. Habitat Directive.²⁴⁶

For several years leading members of the scientific community have called for the implementation of a plan for conservation of marine areas in the Azores.²⁴⁷ More recently many of the same scientists have also recognised that there is a need for greater co-ordination of research activities at Lucky Strike and Menez Gwen, and a need to take measures to regulate activities at these vents, so as to ensure they can remain both as special areas of reference and study and accessible for future advanced scientific research, while also ensuring that their associated biodiversity is sustainably managed for the future.²⁴⁸ Thus, while MSR arguably poses the greatest threat to these sites for the conceivable future, the scientific community itself, in conjunction with other interested parties such as WWF and the Regional

detailed discussion of the fishing industry in and around the Azores see Santos, Hawkins and Monteiro et. al, above n 211,323 to 327.

²⁴⁵ Interview Professor Ricardo Serrão Santos, Director, Department of Oceanography and Fisheries, University of the Azores, 20 June 2003.

²⁴⁶ Ibid.

²⁴⁷ Santos et al , above n 207, 335.

²⁴⁸ Santos, Colaço, and Christiansen, above n 217, 5.

Government of the Azores, is taking the initiative to call for the establishment of MPAs for Lucky Strike and Menez Gwen. While the scientific community had a significant role and input into the establishment of the Endeavour MPA in Canada, in the case of Lucky Strike and Menez Gwen, it appears that key members of the scientific community are leading the calls for regulation of their own activities.

A key step along the way to the establishment of the proposed MPAs for Lucky Strike and Menez Gwen was a major workshop convened in Horta under the sponsorship of the Secretary of the Environment of the Regional Government of the Azores from 18-20 June 2002. Some 35 experts attended the workshop, including leading scientists involved in hydrothermal vent research from institutions such as the University of the Azores, IFREMER, Université du Québec à Montréal, and Southampton Oceanography Centre, lawyers and policy makers from institutions such as WWF, the IUCN, the Intergovernmental Oceanographic Commission and UNESCO, as well as collaborative research programmes such as InterRidge and Ridge, and several representatives of government departments including the Hydrographic Institute (Portuguese Navy).

The goal of the workshop and the outcome of discussions and recommendations are set out in the detailed record of the proceedings published in 2003.²⁴⁹ Based upon the recommendations of that workshop, a draft decree and regulations in

²⁴⁹ See Santos, Colaço, and Christiansen (eds), above n 217.

relation to the MPA have been prepared.²⁵⁰ As at 20 June 2003 the draft decree and regulations were being considered by both the Regional Government of the Azores and the National Government of Portugal, and the proclamation of the MPA awaits the outcome of negotiations between these governments.²⁵¹ Assuming the MPA proceeds along the lines of the recommendations, the draft degree and regulations currently proposed, it is anticipated that the MPA will take the following form:²⁵²

Boundaries

Both the Lucky Strike and Menez Gwen MPAs will include the water column, the seabed and the sub-surface of the respective vent fields.²⁵³ Significantly therefore, the MPA will include all components of the vent ecosystem. The inclusion of the water column is significant given the microbial communities that occupy the hydrothermal plume.

Zonation

Some areas will be reserved for observational research only, whilst in others only non-intrusive observation and non-destructive sampling will be allowed.²⁵⁴

Prohibited activities

MSR will be the only activity permitted within the MPA. Other activities such as bioprospecting, mining, and other commercial uses such as geothermal energy

²⁵⁰ The draft documents are *Regulamento do Plano de Ordenamento dos Parques marinhos Lucky Strike e Menez Gwen Proposta Decreto Regulamentar* and *Proposta De Decreto Legislativo Parque Marinho Lucky Strike e Menez Gwen*, copies on file with the author.

²⁵¹ Interview Professor Ricardo Serrão Santos, Director, Department of Oceanography and Fisheries, University of the Azores, 20 June 2003.

²⁵² The following discussion of the proposed marine protected areas is drawn from Santos, Colaço, and Christiansen (eds), above n 217. Unless otherwise acknowledged or where the context suggests otherwise that publication is hereby acknowledged as the source of information in relation to the proposed MPAs.

²⁵³ Santos, Colaço, and Christiansen (eds), above n 217, 21.

²⁵⁴ Ibid.

extraction will be specifically prohibited within the MPA. Outside the MPA, if any of these activities might have an impact within the MPA, they may be prohibited, or at a minimum will only be permitted to proceed after a strict independent environmental impact assessment.²⁵⁵

Regulation of MSR

In addition to restricting MSR to certain zones, it is proposed that MSR be conducted in accordance with the following specific measures:

- all research will require prior approval and proposals for research must be accompanied by an environmental impact assessment;
- all by-catch or non target sample collection must be reported;
- there will be controls over pollution within the MPA such as ballast disposal;
- to avoid possible contamination of areas outside the MPA, disposal of sampling material outside the MPA will be prohibited as will biological transplantation;
- voucher specimens and a reference collection will be required to be deposited with a natural history museum.²⁵⁶

PAPUA NEW GUINEA

The PNG territorial sea is host to several intensively studied hydrothermal vent fields, which may possibly be the first hydrothermal vent mineral deposits in the world to be mined. Hydrothermal vents have been discovered in the Manus Basin (including the Vienna Woods, PACMANUS²⁵⁷, Su Su Knolls Willaumez and

²⁵⁵ Santos, Colaço and Christiansen (eds), above n 217,25-26.

²⁵⁶ Santos, Colaço and Christiansen (eds), above n 217,44-46.

²⁵⁷ The PACMANUS field was named after the first Papua New Guinea-Australia-Canada Manus Basin expedition. See R Binns, 'The nature of the PACMANUS hydrothermal field, Eastern

Conical Seamount fields) and in the Woodlark Basin (including on the Franklin Seamount).²⁵⁸

Although both these areas have been subject to study by scientists for the purposes of this chapter the most important area is the Manus Basin. The Manus Basin is located between New Britain, New Island and Manus Island at the eastern end of the Bismarck Sea, northeast of New Guinea.²⁵⁹ The PACMANUS field in the Manus Basin was discovered in 1991.²⁶⁰ It lies between 1750 and 1650 metres deep along the crest of the Pual Ridge, a 500-700 metre high neovolcanic ridge at the centre of the Eastern Manus Volcanic Zone.²⁶¹ Spread over 13 kilometres along the Pual Ridge, the PACMANUS fields consist of four main sites: *Roman Ruins* and *Satanic Mills*, which are sulphide “black smoker” chimneys venting fluid at 276°C, *Snowcap*, a site of diffuse vents emitting fluids at a low 6 °C, and *Tsukushi*, which has vents up to 30 metres in height.²⁶²

Another very active hydrothermal vent field located in the Manus Basin is the Vienna Woods field. This field is located at a depth of 2500 metres and extends

Manus Basin, Papua New Guinea: The results of a decade of seafloor investigation and the first deep drilling of an active, felsic hosted, submarine hydrothermal system’, in C J Yeats (ed) (2003) *Seabed hydrothermal systems of the Western Pacific: Current research and new directions-Conference Presentation*, Extended abstracts, CSIRO Exploration and Mining Report 113F, (2003) CD-ROM, 21, copy held by author.

²⁵⁸ Binns, above n 257.

²⁵⁹ V S Kamenetsky et al, ‘Parental basaltic melts and fluids in eastern Manus backarc Basin: implications for hydrothermal mineralisation’ (2001) 184 *Earth and Planetary Science Letters* 685, 686.

²⁶⁰ R A Binns and S D Scott, ‘Actively forming Polymetallic Sulphide deposits associated with Felsic Volcanic Rocks in the Eastern Manus Back-arc Basin, Papua New Guinea’, (1993) 88 *Economic Geology* 2226.

²⁶¹ Binns, above n 257, 21-22.

²⁶² Ibid.

for about 1000 metres.²⁶³ It includes various kinds of active and inactive complex massive sulphide chimneys.²⁶⁴ Active chimneys, some as high as 20 metres, are known to vent both milky and black smoke, with a maximum recorded temperature of 276°C.²⁶⁵

A range of fauna associated with hydrothermal vents elsewhere in the world has also been identified at hydrothermal fields in the Manus Basin. These include gastropods, barnacles, vestimentiferans, and sea anemones.²⁶⁶ One of the dominant species is the gastropod or 'black snail' (*Olgaconcha tufari*), while my personal favourite, the 'hairy snail' (*Alviniconcha hessleri*) is also abundant in some areas.²⁶⁷ At some sites there are also areas of dead snail shells at the foot of active chimneys. Surrounding these snail "cemeteries", a range of galatheids, whelks, echinasterid starfish, amphipods, shrimps and other non-vent carnivores and scavengers are often abundant.²⁶⁸ Microfauna, such as bacterial mats, are also to be found at Manus Basin vents.²⁶⁹

Activities and Stakeholders

The main stakeholders in PNG are the scientific community and the mining industry, which for the time being is essentially one company, the PNG registered and Australian based company Nautilus Minerals Corporation Limited and Placer

²⁶³ S V Galkin, 'Megafauna associated with hydrothermal vents in the Manus Back-Arc Basin (Bismarck Sea)' (1997) 142 *Marine Geology* 197, 198-199.

²⁶⁴ Ibid.

²⁶⁵ Ibid.

²⁶⁶ Galkin, above n 263, 198.

²⁶⁷ Galkin, above n 263, 199.

²⁶⁸ Galkin, above n 263, 200.

²⁶⁹ J M Auzende et al, 'Étude géologique et biologique in situ de deux zones hydrothermales du bassin de Manus (Papouasie Nouvelle-Guinée) (In situ geological and biological study of two hydrothermal zones in the Manus Basin (Papua New Guinea))' (1997) 325 *Earth & Planetary Sciences* 585.

Dome Oceania Limited a PNG registered company that is farming in to Nautilus's tenements.²⁷⁰

Several MSR research institutions and universities have carried out research on PNG's hydrothermal vents, including Australia's CSIRO, the French research institution IFREMER and the Japanese research institution JAMSTEC. In addition to ship based research there has also been research carried out by submersibles such as the Russian *Mir* submersibles, and the Japanese submersibles the *Shinkai 6500* and the *Shinkai 2000*. In 2000 the PACMANUS hydrothermal fields were drilled as part of the Ocean Drilling Programme Leg 193.²⁷¹ Geologists especially have been interested in these hydrothermal vents. This is due in part to the fact that these hydrothermal vents are not found at mid oceanic ridges or spreading centres, but at a convergent plate boundary. The PACMANUS hydrothermal field is the most thoroughly investigated active hydrothermal system known at a convergent plate boundary.²⁷²

Apart from the interesting geological setting, the Manus Basin hydrothermal fields are also of great interest because of the high concentrations of valuable minerals such as gold and silver associated with these vents. The PACMANUS vents in particular are unusually high in concentrations of silver and gold.²⁷³

²⁷⁰ Hereinafter Nautilus Minerals.

²⁷¹ Binns, above n 257, 21.

²⁷² Ibid.

²⁷³ S D Scott and R A Binns 'Hydrothermal processes and contrasting styles of mineralization in the western Woodlark and eastern Manus basins of the western Pacific' in L M Parson, C L Walker, and D R Dixon (eds), *Hydrothermal Vents and Processes*, Geological Society Special Publication No. 87, (1995), 199.

While research has focused primarily on the geology of hydrothermal vents within PNG waters, some work on vent microbes and their possible use in biotechnology has also been undertaken. For example, Australia's CSIRO has sampled microbes from the Manus Basin on several occasions as well as from other locations such as Lihir Island and Rabaul. These have subsequently been investigated for their potential in biomining and bioleaching applications.²⁷⁴ Some institutions including the CSIRO have carried out bioprospecting lawfully and with informed consent from the PNG government. However, there are recorded instances of some foreign researchers carrying out bioprospecting without the consent of the Papua New Guinea government.²⁷⁵

The second major stakeholder is Nautilus Minerals, which was originally granted two exploration licences in relation to minerals each in an area of about 2,500 km² in the Manus Basin, including the Vienna Woods and the PACMANUS sites. Of these original two licences, one (EL 1196) has been significantly reduced and the other (EL 1205) over Vienna Woods has lapsed. Recently Nautilus Minerals has been granted a further licence covering the original 2,500sq km area of EL 1196 and has applied for an additional five exploration licences (each approximately 2,500 sq km), two of which relate to areas in the Manus Basin known as Vienna Woods (covering the original lapsed EL 1205) and Willaumez, as well as three in

²⁷⁴ Dr Peter Nichols, Project Leader, Marine Products, CSIRO Marine Research, interview, Hobart, 12 November 2003.

²⁷⁵ Even though the identity of that research institution is not revealed in this thesis, its identity and activities are well known within the scientific community and by the relevant government authorities in PNG and it is unclear if this organization will ever be permitted to carry out research in PNG's waters again.

the Woodlark area of Milne Bay.²⁷⁶ The locations of the PNG licences and licence applications, covering a total of approximately 15,000 sq km, are shown in Figure 8. The legislative and policy framework governing the issue of these licences is discussed in detail below.

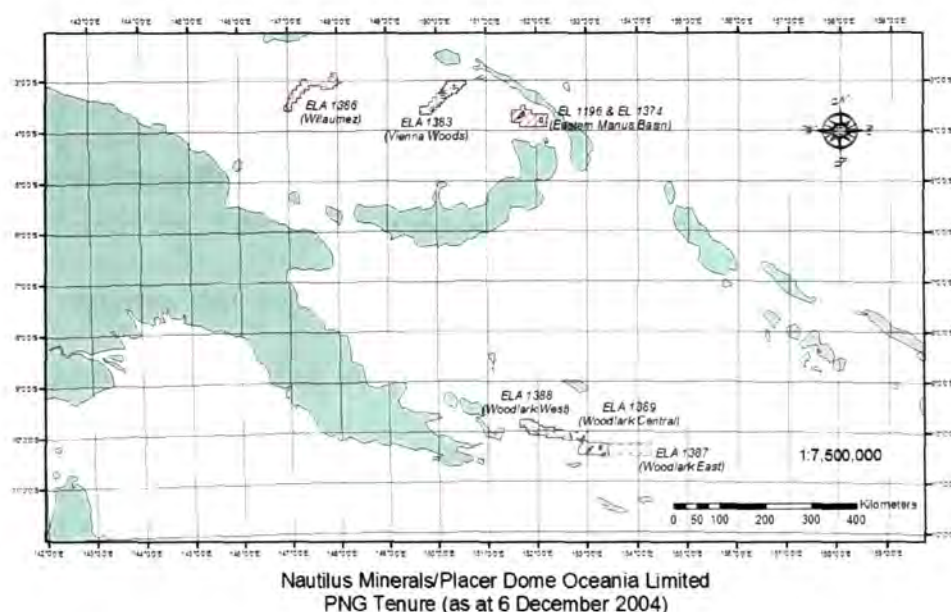


Figure 8 Location of Nautilus exploration licences PNG. Image courtesy of Nautilus Minerals.

It is also worth noting that related companies of Nautilus have made application for exploration licences in Fiji and Tonga's EEZs.²⁷⁷ The areas covered by the applications are 48 square kilometres and 44,000 square kilometres respectively.²⁷⁸ These applications are still pending. The areas covered by these licences are shown in Appendix 4 and 5.

²⁷⁶ Mr David Heydon, Chief Executive Officer, Nautilus Minerals Limited, personal correspondence, copy on file with author.

²⁷⁷ Mr David Heydon, Chief Executive Officer, Nautilus Minerals Limited, interview, 7 May 2003.

²⁷⁸ D Heydon 'Steps for commercialization [sic] of a new World Class copper mine-the "Golden Treasure" beneath the blue waves' in Yeats, C.J. (Ed) (2003) *Seabed hydrothermal systems of the Western Pacific: Current research and new directions-Conference Presentation*. CSIRO Exploration and Mining Report 113F, CD-ROM.

It is also important to recognise that there may be stakeholders with interests beyond those of the two main stakeholders noted above. These might include coastal subsistence, artisanal and commercial fisheries, navigators and the tourist industry.²⁷⁹ The interests of these stakeholders also need to be taken account of in developing any policy or legal regimes that apply to PNG's offshore areas, as they would on land.

PNG's Developing Policy Regimes

PNG is in the process of developing policy regimes and legislation in relation to a number of activities that impact on activities at hydrothermal vents, including offshore mining, bioprospecting and MSR. At the time of writing formulation of these policies is ongoing. But like the emerging regimes in New Zealand, a brief examination of the progress on these issues to date does provide some useful guidance for designing a regime in international waters. A more detailed discussion on this topic was originally intended, however, it was not possible to obtain unconditional permission to disclose confidential material that was provided to the author during his research.

PNG's Mining Act (1992).

Mining activities in PNG are governed by the *Mining Act 1992 (PNG)*. The *Mining Act* extends to the territorial sea, but does not apply in either the EEZ or on the continental shelf.²⁸⁰ The PNG government has recognised that a "policy

²⁷⁹ Papua New Guinea, Department of Mineral Resources, Revised Green Paper on Offshore Mining Policy, copy on file with author.

²⁸⁰ The *Mining Act 1992 (PNG)* applies to all minerals on land. Under section 2(1) of the Mining Act "land" is defined as including "the offshore area being the seabed underlying the territorial sea

and regulatory vacuum” exists with respect to exploration and exploitation of mineral resources offshore,²⁸¹ and PNG is currently in the process of developing an offshore mining policy and appropriate legislation for mining beyond the limits of the territorial sea. The exploration licences granted to Nautilus Minerals, mentioned above, have raised a number of issues that are being considered in the course of development of PNG’s offshore mining policy. Thus before considering that draft policy in detail, it is useful to consider the Nautilus licences and current status of their proposals in detail.

Section 5(1) of the *Mining Act 1992 (PNG)* provides that

“All minerals existing on, in or below the surface of any land in Papua New Guinea, including any minerals contained in any water lying on any land in Papua New Guinea, are the property of the State.”

Pursuant to section 20(1) of the *Mining Act* the Minister for Mineral Resources can grant exploration licences for minerals. Licences can be granted for terms not exceeding two years, which may be extended.²⁸² They grant the licence holder the right inter alia to enter and occupy land which comprises the exploration licence for the purpose of carrying out exploration for minerals on that land, extract and remove samples of rock, earth, soil and minerals and the right to do all other things that might be necessary or expedient for the undertaking of exploration on the land.²⁸³ These activities must be undertaken in accordance with a plan of work

from the mean low water springs level of the sea to such depth as admits of exploration for or mining of minerals”.

²⁸¹ Papua New Guinea, Department of Mineral Resources, Revised Green Paper on Offshore Mining Policy, copy on file with author.

²⁸² *Mining Act 1992 (PNG)* sections 21 and 28.

²⁸³ *Mining Act 1992 (PNG)* section 23.

upon which the licence is conditional. An exploration licence under the Mining Act does not grant any right to mine.

The first of its exploration licences under the *Mining Act* was granted to Nautilus Minerals in 1997.²⁸⁴ Nautilus has over time been carrying out exploration in accordance with the terms of its licence.²⁸⁵ Much of Nautilus's exploration in relation to its tenements has been undertaken in conjunction with MSR conducted by a range of MSR research institutions including Australia's CSIRO, the South Korean research institution KORDI, and JAMSTEC.²⁸⁶ For a number of years the CSIRO provided information in relation to the Manus Basin deposits to Nautilus by way of a formal consultancy agreement, but over time this became much more of an informal arrangement.²⁸⁷ Nautilus is currently conducting its own exploration in conjunction with Placer Dome, with a major geophysics survey being conducted by private contractor Williamson and Associates in January to February 2005.²⁸⁸

A considerable obstacle for Nautilus has been the scepticism within both the mining industry and the finance sector for its plans. Within some elements of the

²⁸⁴ Mr David Heydon, Chief Executive Officer, Nautilus Minerals Limited, interview, 7 May 2003.

²⁸⁵ Recent drilling in Nautilus's tenements in PNG by German scientists and by the British Geological Survey using a limited core rig to 5 metres depth averaged 13g/t Gold, 22% Zinc, 5% Copper, 167g/t Silver. Three deposit types have been recognised by Nautilus with the following indicative grades:

Copper Ore-8.5% Copper, 50 g/t Silver

Mixed Ore- 5% Copper, 12% Zinc, 120 g/t Silver

Zinc Ore-20% Zinc, 200 g/t Silver

Source: Nautilus Minerals Limited Seafloor Massive Sulphide Copper-Zinc Project-Executive Summary, reproduced with consent.

²⁸⁶ Mr David Heydon, Chief Executive Officer, Nautilus Minerals Limited, interview, Sydney, 7 May 2003.

²⁸⁷ Ibid.

²⁸⁸ Mr David Heydon, Chief Executive Officer, Nautilus Minerals Limited, personal correspondence, copy on file with author.

banking and finance community initial reactions to Nautilus's plans were greeted thus

“well, yes we know there are minerals on the sea floor and also that there are minerals on Mars and about the same time as they mine Mars they will mine Nautilus's areas. If it is that obvious then why are no major mining companies also out there”.²⁸⁹

The mining industry was slightly more receptive to the idea of mining deep-sea hydrothermal deposits, and to date their main concerns have centred on the viability of such a project.²⁹⁰

However, since these early days Nautilus has done much to establish its credibility and the feasibility of mining the Manus Basin hydrothermal vent mineral deposits. In December 2004 Nautilus announced that a major international gold mining company, Placer Dome, has entered into an agreement with Nautilus to join its deep-sea exploration program for gold and copper minerals in PNG.²⁹¹

Significantly, Nautilus also recently commissioned leading international engineering group Worley Engineering to conduct an engineering pre-feasibility study. The scope of Worley's study included

- a review of the state of prior art and existing mining technology suitable for mining deep-sea hydrothermal vents;
- options for mining
- technology risks; and

²⁸⁹ Mr David Heydon, Chief Executive Officer, Nautilus Minerals Limited, interview, Sydney, 7 May 2003.

²⁹⁰ Ibid.

²⁹¹ Nautilus Minerals Press Release, 10 December, 2004, copy on file with author.

- likely capital and operating costs of the proposed mining.²⁹²

The Worley study, based on mining 2 million tonnes of ore per annum, required a mining rate of 400 tonnes per hour and a treatment rate of 270 tonnes per hour. Indicative capital costs were US\$308 million, comprising US\$139 million for offshore vessel and mining plant and US\$101 million for onshore treatment plant.²⁹³ The Worley study also suggests that mining from one of three potential ore body types²⁹⁴ would yield an annual production of one of the following:

- Copper Orebody-155,000 tonnes copper in concentrates;
- Zinc Ore body-340,000 tonnes zinc in concentrates;
- Mixed Copper/Zinc Ore-90,000 tonnes copper and 200,000 tonnes zinc in concentrates²⁹⁵.

On the basis of these figures Nautilus estimates that production would be more economic than current porphyry copper mining operations on land in the Andes.²⁹⁶ Nautilus also estimates that 75% of mining operators would produce copper at higher cash operating costs.²⁹⁷

²⁹² Mr David Heydon, Chief Executive Officer, Nautilus Minerals Limited, interview, Sydney, 7 May 2003 and D Heydon, 'Engineering of a Deep Ocean Copper-Zinc Mine' in C J Yeats (ed), above n 279.

²⁹³ *Nautilus Minerals Limited Seafloor Massive Sulphide Copper-Zinc Project-Executive Summary*, Copy on file with author, reproduced with consent.

²⁹⁴ See above n 286.

²⁹⁵ Ibid.

²⁹⁶ Mr David Heydon, Chief Executive Officer, Nautilus Minerals Limited, interview, Sydney, 7 May 2003.

²⁹⁷ Ibid.

The writer is not qualified to assess these figures or to express an opinion on them. But if one can accept these figures at face value as correct, then arguably mining in the Manus Basin is not only feasible, but possibly profitable if exploration succeeds in locating sufficient resources of these deposit types.

Nautilus is also in the process of assembling a consortium of key partners for the proposed mining venture in the Manus Basin. Key partners include Worley Engineering, which will act in the capacity as owners engineer; Perry Slingsby Systems Ltd, the world's largest manufacturer of remote operated vehicles for offshore oil, sub-sea telecommunications and sub-sea trenching;²⁹⁸ Canyon Offshore,²⁹⁹ the largest contract operator in the Gulf of Mexico of deep-sea ROV's for offshore oil exploration and mining; Voest-Alpine Bergtechnik, a tunnelling and coal mining equipment manufacturer;³⁰⁰ Williamson & Associates,³⁰¹ a specialist in deep sea geophysics, and Seacore,³⁰² a major marine drilling company.³⁰³

Finally, Nautilus has also commenced negotiations with potential customers including Sun Metals Corporation, a subsidiary of Korea Zinc, one of the worlds largest zinc producers.³⁰⁴

²⁹⁸ For information on this company see <http://www.perryslingsbysystems.com> accessed 18 January 2005

²⁹⁹ For information on this company see <http://www.Canyonrov.com> accessed 18 January 2005.

³⁰⁰ For information on this company see <http://www.vab.sandvik.com> accessed 18 January 2005.

³⁰¹ For information on this company see <http://www.wassoc.com/> accessed 18 January 2005.

³⁰² For information on this company see <http://www.seacore.com/> accessed 18 January 2005.

³⁰³ Air Niugini, 'Commercial Seabed Mining. Now its Coming to South of Manus Islands' (2003) 1 *Paradise-inflight with air niugini* 59, 61.

³⁰⁴ Nautilus Minerals Limited Seafloor Massive Sulphide Copper-Zinc Project-Executive Summary, reproduced with consent.

While mining of hydrothermal mineral deposits on the high seas is many years away, similar mineral deposits in PNG may be mined in the near future and at a profit.

Exploration Licences and MSR

Section 23(2) of the *Mining Act* provides that

“the holder of an exploration licence is entitled to the exclusive occupancy for exploration purposes of the land in respect of which the exploration licence was granted”.

Accordingly Nautilus’s licence grants exclusive rights to explore the area of the ocean subject to the licence. However, questions have been raised about the impact of these exploration permits on the ability of scientists (and especially geologists) to carry out MSR in the areas subject to the exploration licences. Members of the scientific community have expressed some concerns that this may limit access to such sites for MSR. Given the great scientific interest in the Manus Basin hydrothermal vents scientists are obviously concerned about restrictions that may hamper scientific research. However, although international law recognises the right for scientific research institutions to carry out scientific research in the EEZ, no such right is recognised under international law in the territorial sea. The territorial sea is the sovereign territory of the coastal state. Accordingly, determining who may or may not carry on activities like MSR within the territorial sea is a matter for the sovereign government of PNG to determine in accordance with the domestic law of PNG.

While Nautilus may have the exclusive right to carry out exploration for minerals in the ocean space covered by its licence, there appears to be nothing to prohibit other activities, including MSR not involving exploration for minerals in the area

covered by Nautilus's licence (ie geologists could conduct research and studies on the mineral deposits at the hydrothermal vent fields already located as this is not 'exploration'). Thus assuming all other requirements of PNG law are met, there is nothing under the *Mining Act 1992(PNG)* that would prohibit other activities of MSR research vessels such as bioprospecting. However, the difficulty for MSR research institutions is that usually MSR research cruises involve multi-disciplinary research. Rather than limit research to activities not inconsistent with Nautilus's licence in a particular area, researchers are more likely to target an area where the whole range of scientific research is possible, such as an area perhaps outside PNG's territorial waters.

On the other hand Nautilus point to the fact that their exploration licences specifically permit researchers to continue their full range of MSR.³⁰⁵ Despite the concerns expressed by scientists there appears to be no evidence to suggest Nautilus's operations have had an adverse impact on MSR in PNG.

Development of PNG's offshore mining policy

The PNG government is currently developing an offshore mining policy, which aims to promote exploration for and exploitation of PNG's offshore mineral resources.³⁰⁶ An inter-agency committee³⁰⁷ was established by the PNG

³⁰⁵ Mr David Heydon, Chief Executive Officer, Nautilus Minerals Limited, personal correspondence, copy on file with author.

³⁰⁶ Papua New Guinea, Department of Mineral Resources, Revised Green Paper on Offshore Mining Policy, copy on file with author.

³⁰⁷ The committee includes representatives from relevant government agencies such as the Departments of Prime Minister & National Executive Council, Attorney General, Foreign Affairs, Provincial Affairs, Treasury & Corporate Affairs, Petroleum & Energy, and Transport, as well as Statutory bodies including the National Fisheries Authority, PNG Harbours Board, Office of National Planning & Implementation, Office of the Environment and Conservation, Internal Revenue Commission and the University of Papua New Guinea Law Faculty. See Papua New Guinea, Department of Mineral Resources, Revised Green Paper on Offshore Mining Policy, copy on file with author.

Department of Mineral Resources in March 1998 to recommend a policy framework for consideration and approval by the government. A draft “green paper” was available in February 1999 and was reviewed at an international workshop sponsored by the South Pacific Geosciences Commission and the Metal Mining Agency of Japan. As a result of the deliberations of that workshop, a revised “green paper” was issued by the PNG government.³⁰⁸ To date there have been no further developments.

As noted above, the *Mining Act 1992 (PNG)* does not extend beyond the outer limits of the territorial sea. As such the draft “green paper” foreshadows additional legislation to apply to the EEZ and continental shelf to give effect to the sovereign rights [sic] provided for under LOSC.³⁰⁹ The Offshore Mining Policy and foreshadowed legislation will not only apply to the mineral deposits associated with hydrothermal vents in PNG waters but also to a range of other potential mineral deposits including sand, gravel, diamonds, black sands, manganese nodules and manganese crusts.³¹⁰ While other mineral resources are expected to be dealt with under the policy, the draft “green paper” does refer to polymetallic sulphides associated with hydrothermal vents in some detail. For example, the green paper notes in particular the high grades of minerals associated with the PACMANUS deposits. It also refers to the licences granted to Nautilus as evidence of the growing interest in these mineral deposits.

³⁰⁸ Papua New Guinea, Department of Mineral Resources, Revised Green Paper on Offshore Mining Policy, copy on file with author.

³⁰⁹ Ibid.

³¹⁰ Ibid.

The draft “green paper” also devotes considerable detail to considering the regulation of the environmental impact of offshore mining. Firstly, it clearly acknowledges a lack of detailed information on the impact of mining of hydrothermal vent mineral deposits on their associated biota. Thus the draft “green paper” observes

“Past and recent studies have shown that both the manganese nodules of the deep ocean and the polymetallic massive sulphides of intermediate depth have associated with them a relatively diverse biota which is of primary concern in terms of areas of environmental impact. The environmental impact of manganese nodule mining has been reasonably well evaluated, most recently in the work of the Japanese, whereas, that of possible exploitation of polymetallic sulphide deposits is largely unknown. As such assessing the environmental impact of possible mining on the associated biota of polymetallic massive sulfides remains an area requiring extensive research”.³¹¹

The draft “green paper” also places an emphasis on environmental impact assessment and suggests that

“Because of the unprecedented nature of the deep seabed mining activities contemplated, the State will adopt a precautionary approach in all significant decision-making activities”.³¹²

It is also worth noting that the draft “green paper” considers the impact of an Offshore Mining Policy on MSR and on one interpretation appears to have provisions that have been inserted specifically for the benefit of the offshore minerals industry. This section of the “green paper” firstly discusses LOSC’s regime for MSR in the territorial sea, the EEZ and on the continental shelf. This includes a correct interpretation of the coastal states rights under international law. However, the “green paper’s” interpretation of the coastal State’s rights within its internal waters, archipelagic waters and territorial sea is quite interesting. The “green paper” thus observes

³¹¹ Papua New Guinea, Department of Mineral Resources, Revised Green Paper on Offshore Mining Policy, copy on file with author.

³¹² Ibid.

“Within its internal waters, archipelagic waters and territorial sea, the State has absolute discretion over the conduct of MSR. The State may impose such conditions on MSR as it sees fit, including provisions relating to the disclosure and publication of data.

The country should be mindful of the needs of a tenement holder under the Mining Act or such other legislation that may be developed to regulate offshore mineral exploration and development.

The State will require all information derived from MSR within its sovereignty and maritime jurisdiction be provided by the MSR group. This data or information received after the granting of exploration licence may be made available to the [Exploration Licence] holder upon payment of appropriate fees to the State as owner of such data and information.”³¹³

As a matter of law this is perfectly consistent with PNG’s sovereign rights under international law. A sovereign State is clearly entitled to impose such conditions as it sees fit. However, as a matter of public policy it is indeed a curious provision, which would seem to act as a disincentive to MSR. On the other hand it is a bonus for those mining companies that will gain access to such information. They receive some of the hard scientific data they need to develop the resources for profit and the expense in obtaining that scientific data is born by the scientific research institutions that carry out such research.

Marine Scientific Research Consent Regime

The “green paper” on PNG’s Offshore Mining Policy, although essentially concerned with mining, also notes the potential economic value of hydrothermal vent genetic resources. Thus the green paper observes

“It is recognised that the biodiversity and genetic resources associated with certain areas of marine minerals may have significant economic value. Therefore, means must be sought to ensure that the state receives adequate compensation from any utilisation.”³¹⁴

³¹³ Papua New Guinea, Department of Mineral Resources, Revised Green Paper on Offshore Mining Policy, copy on file with author.

³¹⁴ Papua New Guinea, Department of Mineral Resources, Revised Green Paper on Offshore Mining Policy, copy on file with author.

However, there is currently no legislation in PNG that regulates bioprospecting in PNG's territorial waters and EEZ. PNG is currently developing guidelines for MSR within its waters and is also considering options for legislation to regulate bioprospecting.

LESSONS TO BE LEARNT FROM THE DOMESTIC REGIMES

The four regimes that have been discussed in detail in this chapter each have very different characteristics. It is impossible to nominate one approach as a preferred approach that might be suitable to translate onto the high seas. All the regimes have features that are worthy of further investigation, while all have some feature that could be criticised by one stakeholder or another. The following discussion therefore does not seek to put forward one regime as a preferred model. Rather it seeks to highlight some of the main lessons that can be learnt from the domestic experience so far. Each of these six lessons is relevant to how we may go about designing a legal regime for regulating access to hydrothermal vents on the high seas. These lessons are:

1. The need for any regime to accommodate multiple and at times conflicting uses.
2. The role of scientists as both stakeholders and leaders in the policy development process.
- 3 The need for basic research on the environmental impact of mining (and other activities such as tourism) on hydrothermal vent ecosystems, and the need to develop effective tools for environmental impact assessment.

4. The feasibility of MPAs as a tool for conservation of biodiversity in the deep-sea.
5. The need to avoid using a “sedentary species” type definition in a high seas regime.
6. The need to integrate any access and benefit sharing regime with intellectual property rights.

Each of these lessons is discussed in more detail below.

Accommodating multiple and at times conflicting uses

One of the most obvious lessons that emerge from discussion of the domestic regimes is that there is usually more than one stakeholder whose interests may be affected by regulating access to particular hydrothermal vent sites. At times these uses conflict with one another. The strongest example of this is in PNG, where the emerging regime attempts to protect the legitimate commercial interests of a company that is expending large amounts of capital in developing a resource, and the concerns of scientists who wish to have continued access to an area of immense scientific interest. In the case of PNG there has been a clear policy decision that the policy and legal regime will protect the interests of the mining industry. Of course this is understandable in a country like PNG that is heavily dependant on its natural resources for future economic development. Scientific research is arguably of little immediate economic benefit to PNG.

However, when one contrasts the approach of PNG with that of New Zealand, it may be appropriate to ask whether the PNG regime is too strict in its regulation. Why is it that the New Zealand government allows MSR in the area covered by

Neptune Resources exploration licence? In PNG MSR in Nautilus's licence area is subject to regulation. However, as the New Zealand experience shows, it is possible to accommodate both uses. How that is done is just a question of degree.

The Canadians and the Portuguese have taken a very different approach. Mining is clearly prohibited in the MPAs established by these States, whereas MSR continues largely unaffected.

Scientists as stakeholders and leaders in the policy making process

One of the most striking lessons from all four regimes is that the scientific community is a major, if not the main stakeholder. Although scientific arguments are frequently invoked in discussing the design of many policy and legal regimes, science per se has rarely been considered as a stakeholder in its own right.³¹⁵

However, as experience in domestic waters shows, MSR is the major activity at all hydrothermal vent sites. At most areas on the high seas it is the only activity. Any international regime must therefore permit MSR to continue, and where possible must avoid imposing any unnecessary burdens on research. That is not to say MSR should be unregulated. As already noted in Chapter 1, MSR is one of the most immediate threats to hydrothermal vents that have been identified to date. However, as both the Canadian and Portuguese experience shows, it is feasible to regulate MSR in the deep-sea while avoiding complicated and bureaucratic procedures. It is too early to say to what extent these regimes will be successful,

³¹⁵ H Thiel, 'Science as Stakeholder-a proposal for unique science priority areas' (2003) 12(1) *Ocean Challenge*, reproduced in Gjerde and Breide (eds) above n 215, 164-167.

but experience to date shows that regulation of MSR in the deep-sea is feasible. This issue is covered in detail in Chapter 8.

Experience from the domestic regimes also shows that the scientific community is willing to be engaged in the process of developing regulation of their activities. This engagement by the scientific community should be harnessed to develop a regime for the high seas. After all, the scientific community understands the deep-sea more than any other party to the process of developing appropriate regimes. Significantly, not only has the scientific community shown a willingness to be involved in the development of some of the domestic regimes, in some cases it has taken a leading role in pushing forward the case for regulation, especially in Canada and Portugal. The willingness of leading members of the scientific community to be engaged and often to lead the process of developing regulation should be encouraged.

Deep-sea mining and environmental regulation

One of the most glaring defects in each of the regimes that regulate mining at hydrothermal vents was the lack of any transparent regulation of the environmental impact of deep-sea mining. Although some of the regimes, for example PNG, have recognised the need to develop guidelines and mechanisms for assessing and minimising the potential environmental impact of mining at hydrothermal vents, so far none of the four states discussed above have developed such regulations. As the PNG “green paper” discussed above highlights however, very little is known about the potential environmental impact of deep-sea mining on the biodiversity of hydrothermal vents and in the deep-sea more generally. On the basis of existing scientific knowledge, it is unclear what environmental impact

mining anywhere in the deep-sea will have on biodiversity of hydrothermal vents and the deep-sea more generally.

The writer is not suggesting that there should be no mining of deep-sea mineral resources (including those associated with hydrothermal vents), only that before mining can proceed there needs to be more scientific investigation of its potential environmental impact, and appropriate regulation perhaps through standard tools such as environmental impact assessment. Similar pre-conditions need to be satisfied before mining can commence on the high seas.

The ISA is currently developing regulations for prospecting for hydrothermal mineral deposits on the high seas and these are considered in detail in chapter 9. There is an urgent need for the ISA to develop such regulations as some countries may base their own regulation on those drafted by the ISA. One particularly concerning aspect of the ISA's progress on these regulations is that there has been little other than token consultation with the existing commercial interests such as Nautilus Minerals. Clearly these companies' interests will be affected by whatever regulations the ISA develops even though their operations do not fall under the jurisdiction of the ISA. The lack of adequate consultation with existing commercial interests is a matter of concern.

While not currently of concern, further scientific study might be warranted in relation to the environmental impact of other activities such as tourism.

Marine Protected Areas as tools for biodiversity conservation in the deep-sea

Both Canada and Portugal have shown that MPAs are equally feasible in the deep-sea as they are in shallow waters. Both countries' experience shows that it is possible to design a management regime to accommodate a range of activities and stakeholders' interests at hydrothermal vents. This is hardly surprising as experience with MPAs around the world does show that MPAs can accommodate the interests of a wide range of stakeholders, while at the same time providing for protection of the marine environment and the sustainable use of marine resources.

There is currently no legal basis for the establishment of MPAs on the high seas. However, as discussed in Chapter 3, existing regional institutions and mechanisms under the Antarctic treaty system, and, as will be outlined in Chapter 9, some parts of Part XI of LOSC, might be able to be utilised to create MPAs for hydrothermal vents on the high seas. Future development of international law to create such mechanisms should be encouraged.

The sedentary species definition and the high seas

Chapter 2 highlighted the legal difficulties associated with the sedentary species definition under LOSC as applied to the continental shelf. Discussion of the existing regime in New Zealand in this chapter highlighted one specific example where this theoretical problem exists in actuality. The New Zealand example highlights how the sedentary species definition hinders coastal State regulation of activities at hydrothermal vents on its continental shelf.

This re-inforces the concerns raised about the 2003 SBSSTA report discussed in chapter 2 about the need to avoid any attempt to incorporate any distinction

between species attached to the seabed and those in the surrounding waters in any future regime.

Intellectual Property Rights and the domestic regimes

The last lesson that can be learned from the domestic regime is the importance of the link between access to genetic resources at hydrothermal vents and intellectual property rights such as patents. Increasingly the race to the bottom of the deep-sea for new developments in biotechnology is also becoming a race to be the first to the patent office. Currently rights to use and market biotechnology developed from hydrothermal vents species are determined solely by who is first to obtain rights under laws dealing with intellectual property such as patents and trademarks.

In Portugal it is proposed that bioprospecting will be prohibited within the Lucky Strike and Menez Gwen MPA. However, it is unclear how the proposed MPA will deal with the sharing of samples collected by researchers as part of MSR and subsequently transferred or sold to biotechnology companies. Given that bioprospecting is prohibited, will MSR research institutions violate the terms of their approval to conduct MSR by sharing samples with biotechnology companies? What if research conducted by MSR research institutions results in new developments in biotechnology, which are eventually commercialised in conjunction with biotechnology companies? Will such entities be liable to share profits gained with Portugal? These questions cannot be addressed at this stage.

New Zealand appears to have recognised that this an issue that requires consideration, although concrete measures have not yet been contemplated. With

this limited exception, none of the domestic regimes have made the connection between the economic incentive for bioprospecting and MSR at hydrothermal vents and intellectual property rights.

This issue needs to be addressed as part of any comprehensive legal regime that applies to the genetic resources of the deep-sea on the high seas or within the territorial sea and EEZ of coastal States. This issue is considered in detail Chapter 7.