An Analysis of the International Legal Framework for the Protection of Coral Reefs

LLM Masters Coursework and Minor Dissertation

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DECLARATION

Research dissertation presented for the approval of senate in fulfilment of part of the requirements for the degree of master of laws in approved courses and minor dissertation. The other part of the requirements for this qualification was the completion of a programme of courses.

I hereby declare that I have read and understood the regulations governing the submission of master of laws dissertations, including those relating to length and plagiarism, as contained in the rules of the university, and that this dissertation conforms to those regulations.

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ABSTRACT

The biodiversity of the world's coral reefs is of great value and benefit to the international community. This valuable resource is being degraded by many threats that have increased over the past few years as coastal development, fishing practices and recreational uses have increased. The loss of coral reefs is well publicised but there seems to be a gap in the protection of coral reefs in international law. While some Conventions have the potential to protect the reefs, State practice has illustrated a reluctance to do so. In addition, legal instruments aiming to reduce threats to the ocean environment are having limited success at coral reef protection in part due to their fragmented approach. The myriad of threats are dealt with by a myriad of Conventions. The most relevant of these will be the subject of discussion and will be followed by an analysis of the international community's success in protecting and conserving coral reefs through a strong legal framework.

ABBREVIATIONS

APM – Additional Protective Measures

CBD - United Nations Convention on Biological Diversity

CITES – Convention on International Trade in Endangered Species of Wild Fauna and Flora 1973

COP – Conference of the Parties

CTI – Coral Triangle Initiative

EEZ- Exclusive Economic Zone

EIA – Environmental Impact Assessment

FAO – Food and Agriculture Organisation

GEF – Global Environmental Fund

GPA – Global Plan of Action for the Protection of the Marine Environment from Land Based Activities

ICRI – International Coral Reef Initiative

ICZM – Integrated Coastal Zone Management

IGR – Intergovernmental Review (of the GPA)

IMO - International Maritime Organisation

IUCN – International Union for the Conservation of Nature

LBS – Land Based Sources of Pollution

MAB – Man and Biosphere Programme

MARPOL 73/78- International Convention for the Prevention of Pollution from ships of 1973 as modified by the Protocol of 1978

MOU – Memorandum of Understanding

MPA – Marine Protected Areas

NGO- Non Governmental Organisations

PADH – Physical Alteration and Destruction of Habitats

POP – Persistent Organic Pollutant

PSSA – Particularly Sensitive Sea Area

SBSTTA – Subsidiary Body on Scientific, Technical and Technological Advice

UN - United Nations

UNCED- United Nations Conference on Environment and Development 1992

UNCHE – United Nations Conference on the Human Environment 1972

UNEP- United Nations Environment Programme

UNESCO – United Nations Educational, Scientific and Cultural Organisation

UNCLOS - United Nations Convention on the Law of the Sea 1982

UNDESD – United Nations Decade for Education for Sustainable Development

UNDP – United Nations Development Programme

UNFCCC – United Nations Framework Convention on Climate Change 1992

WHC – Convention for the Protection of World Cultural and Natural Heritage 1972 (The World Heritage Convention)

WNBR – World Network on Biosphere Reserves

WSSD – World Summit on Sustainable Development 2002

WOC – World Ocean Conference

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Chapter 1

Introduction

The biodiversity found on a coral reef is above and beyond that found in the tropical rainforests,[1] with an estimated 25 percent of all marine species concentrated in an area that only covers 1 percent of the ocean floor.[2] This huge wealth of biodiversity is founded upon a structure made entirely of animals. The coral polyps that provide the limestone structure of the reef date back around 200 million years[3] and they in that time, although their growth is slow, have produced huge areas of various types of reef. These include atolls, fringing reefs and barrier reefs,[4] the most famous being that of the Great Barrier Reef in Australia which covers around 350,000 square kilometres.[5]

The Benefits of Coral Reefs

Coral reefs as an ecosystem are extremely valuable to the local population, not just for livelihoods but for sustenance with small scale fishermen utilising the stocks. Income from the coral reefs sustains many small States and their coastal communities[6] but it also provides welfare at a regional and global level.[7] Replenishment of commercial fishing stocks occurs within coral reefs which serve as spawning areas. These habitats are also nursery areas which are intertwined with mangroves and sea grass ecosystems. These three coastal environments have a symbiotic relationship for while coral reefs protect the mangroves and therefore the coast from wave action and erosion, the mangroves bind sediment and ensure clear

[1] A Kiss and D Shelton *International Law and the Environment* 3rd Edition (2004) ch11 p655.
[2] UNEP and WWF Coral Reefs Advocacy Initiative: *Conventions and Coral Reefs* May 2003. www.unep.org.
[3] There are many types of coral but the primary 'reef-builders' gain food from algae called zooxanthellae which produce energy from photosynthesis, which requires sunshine and is therefore why tropical reefs are found in shallow waters. The corals use the waste product of carbon dioxide to produce energy.
[4] Fringing reefs occur along the coast, atolls are rings of reef surrounding an island or lagoon and barrier reefs occur off the coast separated by a deep area of water.
[5] M Tupper et al 'ReefBase: A Global Information System on Coral Reefs [online] http://www.reefbase.org/global_database/default.aspx?section=m2.
[6] Around 30 million people are totally dependent upon coral reefs for their survival. C Wilkinson et al 'Status of Coral Reefs of the World 2008, Report of the Global Coral Reef Monitoring Network. www.gcrmn.org.
[7] T Arin RA Kramer 'Divers Willingness to Pay to Visit Marine Sanctuaries: An Exploratory Study' (2002) 45 *Ocean and Coastal Management* 171 p171.

water with which corals can grow. Income from the fishing industry is supplemented from the tourism industry with recreational sports such as scuba diving bringing in investment, development and recognition of aesthetically beautiful locations. Furthermore, research has shown that certain corals or derivatives thereof are viable genetic resources and are used increasingly in the pharmaceutical industry.[8]

The Threats to Coral Reefs

The increase in anthropogenic factors due to the above benefits has seen damage and destruction of a large number or reefs, particularly in the developing world. 19 percent of the world's reefs have been 'lost' since 1950 with a further 30 percent seriously threatened.[9] Those that are healthy may be at risk due to unforeseen and unpredictable threats such as climate change. Climate change is a major concern for the coral reefs because of rising sea levels and temperatures leading to bleaching and acidification. Climate change however, will compound several other threats such as overexploitation of the fish stocks and overcapacity of the fishing industry which uses larger gear with destructive consequences. While tourism is a viable sustainable option, mismanagement could lead to damage through boat traffic and overuse especially in the diving industry. Tourists wish to use naturally protected reefs, often designated as a marine protected area (MPA) but management of these MPAs can be detrimental due to mismanagement, poor enforcement, corruption and fragmentation. More tourism requires more development at the coast and this has huge ramifications on coastal environments through runoff and sedimentation. Extra resources are needed to feed the tourists and an influx of buildings will bring an increase in pollution. Pollution occurs also through the large shipping industry that utilises deep harbours along the coast. Operational discharges from ships and biological pollution can occur with alien species on the hulls and transported in ballast tanks. Lastly, the souvenir industry that follows from tourism has seen a rise in the use of coral and shells as curios and

[8] For example, chemicals found in some corals are used in HIV treatments. http://coralreef.noaa.gov/aboutcorals/values/medicine/.
[9] Op cit note6.

jewellery which are traded internationally along with live organisms for the aquaria trade and Asian food market.

The Legal Background

Recognition of the habitat and ecosystem approach has evolved from the Stockholm Conference[10] throughout the twentieth century. [11]The most influential report during this time was the Brundtland Report[12] which noted that preservation of the habitats could not be separated from the preservation of the species and that this protection of the ecosystem would be a huge step forward toward sustainable development.[13] Linkages between related ecosystems such as mangroves and coral reefs were extended in the Brundtland Report which although not specifically talking of coral reefs, understood the relevance of such an ecosystem approach in regard to policies of protection. The Expert Group on Environmental Law which was formed as part of the Report drafted legal principles that would help to develop international environmental law. [14] Principle 3 noted that:

> States shall:
> a)Maintain ecosystems and related ecological processes essential for the functioning of the biosphere in all its diversity, in particular those important for food production, health and other aspects of human survival and sustainable development;
> b)Maintain maximum biological diversity by ensuring the survival and promoting the conservation in their natural habitat of all species of flora and fauna, in particular those which are rare, endemic or endangered.

[10] The United Nations Conference for Human and the Environment (UNCHE) 1972 held in Stockholm. The Stockholm Declaration recognised that many problems faced the world's resources and that these must be reduced for the benefit of all generations in order to protect the natural heritage. Principle 3.

[11] For example at The World Conservation Strategy 1980 http://data.iucn.org/dbtw-wpd/edocs/WCS-004.pdf and the World Charter for Nature http://www.un.org/documents/ga/res/37/a37r007.htm in which Principle I(3) states that 'all areas of the earth both land and sea shall be subject to these principles' and that special protection shall be given to unique areas and to habitats of rare species.

[12] The World Commission on the Environment and Development (WCED) *Our Common Future* 1987 also known as the Brundtland Report. http://www.un-documents.net/wced-ocf.htm.

[13]Chapter 6: 'Species and Ecosystems: Resources for Development. http://www.un-documents.net/ocf-06.htm.

[14] 'Our Common Future, Annexe 1: Summary of Proposed Legal Principles for Environmental Protection and Sustainable Development Adopted by the WCED Experts Group on Environmental Law' http://www.un-documents.net/ocf-a1.htm.

These instruments therefore recognised the importance of an ecosystem approach and one that protected the diversity of all resources. They leant weight to any actions by the international community but they were not legal instruments and they did not establish any obligations. The Rio Conference[15] was the exception as it was soft law and perhaps the most influential instrument regarding the protection of biodiversity.[16]

The Legal Framework

The movement therefore towards ecosystem protection has been welcomed and coral reefs should be a main component of any such agreement. However, despite the threats to the reefs and the potential benefits that could be utilised, no formal legal instrument has been forthcoming. A number of Conventions partially or wholly conserve, or attempt to conserve coral reefs but there does not seem to be a strong legal framework that solely protects the coral reefs which are so important for the health of the planet. A plethora of treaties will be discussed in this paper and analysed to see whether they protect coral reefs or whether they have the ability to do so. In addition, those that do protect coral reefs will be examined to see whether they are successful.

[15] The United Nations Conference for the Environment and Development (UNCED) 1992 held in Rio de Janeiro. Hereafter called the Rio Conference.

[16] Principles 1, 4 and 15. Principles 2, 6 and 7 deal with common but differentiated responsibility which is relevant for the ability for states to exploit their own resources but with an understanding that developing countries would need help to do so.

Analysis of the Legal Framework

Chapter 2 will discuss the two overarching treaties that deal with the ocean environment and the protection of the world's biodiversity and whether these Conventions have made significant progress towards coral reef protection: these are the United Nations Convention for the Law of the Sea[17] and the Convention on Biological Diversity.[18]

Chapter 3 deals with three international agreements publicised as being the most relevant for protecting coral reefs. Mention will be made of The World Heritage Convention[19] the Ramsar Convention[20] and the Man and Biosphere Programme. Although their original aim was to protect a specific area of biodiversity, their expansion into preserving coral reefs will be analysed.

Chapter 4 will look at those Conventions that deal with specific threats to the marine environment. These are fishing, trade, pollution and climate change.

Finally a conclusion will be drawn as to whether the mentioned Conventions do protect the reefs or whether more should be done, in particular a legal instrument solely for the preservation of the world's coral reefs.

[17] 1982 in force 1994.
[18] 1992 in force 1993 www.cbd.int/history/.
[19] Convention for the Protection of the World Cultural and Natural Heritage 1972 in force 1975.
[20] Convention on Wetlands of International Importance for Wildfowl Habitat 1971 in force 1975.

Chapter 2

The Overarching Legal Instruments

The ecosystem approach towards nature conservation has become the most valuable move forward in international law. The two most important Conventions in this regard are the United Nations Convention on the Law of the Sea [21] and the Convention on Biological Diversity. [22] How these two Conventions protect the coral reefs will be discussed although it must be kept in mind from the outset that there are differing outlooks on how to describe the reefs: whether they are merely a habitat for fish stocks, an ecosystem within the ocean ecosystem or a living resource in themselves.

The United Nations Convention for the Law of the Sea

UNCLOS was the first major binding treaty that dealt with all problems related to the sea. Part XII begins with Article 192 which states that:

> States have the obligation to protect and preserve the marine environment.

The importance of habitats and environment is referred to in Article 194(5):

> The measures taken in accordance with this part shall include those necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life.

These clauses are of a general nature for the international or regional community to apply as they wish. The mention of habitats and ecosystems is merely as an addition for the preceding obligations that deal with prevention of pollution and protection of a species, not for the protection of the ecosystem itself; however, it

[21] Op cit note17 hereafter called UNCLOS.
[22] Op cit note18 hereafter called the CBD.

is at least partial recognition.[23] While UNCLOS is clear on its need for marine protection it is an overarching, umbrella treaty:[24] a framework whose provisions promote further laws and regulations to be drafted in specific terms. In this respect, although it is widely ratified,[25] UNCLOS on its own is inadequate to provide protection for the coral reef ecosystems under Article 194(5).

The resources of the oceans are mentioned in Article 61 'Conservation of the living resources' but it refers exclusively to the fish stocks and their management and sustainable utilisation elaborated in Article 62. What these articles also note is that the coastal State has exclusive jurisdiction on the measures they wish to impose for such conservation.[26] The establishment of the Exclusive Economic Zone (EEZ) by UNLCOS of 200 nautical miles[27] has meant that most marine resources fall within the coastal State's jurisdiction giving them sovereign rights to explore and exploit, conserve and manage the natural resources as well as a duty to ensure these resources are not over-exploited. Coastal States therefore have complex guidelines that ensure an ecosystem approach to resource preservation although, again, the ultimate decisions rest with the particular State. Although the EEZ was part of customary international law before it was crystallised by UNCLOS, these Articles have effectively divided the ocean up into zones which is detrimental to any attempt at a full ecosystem approach.[28] Although not exactly an issue for coral reefs which are more often than not found in the territorial sea[29] and the EEZ, the zones of the ocean have led to an arbitrary dividing up of the ocean as well as jurisdictional differences between States, with only general guidelines ensuring limited uniformity.

[23] PW Birnie and AE Boyle *International Environmental Law* 4th Edition (2008) p715.
[24] T Mensah 'The International Legal Regime for the Protection and Preservation of the Marine Environment from Land Based Sources of Pollution' in A Boyle and D Freestone (eds) *International Law and Sustainable Development: Past Achievements and Future Challenges* (1999) 271 p299.
[25] As of October 2009 there were 159 State parties to UNCLOS.
[26] Article 61(1) reiterated in Article 193 in which 'States have the sovereign right to exploit their natural resources pursuant to their environmental policies and in accordance with their duty to protect and preserve the marine environment.
[27] Part V of UNCLOS Article 55-57.
[28] D Freestone 'The Conservation of Marine Ecosystems under International Law' in C Redgwell and M Bowman (eds) *International Law and the Conservation of Biological Diversity* (1996) p94.
[29] Part II of UNCLOS. The territorial sea is up to 12 nautical miles from the baseline. Sometimes coral reefs may also be found in internal waters especially where bays are formed – see Part II Section 2 Article 8 of UNCLOS.

This is in addition to no real attempt at enforcement because of States sensitivity over sovereignty.[30]

This division of the ocean has meant huge discrepancies between how States manage their own natural resources. Although it notes in UNCLOS that cooperation is required with any relevant international agreement regarding natural resources,[31] the lack of such an agreement for coral reefs has meant that these discrepancies continue. The lack of agreement is partly due to the sovereignty issue; States do not wish to be told how to use and manage their own resources and coral reefs are a particular example. There is evidence to suggest however, that coral reefs move in their larval stage and migrate over large distances to replenish reefs elsewhere.[32] This would indicate a transboundary issue requiring international cooperation. The common heritage of mankind concept would also lend itself to international cooperation regardless of where that resource is found.

UNCLOS was drafted after the concept of the Regional Seas Conventions had been drafted by the United Nations Environmental Programme[33] and there is recognition within UNCLOS that these are an effective means to protecting the marine environment.[34] States discretion is once again important but agreements between States in a particular area have led to concerted conservation. Their original purpose was for fishing stocks but there has been a move by several of these agreements to provide ecosystem approach conservation for the fish habitats including coral reefs pursuant to Article 194(5) of UNCLOS and Article 61.[35] The

[30] Op cit note23 p718.
[31] Articles 61(2) and 61(3) which mention international organisations and international minimum standards.
[32] Op cit note1 p657.
[33] Hereafter called UNEP. The Regional Seas Programme began in 1974 and has so far ten Conventions as well as two further independent Conventions. Further action plans exist and although these are governed by UNEP, they are not of a legally binding nature. http://www.unep.org/regionalseas/about/default.asp.
[34] The provisions of Article 61 mention that cooperation between States is vital 'whether at international, sub-regional or regional' level.
[35] Article 10 of the Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region 1985 (the Nairobi Convention) notes the importance of protection of ecosystems and biodiversity and is written in mandatory language. This is complemented by a protocol providing all member States with further recommendations and measures that must be implemented. The Convention for the Protection of the Marine Environment

Regional Seas Conventions are tailored for the specific threats and impacts felt within that area. However, there are many variations between each Convention; not only in how they are written but also between the obligations they ensure[36] and the effectiveness of the States involved.[37] This lack of uniformity and cohesiveness is of great detriment to the world's coral reefs.[38]

During the Rio Conference there was an admission by the international community that over-exploitation and degradation of the marine environment had not been curbed by UNCLOS[39] and that the conservation measures set down in UNCLOS were severely inadequate. Chapter 17 of Agenda 21[40] aimed to set down more concrete objectives, goals and obligations to protect the marine environment.[41] More specifically, Agenda 21 recognised the need for a full holistic ecosystem approach[42] that would improve upon the basis formed in UNCLOS[43] through the concept of integrated coastal and marine management.[44] This integrated approach would be strengthened by international, regional and national cooperation and coordination[45] but which would not infringe upon coastal State sovereignty.[46]

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of the North-East Atlantic 1992 (the OSPAR Convention) added Annex V in 1998 which fully endorses the ecosystem approach and ensures a network of marine protected areas is designed by all member States.

[36] For example, Article 11 of the Convention for Cooperation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region 1981 (the Abidjan Convention) is a much weaker provision on ecosystem protection than the Nairobi Convention.

[37] Op cit note23 p460-461.

[38] The East Asian Seas and South East Asian Seas are so far just Action Plans with no Convention text formulated.

[39] P Sands *Principles of International Environmental Law* 2nd Edition (2003) p573.

[40] Agenda 21 was a series of action plans and recommendations for each State to follow for the protection of the environment.
http://www.un.org/esa/sustdev/documents/agenda21/english/Agenda21.pdf.

[41] Chapter 17 of Agenda 21 is titled 'Protection of the Oceans, All Kind of Seas, Including Enclosed and Semi-Enclosed Seas, and Coastal Areas and the Protection, Rational Use and Development of their Living Resources.'

[42] Chapter 17.1 states that 'the marine environment...forms an integrated whole that is an essential component of the global life-support system...'

[43] Ibid Chapter 17.1.

[44] Chapter 17.5.

[45] Chapter 17.9-17.10.

[46] Although not expressly mentioned, the use in each Chapter of 'Coastal State should...' and 'shall commit themselves' reflects the understanding that the zones set down in UNCLOS must be respected and that it is State obligation to enforce any relevant international agreement. See A Yankov 'The Law of the Sea Convention and Agenda 21: Marine Environmental Implications' in A Boyle and D Freestone (eds) *International Law and Sustainable development: Past Achievements and Future Challenges* (1999) 271 p275.

What Agenda 21 also recognised was that 'problems extend beyond fisheries.'[47] Although the stocks are important, the sustainable use and conservation of the marine environment encompasses all resources:

> Coral reefs and other marine and coastal habitats, such as mangroves and estuaries, are among the most highly diverse, integrated and productive of the Earth's ecosystems...in many parts of the world, such marine and coastal systems are under stress or are threatened from a variety of sources, both human and natural.[48]

To this end, Agenda 21 set down objectives and commitments for all States to preserve rare or fragile ecosystems as well as habitats and other ecologically sensitive areas[49] by limiting use on these areas or designating protected areas.[50] This should be achieved through science and research, coordination, cooperation with international organisations as well as education and capacity building along with financial assistance.[51]

Action therefore to protect coral reefs was strengthened greatly by Agenda 21 which set down a thorough action plan for their preservation. There is no doubt that Agenda 21, although a soft law document was an important and well observed document that has become the baseline for all consequent agreements, especially regarding the marine environment. From Agenda 21 evolved organisations which were specifically created for reef protection[52] illustrating the influence Agenda 21 had on the mindset of the international community regarding coral reefs.[53] Although

[47] Chapter 17.72.
[48] Ibid.
[49] Chapter 17.74. Chapter 17.75 mentions also that coastal States can be stricter than these objectives allow but also notes that States will differ in their capabilities. (Chapter 17.76).
[50] Chapter 17.85.
[51] Chapter 17.86-17.95 Strengthening of international coordination is of huge importance. Chapter 17.115.
[52] The International Coral Reef Initiative (ICRI) is a collection of organisations and governments which aim to implement Chapter 17 of Agenda 21. Coral reefs are to be preserved through cooperation, research and information exchange between all countries. To achieve this, action plans and recommendations for each region of the world are drafted and are implemented with the help of the World Bank, the Commission on Sustainable Development and the United Nations Environmental Scientific and Cultural Organisation (UNESCO) amongst others. www.icriforum.org.
[53] The United Nations Agreement for the Implementation of the Provisions of the United Nations Convention of the Law of the Sea of 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks 1995 in force 2001 (The Straddling Stocks

complete implementation of such plans and obligations formed by Agenda 21 is yet to be fully realised,[54] the addition of a further Convention drafted at Rio, was aimed at helping in this challenge.

The Convention on Biological Diversity

As well as Agenda 21, the Rio Conference also saw the drafting of the Convention on Biological Diversity (the CBD).[55] This treaty like UNCLOS is an overarching umbrella treaty that envisages further instruments on specific areas; and like UNCLOS contains general provisions.[56]

Article 2 defines biological diversity as:

> The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part...within species, between species and of ecosystems.[57]

Throughout the Convention there is no specific type of ecosystem mentioned. Although this means that every type of ecosystem is covered,[58] it has also been observed that the only area in the Convention that talks of the marine environment is this definition, and that the provisions of the Convention are not drafted with the marine environment in mind.[59] It does however reiterate that the world's biodiversity and its protection are the common concern of all mankind with its intrinsic value cited as one reason for protection.[60] There is also an understanding, as

Agreement) manage fish stocks but addresses issues posed in Agenda 21 such as sustainable utilisation of the stocks through ecosystem management measures, inter-species management measures and biodiversity protection in the marine environment. Article 5(d)(e) and (g).

[54] A Yankov note46 p275.

[55] Op cit note18.

[56] Op cit note23 p617. Words such as 'endeavour' 'encourage' and 'as far as possible' mean there is no real mandatory obligation on States.

[57] Article 2 of the CBD.

[58] MM Goote 'The Jakarta Mandate on Marine and Coastal Biological Diversity' (1997)12 *International Journal of Marine and Coastal Law* 189.

[59] D Freestone note28 p92.

[60] Ibid.

with most international treaties that the sovereignty of a State is recognised and respected.[61]

The three objectives of the CBD are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources.[62] To achieve these objectives, the CBD sets out substantive requirements, which include *in situ* and *ex situ* conservation.[63] For coral reefs, *in situ* conservation is most appropriate and this is to be achieved by designating protected areas under Article 8. A list of measures under Article 8 would ensure protection for each component of the ecosystem by ensuring sustainable use and sustainable development with management plans and particular measures needed for the more endangered species.[64] These provisions have been accused of being terrestrially biased leading to poor coherence when applied to the marine environment[65] which is reflected in the environmental impact assessments (EIAs) provision.[66] Although this is a welcome addition to any conservation scheme and a positive move towards careful development, without scientific data and research such EIAs would be inadequate, especially for such an unknown realm as the marine environment.

The Conference of the Parties (COP) recognised that the Convention failed to deal with marine biodiversity sufficiently and so the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA)[67] at the second COP drafted the Jakarta Mandate.[68] This was a series of recommendations that followed on from the ecosystem approach of Chapter 17 of Agenda 21 which recognised that marine and coastal biodiversity was an important area that had been neglected so far by the

[61] Article 3 of the CBD.
[62] Article 1 of the CBD.
[63] In situ conservation is defined in Article 2 as 'the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings...' ex situ conservation is defined as 'the conservation of components of biological diversity outside their natural habitats.'
[64] Op cit note23 p623.
[65] D Freestone note28 p92-93.
[66] Article 14.
[67] Under Article 25 of the CBD.
[68] http://www.cbd.int/marine/pow.shtml.

Convention.[69] Integrated management was one of the five themes throughout the Jakarta Mandate[70] as well as the concept of marine protected areas. The Mandate recognised that too much emphasis was being placed on fishing[71] and that integrated marine biodiversity included many other types of living resources including corals and mangroves that were also threatened by over-exploitation and had thus far been neglected.[72] A three year work programme was set up by the SBSTTA for specific issues including coral bleaching and support for small island States.[73]

There was recognition also that the Jakarta Mandate would not succeed unless there was full cooperation and coordination with other international treaties, like UNCLOS that aimed to protect the marine environment. Article 22 of the CBD notes the importance of and respect for UNCLOS but also notes that if there are any threats to the biodiversity of the sea, then the provisions of UNCLOS could be overridden by the CBD.[74] Furthermore, joint agreements between Ramsar[75] and the World Heritage Convention[76] as well as the Man and Biosphere Programme were essential for full coordination of marine and coastal biodiversity protection.[77]

Under the Jakarta Mandate, protected areas for the marine environment were created (MPAs). These protected areas had been successful on land, and the hope was that they would do the same for the marine ecosystems and habitats. Constant discussions at each COP elaborated the programme of work[78] that would help research and scientifically understand how and where to place these protected areas for the best results. Further research and information led to the elaborated

[69] MM Goote note58 p382.
[70] The other themes were sustainable use of the resources, mariculture and alien species. Paragraph 9 of the Jakarta Mandate.
[71] MM Goote note58 p389.
[72] Op cit note23 p587.
[73] Decision IV/5 http://www.cbd.int/decision/cop/?id=7128.
[74] From the outset however, the CBD was drafted with UNCLOS in mind ensuring that freedom of navigation, innocent passage and other traditional customs were not affected; an important aspect to be kept in mind especially in reference to marine protected areas.
[75] Op cit note20.
[76] Op cit note19.
[77] MM Goote note58 p387.
[78] The programme of work was created by the SBSTTA as part of the Jakarta Mandate www.cbd.int/marine/pow.shtml it was extended through Decision VI/3 at COP 6 in 2002 by a further 6 years because the SBSTTA reported that full implementation had yet to be realised. http://www.cbd.int/decision/cop/?id=7177.

programme of work under COP 7 in 2004[79] which aimed to assist in the implementation of the Jakarta Mandate; in particular marine protected areas and integrated marine and coastal management. This was elaborated in 2008 at the last COP where specific criteria and guidance to help the designation and management of marine protected areas were set down.[80] Marine and coastal biodiversity and protection are therefore receiving a great deal of attention at each COP for the CBD.[81] The many discussions held under the COP regarding marine and coastal biodiversity is somewhat proof that as yet no substantive improvement has been seen and that degradation is still continuing[82]

Do UNCLOS and the CBD protect coral reefs?

Both UNCLOS and the CBD are powerful instruments but they are still only umbrella treaties which envisage further agreements and rules in particular areas. The Jakarta Mandate showed a concern for the marine and coastal biodiversity which covers coral reefs in its entirety but the mandate still showed a bias toward fisheries which many believed should be altered.[83] The ecosystem approach is the most important way forward and yet this will never be fully realised while the zoned approach of UNCLOS is in place. Jurisdictional differences between States have seen priority given to sovereignty which has led to compromises in both of these Conventions with implementation still way behind. On their own therefore, these two Conventions do not substantively improve the conservation of the coral reefs. They merely discuss what needs to be done and then delegates to other instruments that are more appropriate.

What the continual discussion of marine and coastal biodiversity has accomplished however is a large amount of publicity for the habitats of the ocean. This is usually in favour of protecting the economic interests of the fishing industry but the importance of the smaller animals found in coral reefs as well as the coral

[79] Decision VII/5 www.cbd.int/marine/resources.shtml.
[80] Decision IX/20 http://www.cbd.int/decision/cop/?id=11663.
[81] At COP 10 which is to be held in October 2010 in Japan the main issue already listed for 'in depth' discussion is marine and coastal biodiversity.
[82] Op cit note23 p751.
[83] MM Goote note58 p389.

reefs themselves have been given much more attention. This of course is a great step forward. The marine habitats have become an important aspect in the UNEP Regional Seas Programmes and are developing into a large area of recommended work. The Global Strategy[84] attempts to ensure full coordination with the CBD and with the 2002 World Summit on Sustainable Development (WSSD) which has understood the importance of marine biodiversity protection, in particular the coral reefs. The WSSD Plan of Implementation contained measures directed at the protection of coral reefs. [85] Cooperation and further work in marine research through several organisations[86] were important in addition to thorough implementation of the Jakarta Mandate and the CBD[87] as well as full understanding of the impacts on the coral reefs of fishing, through the methods, illegal fishing and the sustainable utilisation of stocks.[88]

Furthermore, governmental and non-governmental organisations have increased to provide research and education on the marine environment,[89] some of which are concentrated on coral reef research. These organisations illustrate the growing partnerships forged between Conventions and the different international forums. The ICRI[90] is an important spokesperson for the coral reefs within legal policies at the international and regional level in addition to its networks that facilitate coordination, information exchange and community involvement.[91] Separate arms of the United Nations have been established including the United

[84] The UNEP Global Strategy (2008-2012) contains 9 directions aimed at strengthening the Regional Seas Conventions. They include the need for further cooperation (Direction 3), integrated management using the ecosystem approach (Direction 4) and support the Plan of Implementation by the WSSD (Direction 7).
http://www.unep.org/regionalseas/globalmeetings/9/SD_New/Final_Strategic_Directions_2008_2012.pdf.
The ecosystem approach is also the most important component in the Medium Term Strategy (2010-2013) which begins with the year of biodiversity.
[85] Paragraph 30 of the Plan of Implementation.
http://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/WSSD_PlanImpl.pdf.
[86] Ibid Paragraph 36(d).
[87] Paragraph 30(d) and Paragraph 32.
[88] Paragraph 31.
[89] For example the World Wildlife Fund for Nature (WWF) in the Coral Triangle.
http://www.worldwildlife.org/what/wherewework/coraltriangle/index.html?linklocation=topnavdropdownmenu and The Nature Conservancy www.nature.org.
[90] Op cit note52.
[91] The International Coral Reef Action Network (ICRAN). www.icran.org. Other networks include planning and coordination (CPC), monitoring (Reefcheck) and research (CORDIO).

Nations Division for Ocean Affairs and the Law of the Sea[92] and the Intergovernmental Oceanographic Commission under UNESCO.[93] Although containing no legal obligations upon States, the work of these organisations is hugely beneficial, not only because of the wealth of research and information they provide to the international community but because of their contribution to public awareness through international campaigns such as the International Year of the Reef in 2008[94] and the International Year of Biodiversity in 2010.[95]

Therefore, the impact that the CBD and UNCLOS have had on coral reef protection is of an indirect nature but nonetheless essential. Without them, further information and research on the threats to coral reefs would have not been forthcoming. Yet this research has not led to full legal protection. The network of marine protected areas has the potential of garnering full protection for the reefs but as we shall see in a later chapter, this is still to materialise.[96] Being umbrella treaties, both the CBD and UNCLOS look to other Conventions to effectively ensure conservation in specific areas of biodiversity. The theory is that if there is no instrument that protects coral reefs then the use of a surrogate legal instrument will be acceptable: one that is successful, widely recognised and wholly appropriate for the coral reefs as an environment and an ecosystem. Three of these agreements will be discussed in relation to their adequacy and appropriateness at coral reef conservation.

[92] UNDOALOS http://www.un.org/Depts/los/index.htm.
[93] IOC-UNESCO http://www.ioc-unesco.org/index.php?option=com_frontpage&Itemid=1
[94] www.iyor.org.
[95] For information on the Year of Biodiversity see www.cbd.int/2010/about.
[96] Chapter 4 below.

Chapter 3

International Conventions that Could Protect Coral Reefs

Part I RAMSAR

The Legal Framework

For some scholars, the most appropriate forum for the protection of coral reefs is The Convention on Wetlands of International Importance especially as Waterfowl Habitat[97] also known as Ramsar.[98] At present, there are 159 parties with 1847 sites listed. The number of parties has increased rapidly[99] as the importance of habitat and ecosystems to the protection of species has been recognised. Ramsar was ahead of its time, being the first global treaty that aimed for widespread participation and protection solely for habitat. Since its inception, there is acknowledgement that Ramsar is a successful Treaty.[100] It is seen as one of the 'big four' treaties with a central part to play in environmental law.[101] Ramsar's central role has recently been strengthened through its alliance with the CBD with a memorandum of cooperation signed in 1992,[102] reiterated in 1996[103] and which has led to a Joint Work Plan[104] with understanding that Ramsar is the best forum for researching, protecting and conserving wetlands and their associated biodiversity.

[97] Op cit note20 Hereafter called Ramsar.
[98] M Davidson 'Protecting Coral Reefs: The Principal National and International Legal Instruments' *Harvard Environmental Law Review 26 (2002) 499* omitted Ramsar from her discussion but others note the 'increasingly important role that Ramsar is playing in international environmental law with respect to the conservation of coral reefs.' E Goodwin 'Conservation of Coral Reefs Under the Ramsar Convention on Wetlands' *Journal of International Wildlife Law and Policy 9 (2006) 1* p3.
[99] In 2006 there were 133 Parties as noted in J Scanlon and A Iza 'A Commentary on Water and Wetlands' *South African Journal Environmental Law and Policy' 13 (2006) 211* p211.
[100] Ibid.
[101] S Lyster *International Wildlife Law* (1985) p179.
[102] At COP5 Japan Resolution 5.1.
[103] 6th COP Brisbane Resolution 6.9.
[104] Fourth Joint Work Plan between [CBD] and [Ramsar] 2007-2010 http://www.ramsar.org/cda/ramsar/display/main/main.jsp?zn=ramsar&cp=1-31-115^15844_4000_0__.

The obligations under Ramsar are set out in Article 4 in which there are duties to conserve, cooperate (especially in regard to transboundary wetlands), initiate training and research and in 3(1) ensure wise use of wetlands. The two rungs to these obligations are to promote conservation and to promote wise use of all wetlands.[105] Listing of all wetlands of international importance with the Bureau[106] ensures publicity, relevant funding and heightened information and guidance.[107] For those wetlands that are not listed but are to be protected at national level, the wise use principle is important and means basically that wetlands may be used but in a wise manner. Discussion on this topic of what is 'wise' has been continuing and although this is not relevant to us per se, its evolution through amendment and alliance with the CBD is important in the context of coral reefs for wise use has many wide implications for the reefs and for the biodiversity found there.[108] It is also important as it shows the ability of Ramsar to amend and evolve its definitions and ideals.

The question remains as to whether Ramsar could protect coral reefs. From the title of the convention itself, a tenuous link appears because of its protection of *wet*lands. The link between water and coral reefs is plain to see but the issue then remains whether coral reefs can be classed as a wetland. What is also important from the title itself is the emphasis on wetlands important for waterfowl.

Ramsar was noticeably sectoral in its approach to wetlands, not just noticeable through its title, but also by the definition of wetlands in Article 1(1):

> …Wetlands are areas of marsh, fen, peatland, or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water, the depth of which at low tide does not exceed six metres.

[105] D Farrier and L Tucker 'Wise Use of Wetlands under the Ramsar Convention: A Challenge for Meaningful Implementation of International Law' *Journal of Environmental Law 12/1 (2000) 21* p21
[106] Article 2(2). The Ramsar Bureau is set up in Article 8 and while it started at the IUCN, it is now a permanent, independent institution.
[107] For a full discussion of the values that come with application of the Ramsar Convention see D Navid 'The International Law of Migratory Species: The Ramsar Convention' *Natural Resources Journal 29 (1989) 1001* p1010.
[108] It has been noted however that this gap between wise use and conservation is closing thanks to the concept of sustainable development and the CBD, meaning that issues of differing status of wetlands are less substantial. Op cit note105 p25

This meant that not only must the wetland be for waterfowl, as defined in Article 1(2) but they must also be in conformity with the definition. This definition was criticised for being too narrow and restrictive.[109] It was a progressive treaty at the time of its adoption in regard to habitat protection, but there was no mention of the surrounding area, the catchment or their boundaries whose character could and would affect the wetland itself. This was not a holistic approach to wetland protection.[110]

Changes were forthcoming for both; the waterfowl emphasis was gradually lost and it was recognised that Ramsar had been broadened and that it was not merely waterfowl which indicated an important wetland site.[111] In 1988 Recommendation 4.10[112] stated that wetlands must be managed along with their 'support systems' indicating a move towards a more ecosystem orientated approach. This was further strengthened by Recommendation 5.6[113] and the cooperation with the CBD which advocated protection within and outside protected areas.[114]

In respect to the relevance for coral reefs, this latter recommendation mentioned catchments and coastal zones in particular noting their significant effects on wetlands. This meant that broader catchment zones/ areas that had an effect on the water quality or biodiversity should be taken into account and incorporated into the management plans for protection. For example, for a mangrove to be included in a wetland site, the surrounding system and the surrounding catchment must be accounted for as well. This would mean the coral reefs that protect the mangroves from wave action and erosion and which would ensure a breeding ground for the reef fish thereby ensuring protected biodiversity.[115] The ecosystem approach therefore that has been adopted by Ramsar would give reef protection a valid place under Ramsar and indeed would show a further step forward in its holistic approach.

This discussion nevertheless must be read in light of the definition's particular mention of 'six metres of marine water.' This limit of six metres is

[109] Op cit note39 p543.
[110] Op cit note23 p673.
[111] www.iucn.org/themes/ramsar/lib_manual_2.htm#21.
[112] Recommendation 4.10 at COP 4 in Montreaux www.ramsar.org/documents/recommendations.
[113] Recommendation 5.3 at COP 5 in Japan www.ramsar.org/documents/recommendations.
[114] Article 8(c) of the CBD.
[115] E Goodwin note98 p15.

problematic for it 'excludes all but the upper portions of the reef structure for the vast majority of coral reefs and maybe entire reefs…'[116] By including only the upper portions of a coral reef, fragmented protection could be more detrimental and could lead to further degradation of both the reef and the adjacent wetland. The move into a full holistic ecosystem approach as seen above, should correct this for if the reef above six metres is defined as part of the wetland then the ecosystem approach would demand that the full catchment area and boundaries include the whole coral reef area. The nature of the boundary definition in Article 2(1) would further this argument for it states that:

> …boundaries…may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands…

Would this imply however, that coral reefs are merely the catchment area or 'buffer' and not a substantial part of the wetland site?

Goodwin argues that while this extends the limits to include reefs below six metres, it is still merely for the boundary catchment purposes, with no real change in definition and also limited to those reefs that are coast adjacent.[117] This would lead to further fragmentation of coral reef protection and so he concludes that Articles 1 and 2(1) do not advocate full protection of reefs under Ramsar.

The legal competence arguments that Goodwin proposes are academic in nature, for while the definitions all point to a tenuous opportunity to cover coral reefs, the treaty itself is subject to interpretation under the Vienna Convention[118] so that not only must the treaty be read as a whole, but also in good faith in light of its context and purpose.[119] This interpretation is also subject to subsequent State practice and the relevant rules of international law which give contextual understanding to the Treaty.[120] The latter has been touched upon already in regard to the CBD and the ecosystem approach and the need for sustainable development and wise use to be interchangeable. State practice is important for it shows a real step

[116] E Goodwin note98 p12.
[117] Ibid.
[118] The Vienna Convention on the Law of Treaties 1969 in force 1980 www.untreaty.un.org/ilc/texts/instruments/english/.../1_1_1969.pdf.
[119] Ibid Article 31.
[120] Article 31(3)(c). IM Sinclair, CMG *The Vienna Convention on the Law of Treaties* (1973) p71.

towards coral reef protection not only in subsequent practice but in subsequent agreements.[121]

Subsequent Agreements and Subsequent Practice:

Two protocols have been adopted[122] to improve flexibility, but there are still flaws in Ramsar in regard to formal amendment.[123] What has been noted however, is that: 'Parties to the Ramsar Convention have not allowed the wording of the Convention to stand in the way of significant adjustments'[124] and States have ensured adaption and evolution even without these formal amendment procedures. Ramsar submits strict Recommendations and clear, detailed resolutions and guidelines which although are not legally binding are of real practical significance.[125] For some these recommendations have taken on a 'hard law' appearance[126] and have led to an understanding that although they are not legal, they are authoritative and prove the intention of State parties as to how the treaty should be interpreted.[127]

These Recommendations therefore are an important indication as to how Ramsar has been interpreted and as to the mindset of State parties and their view of what constitutes a wetland. These Recommendations prove that coral reefs have become an intrinsic part of Ramsar's remit. At the beginning, some found this a little farfetched[128] but over the next few years attitudes changed with biodiversity and ecosystem protection the norm throughout international environmental law. In 1995 saw Ramsar directly publicised itself as a valid forum for coral reef protection[129] and

[121] See Article 31(3)(a) and (b).
[122] These were the Paris Protocol 1982, in force 1986 and the Regina Amendments in 1987 which came into force 1994.
[123] Op cit note23 p676 where they believe this lack of formal amendment procedure leads to problems in flexibility and whose protocols have led to further confusion as to who is bound by the protocols.
[124] D Farrier and L Tucker note105 p41.
[125] Ibid p25.
[126] J Verschuuren 'Ramsar Soft Law is not Soft at all: Discussion of the 2007 Decision by the Netherlands Crown on the Lac Ramsar Site on the Island of Bonaire' (2008). www.ramsar.org/publications.
[127] Ibid.
[128] In his article, Navid's use of an exclamation mark indicated his surprise that coral reefs could be classed as a 'wetland' D Navid note107 p1004 which says: '…the coverage of the convention extends to a wide variety of habitat types including rivers, coastal areas, *and even coral reefs!*'
[129] D Peck 'Coral Reefs and the Ramsar Convention' (1995). www.ramsar.org/publications.

this momentum led to Recommendation 6.7 in 1996[130] which recognised the importance and relevance of coral reefs as a wetland type and as areas of great biodiversity and wealth. Particular impetus on the Pacific States which heavily rely on coral reefs was given in the same year under Recommendation 6.18[131] with the coral reef nations still important today.[132] In 2002 Additional Guidelines[133] were drafted to aid State parties in identifying and designating coral reefs as an example of under-represented wetland types with many benefits and uses as areas of biodiversity.[134] These Recommendations were then for the State to follow and implement. If this occurred by the majority of States, then State practice would dictate that such interpretation (inclusion of coral reefs into Ramsar's definition) would become the norm and would mean that listing of coral reefs would be expected by all relevant States.

Can Ramsar Protect Coral Reefs?

Geographically, States with coral reefs, in particular developing States[135] have ratified Ramsar which increases the opportunity for coral reef protection. In 2006 when Goodwin wrote his article, using the World Atlas of Coral Reefs[136] as a guide, he noted that 54 contracting parties had coral reefs.[137] In 2009 this increased to 56. These two countries are the UAE (ratified in 2007) and Yemen (ratified in 2008) adding .67 percent of the world's coral reefs to Ramsar's remit, bringing the

[130] Recommendation 6.7: Conservation and Wise Use of Coral Reefs and Associated Ecosystems COP6 Brisbane, Australia. www.ramsar.org/documents/recommendations.
[131] Recommendation 6.18 'Conservation and Wise use of Wetlands in the Pacific Islands Region' COP6 Brisbane Australia. states that 'the Ramsar Convention includes coral reefs in its definition...but few coral reefs have been included in the Ramsar list so far.' www.ramsar.org/documents/recommendations.
[132] See Recommendation 7.2 'Small Island Developing States, island wetland ecosystems and the Ramsar Convention' COP7 1999 San Jose, Costa Rica. www.ramsar.org/documents/recommendations.
[133] Resolution VIII.11 'Additional Guidelines for Identifying and Designation Under-Represented Wetland Types as Wetlands of International Importance' at COP8 Valencia, Spain. These guidelines were in addition to the general guidelines VII.11 set down at the previous COP7 in 1999.
[134] These guidelines corresponded with the WSSD South Africa, where Ramsar was identified as a major Convention for the protection of biodiversity. Op cit note85.
[135] The establishment of a Ramsar fund has perhaps been a major factor in developing States ratification. Op cit note23 p675.
[136] M Spalding et al 'The World Atlas of Coral Reefs' (2001) Prepared at the UNEP World Conservation Monitoring Centre. www.coral.unep.ch/atlas.htm.
[137] E Goodwin note98 p19. The World Atlas lists 80 States that contain coral reefs although this list omits some States with a small amount of coral reef including South Africa, Equatorial Guinea and Guinea and so the number of countries parties to Ramsar with coral reefs may be 59

total of coral reefs protected under Ramsar to 80.47 percent. It is noted also that the coral reefs not covered by Ramsar are found particularly among the small island States and this remains true today.[138] This begs the question of why these islands States are not members of Ramsar even though the Convention is actively seeking their membership. The ability of Ramsar to effectively cover coral reefs would need every State with coral reefs to be a member, especially those States that not only contain a significant proportion of the worlds reefs but also those States that are developing and rely heavily on coral reefs in an economic and social way as well as their link to other important habitats such as mangroves and sea grass. Geographically, full membership is necessary, but what is more important is that the States that are members must actively list and name wetland sites that have coral reefs.

Does Ramsar Protect Coral Reefs?

In 2006 only 3.8 percent of potential coral reef sites had been listed on Ramsar with significant gaps found in Asia and Africa.[139] For example, Malaysia, Fiji, Papua New Guinea and Palau all had sites listed but none contained coral reefs. Egypt had two sites listed on Ramsar and neither contained coral reefs.[140] Of those sites that did contain coral reefs, the majority of them were not listed; not because of their coral reefs but because of the associated wetland, usually mangrove or seagrass.[141]

Recent data shows an increase since 2006[142]so that today, 71 sites are listed that contain coral reefs and 25 are sites with coral reef as the dominant type of wetland. Although this is an increase from 54 sites with 16 dominantly coral reefs in 2006, [143] the huge increase in total wetland sites under Ramsar means that

[138] Of countries not part of Ramsar, the small island States including Kiribati, Vanuatu, Micronesia and the Solomon Islands make up 11% of the worlds coral reefs.
[139] www.ramsar.org/pdf/mtg/mtg_icri2006_report.pdf there is an improvement since the last report in 2002 www.ramsar.org/pdf/cop9/cop_9_doc22_e.pdf which reflects the recommendations made at the time. See Recommendation VIII.11 at note133 but even then, only 36 sites containing coral reefs were designated.
[140] These statistics are relevant today because of no further designation of Ramsar sites as seen at www.wetlands.org/database.
[141] Mangroves were listed on 182 sites and seagrass 178 sites.
[142]Date of Goodwin's article.
[143] E Goodwin note98 p23.

cumulatively the number of wetlands that have coral reefs has not increased. Only 3.8 percent of Ramsar's listed sites contain coral reef with .87 percent of those containing coral reefs as the dominant type.[144]

Region	Total Sites Listed	Total Area (hectares)	Sites containing coral reefs	Sites with coral reefs as the dominant wetland type	Countries with coral reefs listed as dominant wetlands
Africa	278	81,321,547	8	2	South Africa, Equatorial Guinea
Asia	230	12,759,547	10	4	Japan(x2) Iran, Philippines
Europe	932	24,403,193	7	4	France(x2) UK, Netherlands
Neotropics	148	30,739,222	20	5	Venezuela, Brazil, Saint Lucia, Cuba, Trinidad and Tobago
N. America	174	22,535,636	16	6	Mexico
Oceania	77	8,214,277	10	4	Australia

Table 1: the number of coral reefs protected in Ramsar sites and the number of those designated as the dominant type of wetland. Gaps observed in 2006,[145] are still obvious with the regions failing to proportionally represent their coral reefs.[146]

The surge of interest surrounding coral reefs that was seen from 2002 has slowed down significantly. No more Recommendations have been drafted and at the most recent meetings mention of coral reefs has become more general with terms

[144] www.ramsar.wetlands.org/database/searchforsites.
[145] Op cit note139.
[146] Information accessed from www.ramsar.wetlands.org/datatbase/searchforsites/tabid/765/language/en-US/default.aspx on 11/09/09 but note that the information is out of a total of 1839 sites. Discrepancies may be observed because of late processing or information that is yet to be updated, however, the numbers give a close approximation with 8 sites missing from the most up to date total.

such as 'coastal wetland' being used. [147] The latest COP held in Korea in 2008 continued the quest of gaining membership from the small island States with a workshop organised for 2010 to help these States in the management of their wetlands and the opportunities available for coral reef protection.[148] What is noted from COP 10 is the emphasis on global problems that supersede mere conservation of wetlands but which wetlands can have positive affects upon. Issues such as poverty alleviation, climate change and freshwater resources were all mentioned in Korea, as was the need for full partnership with other Conventions to achieve these goals.[149] Although not specifically mentioned, the importance of the coral reefs in these areas, particularly climate change and poverty alleviation is well known and it is hoped that this link has not gone unnoticed.

Is Ramsar the Right Convention to Protect Coral Reefs?

There is evidence that Ramsar could be used as a forum for coral reef protection not only because its legal competence is confirmed but because State practice shows evidence that coral reefs are already being listed on Ramsar sites. This listing so far is piece meal with evidence that the reefs themselves are not the dominant reason for their designation but merely because of the catchment approach. There is also evidence, that although geographically Ramsar does cover a majority of coral reefs through its large membership, the important areas of coral reef, ie small island states, are not members and have not been persuaded to join as yet. What might work in Ramsar's favour is its attempt to form partnerships and links with other Conventions ensuring publicity for its widened definition of wetland and its knowledge of coral reefs[150] and its relationship with NGO's who specialise in coral reef protection,[151] as well as agreements with private organisations who could bring much needed funding to Ramsar and which would perhaps encourage further membership. As we shall see, the relationship between Ramsar and the Man and Biosphere Programme[152] and the World Heritage Convention could lead to a trilogy

[147] The Strategic Plan 2009-2015 Resolution X.1 at COP10 Changwon Korea. www.ramsar.org/pdf/key-strat-plan-2009-e.pdf.
[148] www.ramsar.org/news/newsarchives2009.
[149] E Tsioumani 'Ramsar/COP-10 Overview of Results' *Environmental Policy and Law 39/1 (2009) 30.*
[150] For example the CBD.
[151] For example ICRI.
[152] See 'Biosphere Connections' 2007 www.ramsar.org/news/newsarchives2007.

of conventions which would bring together a solid legal base with which to protect, manage and conserve coral reefs.

Part II The World Heritage Convention

The Legal Framework

The World Heritage Convention (WHC)[153] is a widely recognised and well supported Convention which provided the model for Ramsar[154] and which is claimed to be an important instrument for the protection of natural heritage and therefore coral reefs.[155]

The WHC was set up in 1972 under the auspices of the United Nations Educational, Scientific and Cultural Organisation (UNESCO) to protect the heritage of mankind[156] and to help each State achieve such protection.[157]

Article 2 defines natural heritage as:

> **Natural features** consisting of physical and biological formations or groups of formations which are of outstanding universal value...
> **Geological and physiographical formations** and precisely delineated areas which constitute the habitat of threatened species or animals and plants...
> **Natural sites**...of outstanding universal value

Each State may designate a site or property in their jurisdiction for inclusion in the World Heritage List[158] which contains cultural sites, natural sites and mixed sites. These listed properties must then be managed as per the obligations stated in Article 4 and 5 of the Convention which require management policies and continuous education to successfully protect these sites and ensure future preservation. International assistance to achieve these obligations is provided for in Article 13 as well as the World Heritage Fund[159] providing financial assistance to those States who require it.

[153] Op cit note19 hereafter called the WHC.
[154] Op cit note23 p680.
[155] M Davidson note98 p537.
[156] Preamble to the Convention.
[157] Preamble and Article 6(1).
[158] Article 11(1) and (2).
[159] Article 15.

In order to list areas, each State must follow the Operational Guidelines[160] which set forth the procedures on how to inscribe properties on the list, how to ensure complete management, protection and conservation of the properties as well as providing for funding and assistance as noted in the Convention.[161]

The Guidelines and the Convention make use of a tentative list of properties that each State feels is suitable for inscription.[162] This inventory[163] must be completed before any such property can be nominated and must provide full information of the area and the reasons why it is listed. Each State must review this list periodically.[164]

For all sites on the tentative list and for eventual nomination, the Operational Guidelines set down a list of criteria which must be met by the property. These criteria indicate a property's outstanding universal value.[165] This is in addition to the 'conditions of integrity'[166] which include the size and the sustainability of the site as well as the degree of neglect already observed.

The precise meaning of outstanding universal value and its threshold is described in the Operational Guidelines as:

> Significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity...protection is of the highest importance to the international community as a whole...[167]

[160] The Operational Guidelines drafted in 2005 were revised at the 2007 Committee Meeting. www.whc.unesco.org/en/guidelines. Hereafter called the Guidelines.
[161] Ibid p11.
[162] Page 28 of the Guidelines.
[163] Article 11(1).
[164] Page 28 of the Guidelines which require review and re-submission every ten years.
[165] Page 30. These criteria include: (vii) natural phenomena or areas of exceptional natural beauty and aesthetic importance... (ix) outstanding examples...biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals... (x) contain the most important and significant natural habitats for in-situ conservation of biological diversity.
[166] Page 32.
[167] Page 24.

The International Union for the Conservation of Nature (IUCN) is the advisory body[168] for all natural heritage nominated for listing in the WHC as specified by the Convention.[169] Each nomination by a State is therefore passed to the IUCN from the Secretariat[170] who judges each property. The IUCN forwards it to the Bureau: a small group of members of the World Heritage Committee who reviews each proposed property on the basis of the Operational Guidelines.[171] The Committee is the main institution which meets every year and consists of 21 members[172] which are elected by the UNESCO General Assembly at the General Conference.[173] Monitoring and reporting must continue throughout[174] and will be reviewed by the Committee at each meeting. If threats to the value of the property are noted then the Committee can opt to add the property onto the World Heritage in Danger List.[175] This is to enable further assistance to remove such threats and to provide help and training to reverse the degradation caused by human influence.[176]

Many believe that the WHC is a stronger Convention for the protection of natural heritage than Ramsar because it has more specific obligations and more stringent criteria. There is also a precise protocol to follow and thorough guidelines for each State to follow. This is advantageous especially in view of the fact that it is up to each State to nominate, monitor and manage each site. What is probematic however is that this procedure is lengthy and does take time.[177]

[168] Pages 18 and 20.
[169] Article 14(2) The International Council of Monuments and Sites (ICOMOS) is mentioned in respect to the cultural properties.
[170] The Secretariat is appointed by UNESCO. See p17 of the Guidelines and Article 14 of the WHC.
[171] Page15 of the Guidelines and Article 8 of the WHC. The Long title of the Committee is the 'Intergovernmental Committee for the Protection of the Cultural and Natural Heritage of Outstanding Universal Value.' www.whc.unesco.org/en/committee.
[172] Part III of the WHC.
[173] The 17th General Assembly met in October 2009 and elected 12 new members to the Committee. http://whc.unesco.org/en/news/563.
[174] Page55 of the Guidelines.
[175] Article 11(4) of the WHC.
[176] Ibid. See http://whc.unesco.org/en/158/.
[177] Op cit note23 p678.

Can the World Heritage Convention Protect Coral Reefs?

Both the criteria and the definition of natural heritage indicate that coral reefs are a major area that would benefit from world heritage status. There are no legal issues that suggest otherwise and several other institutions have in the past reported that the world's coral reefs could well be included in the Convention.[178] As with all international instruments, State discretion decides which sites are added to the tentative list and then nominated,[179] in conformity with State soveriegnty[180] so that the State in question must want the coral reefs to benefit from international recognition and worldwide assistance. Nevertheless, Article 12 notes that each State party to the Convention must adhere to obligations of protection for all areas of value regardless of whether they are on the lists. This would mean that every State with coral reefs should protect and preserve their reefs through their own legislation in line with the Conventions obligations.

Does the World Heritage Convention Protect Coral Reefs?

The Convention is no doubt a successful treaty with wide ratification and a long standing history. There have been issues of cultural bias throughout the Convention's history however, where sites of cultural heritage are favoured. The use of the tentative list as a means to rebalance the World Heritage List[181] complements the Global Strategy[182] created in 1994 ensuring that all areas are represented and that all themes such as marine and coastal, deserts and small island States are included in the listed properties.[183]

[178] UNEP. www.unep-wcmc.org and the World Research Institute www.wri.org.
[179] M Davidson note98 p538.
[180] Article 6.
[181] Page 29 of the Guidelines.
[182] Called the Global Strategy for a Balanced, Representative and Credible World Heritage List. http://whc.unesco.org/en/globalstrategy.
[183] Ibid. Paragraph 59(b) states that State Parties 'are requested to consider whether their heritage is already well represented on the list [to promote a balanced World Heritage List] by proposing only properties falling into categories still represented [are included in the nominations and tentative list...'].

If the cultural bias does still exist then this of course could afffect the coral reefs by either showing poor or under-representation. The WHC set up the World Heritage Marine Programme[184] in order to protect and assist in the management of the 'precious marine areas' because as it states, it is:

> uniquely positioned to make an important contribution for the protection of marine protected areas. Its international profile, legal status, site-based orientation and its comprehensive natural heritage criteria provide a practical approach to...marine conservation.[185]

Technical support, workshops and education, fundraising and coordination with other institutions and other WHC programmes such as the Pacific 2009 Programme and the SIDS Programe[186]aim to achieve such consevation. There is evidence therefore, that the WHC confirms the place of coral reefs within the term natural heritage and is aiming for full coverage of all marine and coastal environments with which it believes it can afford full protection. The data however, not only suggests that this is not the case, but also that the cultural bias is still firmly in place regardless of the recent Committee meeting whose objective 'was to correct the imbalance between the number of cultural and natural sites as the former exceed the latter.'[187]

It is true that the World Heritage Convention is widely ratified; as of November 2009, there were 186 parties to the Convention. However, the number of parties has increased by only a small fraction with only 2 States ratifying between 2007 and 2009.[188] [Table 1]

[184] http://whc.unesco.org/en/marine-programme launched in 2005.
[185] Ibid.
[186] http://whc.unesco.org/en/pacific2009. The Pacific 2009 programme was launched in 2003 and aimed to ensure full representation of the pacific States and their cultural and natural heritage through capacity workshops and full membership. this is in addition to the Small Island Developing States Programme (SIDS) which aims for full marine conservation and coordination with international funds to provide help and assistance to the States for listing their natural sites. http://whc.unesco.org/en/activities/42.
[187] www.whc.unesco.org/en/news/519.
[188] These were: Djibouti (2007) and The Cook Islands (2009).

Year	No of parties	No of sites listed	Natural	Cultural	Percentage of natural %
2003	175	730	144	586	19.72%
2007	185	878	174	704	19.81%
2009	186	890	176	712	19.77%

Table 1

Geographical Coverage of Coral Reefs

Of the 80 States mentioned in the World Atlas of coral reefs[189] only nine States are not party to the WHC.[190] In addition, those States not mentioned in the Atlas, but which have coral reefs are also members.[191] These few States only contain around 2.41 percent of the world's reefs therefore geographically the coverage of coral reefs is significantly large. This number is misleading however, because of these States party to the WHC, 25 of them have not yet listed and these include several States with large areas of coral reefs within their jurisdiction including the Marshall Islands, Eritrea and the Maldives.

Of those States which have listed properties, there is a further differentiation between marine and coastal sites and those sites that contain reefs: of the 38 properties listed as marine and coastal sites, only 27 of these contain reefs.[192]

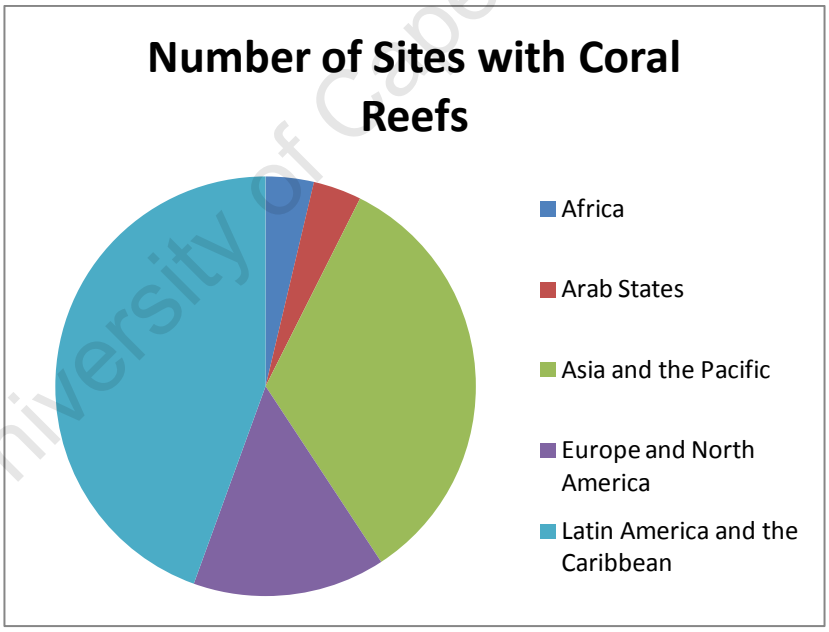
Regionally, there is a sign that most sites containing coral reefs are in more developing States (particularly true for the Asian and Pacific States) and that a large proportion of the reefs are not well represented, for example the Red Sea, Micronesia and areas part of the Coral Triangle. [Table 2] This is still occurring despite the WHC's continued effort to involve the Pacific States. [193]In addition, two of these sites listed in the Latin American region have now been listed on the 'danger' list after this year's Committee Meeting in Seville Spain[194] because of the continuous

[189] Op cit note136.
[190] These are: Bahamas, Brunei, Somalia, Singapore, the Spratly Islands, Taiwan and Tuvalu,
[191] As noted in the Ramsar section, these include South Africa and Guinea. However, Equatorial Guinea is not a member.
[192] For example New Zealand and the USA have listed sites within their marine environment but neither contain reefs.
[193] See the Pacific 2009 and SIDS Programme above note186.
[194] http://whc.unesco.org/en/sessions/33COM.

degradation seen on the coral reefs through human development, biodiversity loss and climate change.[195]

Africa	Arab States	Asia and the Pacific	Europe and North America	Latin America and the Caribbean
Seychelles (1)	Yemen (1)	Australia (4)	France (2)	Belize (1)
		India (1)	UK (2)	Brazil (1)
		Indonesia (2)		Colombia (1)
		Japan (1)		Costa Rica (2)
		Philippines (1)		Cuba (1)
				Ecuador (1)
				Mexico (3)
				Panama (1)
				St Lucia (1)

Table 2



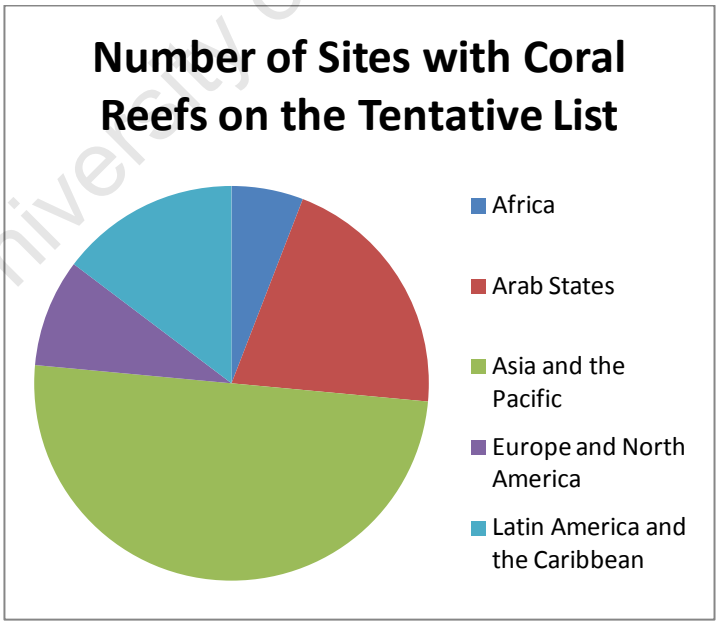
The tentative lists are sites that States wish to nominate at some point in the future, as well as an indicator of movement away from the cultural bias. This is a more promising outlook as noted in Table 3: whereas there are only 27 sites so far

[195] Belize's Barrier Reef Reserve System was inscribed on the danger list because of development and continuous mangrove cutting in the area. Decision 33 Com 7B.33. The Galapagos Islands off Ecuador were kept on the danger list because of the threat of tourism and invasive species affecting the unique biodiversity. Decision 33 Com 5c (4).

inscribed containing reefs, the tentative list shows an extra 34 sites which could be inscribed.

Africa	Arab States	Asia and the Pacific	Europe and North America	Latin America and the Caribbean
Mozambique (2)	Bahrain (1)	Australia (1)	Malta (1)	Colombia (1)
	Egypt (4)	Indonesia (5)	USA (2)	Cuba (2)
	Qatar (1)	Japan (1)		Grenada (1)
	Sudan (1)	Kiribati (1)		Nicaragua (1)
		Marshall Islands (1)		
		Palau (1)		
		Papua New Guinea (1)		
		Philippines (3)		
		Solomon Islands (3)		

Table 3



This data shows a marked improvement in the coverage of reefs in all regions however the dates when these were included on the tentative list range from 1995 to the present day. Why are these sites not being nominated or chosen by the Committee and the Advisory Body? While there is constant discussion about

ensuring a rebalance of the list, the Committee continues to inscribe more cultural sites every year. In Seville 2009, 27 sites were nominated but only 13 were added and only 2 of these were natural sites and neither contained reefs.[196] There seems to be reluctance to inscribe natural heritage sites or a refusal by the States to nominate those natural sites on their tentative list. Either way, the bias and refusal to include natural sites is disadvantageous for coral reefs in need of protection. No protection under the WHC will occur for coral reefs if those sites continue to sit on the tentative list. As the Convention notes however, it is up to State discretion which seems to show reluctance for coral reef heritage status. This is a shame, especially in view of the Sustainable Tourism programme the WHC has set up[197] as well as the full coordination and cooperation with other Conventions and institutions which the WHC enjoys.[198]

Is the World Heritage Convention the right Convention to protect Coral Reefs?

It is undeniable that the WHC could protect coral reefs. Unlike Ramsar there are no issues regarding the definitions and legal status of the WHC in respect to coral reefs. In addition, the WHC is geographically equipped to protect almost 98 percent of the world's reefs. The WHC also affords international recognition and the concept of sustainable tourism; a welcome addition for coral reefs found near rural communities. The problem that is raised from this analysis however is that sites containing coral reefs are not listed as natural heritage. Whether this is due to the cultural bias that pervades the Convention itself, or whether it is down to the State in question who refuses to nominate those particular sites is unsure, but it still leads to a large gap in coral reef protection. Although Article 12 of the Convention and the Operational Guidelines state that all sites of outstanding universal value must be protected by State legislation in accordance with the Convention's obligations, there is already a wide recognition and knowledge that this does not happen and is not happening for the coral reefs. Similar to Ramsar, the WHC is not being as successful as it should be. Perhaps, as we noted above, the trilogy of instruments working

[196] www.whc.unesco.org/en/news/536 the two natural sites were the Wadden Sea nominated by Germany and the Netherlands and The Dolomites nominated by Italy.
[197] http://whc.unesco.org/en/sustainabletourism.
[198] Such as ICRAN, CBD, Ramsar and UNCLOS. See the list in the Operational Guidelines p21-22.

together would be more successful and the final one, although not a Convention per se is still an extremely good concept.

Part III The Man and Biosphere Programme

The UNESCO[199] Biosphere Conference in 1968 set up the Man and Biosphere Programme (MAB) to attempt reconciliation between development and natural resource protection. Conservation and sustainable development could be realised through the Biosphere Reserve concept that would be in line with both the Stockholm and Rio Declarations.[200] The Second World Congress on Biosphere Reserves[201] saw the creation of the Seville Strategy and the Statutory Framework[202] which govern the MAB programme. Unlike the two Conventions dealt with in this chapter, the MAB Programme is not a legal treaty. There is no legal obligation upon those member States to create Biosphere Reserves but the option to do so is one that has become a popular and successful method of combining development, conservation and management at a local level.

Article 1 of the Statutory Framework defines Biosphere Reserves as:

> Areas of terrestrial and coastal/marine ecosystems or a combination thereof, which are internationally recognised within the framework of UNESCOs Programme on Man and Biosphere.

The three objectives set down in Article 3 are to conserve the ecosystems and landscapes, to develop economic and human development within the conservation framework and ensure it is culturally and ecologically sustainable, and to logistically support research and monitoring as well as conservation development.

The objectives illustrate that cooperation and support for each State as well as between each department and similar legal agreements are one of the most important aspects of the Biosphere Reserve. It is an overarching ideal where all the existing Conventions and measures could be combined. The World Network of Biosphere

[199] The United Nations Educational Scientific and Cultural Organisation. Hereafter called UNESCO www.unesco.org.
[200] Op cit note10 and 15.
[201] Held in Seville, Spain 1995.
[202] www.unesco.org/mab/publications.

Reserves is testament to this (WNBR).[203] The WNBR is a 'tool' to help establish communication throughout the world on research, information, knowledge and training. At no point does the Statutory Framework infringe upon national sovereignty[204] and recognises and 'encourages' States to update and expand their own legislation to ensure protection of Biosphere Reserves at both international and national level.

Further criteria listed in Article 4 supports the objectives with the need for full representation of a 'mosaic of ecological systems' as well as the need to promote sustainable development through biodiversity on a regional, national and international scale in conjunction with the CBD[205] and the United Nations Decade of Education for Sustainable Development (UNDESD)[206] The designation of zones however, was an important step in conservation and development and one unique to Biosphere Reserves. Each Biosphere Reserve must, according to Article 4(5) have a core, buffer and transition zone with similar objectives but with differing aims. The core constitutes the protected area in its 'natural state' surrounded by a buffer zone that 'conjoins' the core and is used in conjunction with conservation of the core zone. The transition zone is where human development is prevalent and is to be used for sustainable development and resource management.

With reference to coral reefs, several Biosphere Reserves contain coral reefs as either the core or buffer zone, with the transition zone containing the rural communities that live along the coastline. Several of these Biosphere Reserves see an overlap with Ramsar and the World Heritage Convention where the core zone is also a protected area[207] and this is recognised as being an important component of

[203] Article 2.
[204] Article 2(3).
[205] Article 4(2) and (3). This is complemented by the inclusion of the MAB Programme in the CBD's Jakarta Mandate dealing with marine and coastal biodiversity. Paragraph 9 of the SBSTTA recommendations states that '…networks of marine protected areas…and biosphere reserves provide useful and important management tools for different levels of conservation, management and sustainable use…'
[206] http://www.unesco.org/mab/doc/icc/2009/e_BRlearningSites.pdf the ICC-MAB 21st Session held in Korea 2009 agreed on the connection between the MAB programme and the UN DESD 2005-2014. The report (SC-09/conf.207/13) for UNESCO's general conference confirmed that biosphere reserves could be strengthened as learning laboratories for sustainable development an equally important goal as conservation.
[207] The UNESCO website provides documents that show each Biosphere Reserve and its name and date of signature on the list of Biosphere Reserves as well as if it is also a Ramsar site or World

the concept of a Biosphere Reserve[208] where the effect local communities can have on these protected areas is noted and improved.

The Third World Congress on Biosphere Reserves in 2008 held in Spain produced the Madrid Action Plan. [209] Here the objectives were reiterated and strengthened through 31 goals and 65 actions. Zonation was upheld but there was consensus that flexibility was required to allow further management and conservation throughout the whole Reserve.[210] Synergies with other conservation systems were also recognised and there has been a shift towards fully complementing Article 8 of the CBD as well as full collaboration with other instruments.[211]

The Madrid Action Plan strengthens many partnerships between organisations and lends itself to full conservation and sustainable development with assurances that the local population can benefit and become fully involved. Although there is no mention of coral reefs in the Action Plan specifically, the definition is clear that marine ecosystems are equally important and should be protected. Regional networks that concentrate on particular ecosystems including the oceans are encouraged which again looks to full collaboration with other relevant instruments.[212]

The International Coordinating Council for the MAB Programme met in May 2009[213] and although there was no real definitive push for coral reef protection, there was a proposal to launch an international coastal and island Biosphere Reserve network to address issues of sustainable development and climate change within the

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Heritage site or both. http://portal.unesco.org/science/en/ev.php-URL_ID=6433&URL_DO=DO_TOPIC&URL_SECTION=201.html.

[208] MAB Programme p4 www.unesco.org/mab.

[209] Madrid Action Plan http://unesdoc.unesco.org/images/0016/001633/163301e.pdf.

[210] Ibid Section E.2.

[211] As well as Ramsar and the World Heritage Convention, the Madrid Action Plan notes the need for cooperation between many organisations dealing with specific ecosystems or specific problems found at community level as well as large international Conventions and organisations. UNEP, the other arms of UNESCO, Commission on Sustainable Development, International Union for Conservation for Nature (IUCN) and the Millennium Development Goals (MDGs)

[212] Target 5 of the Madrid Action Plan p7. Regional networks dealing with the oceans do exist such as the Asian network and the Small Island States organisation. http://portal.unesco.org/science/en/ev.php-URL_ID=6942&URL_DO=DO_TOPIC&URL_SECTION=201.html.

[213] The ICC-MAB 21st Session held in the Republic of Korea. May 2009.

coastal environment.[214] At the Council, 22 further Biosphere Reserves were added, six of which contained coral reefs.

Can the MAB Programme Protect Coral Reefs?

The potential for the MAB Programme to protect coral reefs is extremely high. It is an open and evolving concept that could cope with political or economic challenges in addition to any stresses from natural phenomena. Community involvement is also a welcome addition considering how important coral reefs are for the local population. However, the MAB Programme does not carry any legal obligation and therefore no enforcement function. This means that it is up to the board or governing body of each Reserve and in the end, up to each State to designate if they wish and follow the guidelines.[215] There is a growing recognition that national legislation in conformity with the MAB guidelines and Statutory Framework would strengthen the Biosphere Reserve concept.[216] This is a welcome step, but is merely strengthening the idea to those who are already embracing the idea. Geographically the use of the Biosphere Reserve is limited.

Does the MAB Programme Protect Coral Reefs?

As of 2009, there are 553 sites which have been listed by 107 States. Out of the 80 States listed in the World Atlas of Coral Reefs,[217] only 40 are party to the MAB Programme. This means only 71 percent of the world's coral reefs is potentially covered by the MAB Programme. This is significantly lower than the potential coverage noted in the previous two Conventions. The States that are not members of MAB Programme include the majority of small island States and developing countries.[218] When looking at those States that have listed Biosphere Reserves, the number including coral reefs is relatively small. The MAB website provides that out of 553 Reserves, around 93 contain marine or coastal components.

[214] http://www.unesco.org/mab/doc/icc/2009/e_finalRep.pdf paragraph 7.
[215] http://www.unesco.org/mab/doc/faq/brs.pdf.
[216] http://www.unesco.org/mab/doc/icc/2009/e_finalRep.pdf paragraph 16 where the national legislation of Spain is to be shared with all member States as an example.
[217] Op cit note136.
[218] States such as Fiji, the Maldives, Mozambique, Vanuatu, Belize, Saint Lucia and Eritrea are not party to the Programme.

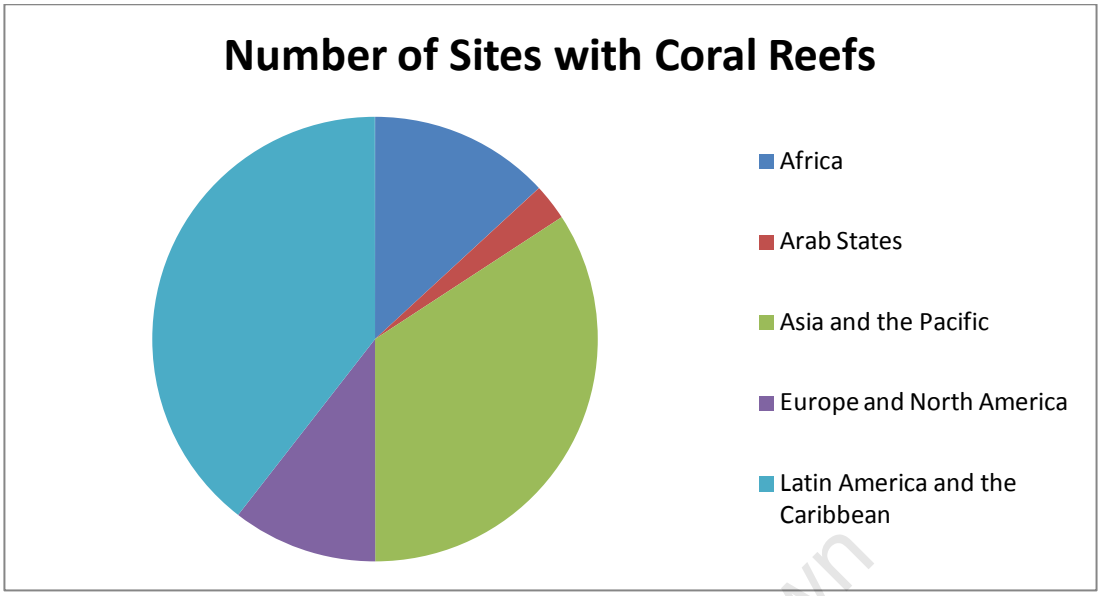
However the search engine shows that only 35 contain coral reefs.[219] [Table 1] It can be noted that Africa and the Arab States are very poorly represented. Egypt for example has two Reserves listed, neither of which contains coral reefs.[220] China has 28 Biosphere Reserves, none of which contain coral reefs; Mexico has 37 Reserves, only six of which cover coral reefs.

Africa	**Arab States**	**Asia and the Pacific**	**Europe and North America**	**Latin America and the Caribbean**
Kenya (2)	UAE (1)	Australia (2)	France (2)	Cuba (4)
Madagascar (3)		Indonesia (2)	USA (2)	Colombia (2)
		India (1)		Dominican Republic (1)
		Micronesia (2)		Ecuador (1)
		Palau (1)		Mexico (6)
		Philippines (2)		Panama (1)
		Vietnam (3)		

Table 1

[219] http://www.unesco.org/mabdb/br/brdir/directory/resecosy.asp.

[220] The same is true for Tanzania, Israel, Jordan and Sudan as well as Latin American States such as Costa Rica and Nicaragua.



Is the MAB Programme the right instrument to protect Coral Reefs?

There is no doubt that the MAB Programme is an innovative and important idea for it combines both sustainable development and conservation and aims to provide long term use and protection. Under UNESCO it has also forged partnerships with other important Conventions and organisations that embrace the long term community initiative and these partnerships are well needed in respect to coral reefs. The problem with the MAB Programme however is that so far geographically the coverage of the world's coral reefs is inadequate and being a soft law document, the Statutory Framework forms no legal obligation and no enforcement mechanism to ensure further State cooperation.

The similarity between all three instruments discussed in this chapter is that coral reefs are poorly represented in all protected areas even though the opportunity is there. Whether States do not deem the coral reefs an important ecosystem for protection or they do not wish to restrict the use of coral reefs by listing them as a protected area is unsure. The Conventions and the MAB all recognise the importance of the oceans and the marine and coastal ecosystems but for all the initiatives and recommendations pushing for marine protection, the small island States and the developing countries have yet to designate their reefs in any significant number.

The conclusion remains therefore that coral reefs are not protected sufficiently under any of the three instruments above although there may be more effective action with all three combined. There has been a gradual movement towards this, but as yet full coverage of coral reefs does not exist in any of the instruments. Furthermore, the use of three instruments lends itself to fragmented management which is reinforced by the fragmented way each threat to the coral reefs has been dealt with.

Chapter 4

Conventions that deal with specific threats facing Coral reefs

There are numerous threats that affect coral reefs in varying degrees. Each threat has a different source and is therefore controlled by different instruments at the international, regional and national level. Coordination between them all is necessary for they all affect the marine environment and therefore must be controlled accordingly. Discussion of the international law protecting coral reefs from these threats will be analysed.

Part I Fishing

The Legal Framework

The fishing industry is deemed to be the biggest threat to the ecology and diversity of the coral reefs[221] through the overfishing by an expanding commercial fleet as well as an increase in local fishers and fishing methods used. The Legal framework reflects these two threats.

Fishing Methods

There are varying types of fishing methods which affect the reefs in varying ways. The increase in financial support for the commercial fisheries as well as an increase in technology has seen an evolution of more effective gear and larger vessels which can collect more fish per trip[222] and which can cause a lot more damage to the coral reefs.

The concept of the EEZ under UNCLOS[223] has bought both benefits and problems to the legal control of the fishing industry with fishing method under coastal States jurisdiction for both its territorial waters and EEZ. UNCLOS provides only general

[221] T R McClanahan 'The Effects of Marine Parks and Fishing on Coral Reefs of Northern Tanzania' (1999) 89 *Biological Conservation* 161 p161.
[222] RR Churchill and AV Lowe *The Law of the Sea* 3rd Edition (1999) p279-281.
[223] Op cit note27.

provisions in this regard.[224] Coastal States have a wide discretion[225] and because 90 percent of the world's fish stocks occur in the EEZ this discretion is extremely powerful[226] but has caused conflict between fisheries.[227]On the other hand such broad provisions under UNCLOS do allow each State to create the correct management strategy for them within the UNCLOS parameters. This broad provision has yet to be effective regarding the full prohibition on destructive and indiscriminate methods such as poison and dynamite. Although these methods are on the decrease after constant control and regulation[228] there is a continued need for State action and enforcement especially in those countries that contain fragile coral reefs.[229]

International control and regulation over certain methods of fishing such as driftnet fishing[230] has been extremely successful limiting coastal State jurisdiction under customary international law[231]and providing strict measures which each State must adhere to if the fishing method is allowed.[232] Neither longline fishing nor driftnet fishing affect the coral reefs directly, but they illustrate a movement by the international community towards the precautionary approach in controlling the

[224] Article 62(4)(c) of UNCLOS.
[225] Article 61 and 62 of UNCLOS. The language used is in general terms including the word 'may'
[226] For example banning foreign fishermen under Article 73 of UNCLOS has led to a displacement of fisheries to areas with poor enforcement.
[227] R Ovetz 'The Bottom Line: An investigation of the Economic, Cultural and Social Costs of Industrial Longline Fishing in the Pacific and the Benefits of Sustainable Use Marine Protected Areas' (2006) 30 *Marine Policy* 809 p815.
[228] RS Pomeroy et al 'Fish Wars: Conflict and Collaboration in Fisheries Management in Southeast Asia' (2007) 31 *Marine Policy* 645 p647.
[229] Practices in Asia and Africa have been detailed by scholars including C Wilkinson et al 'Strategies to Reverse the Decline in Valuable and Diverse Coral Reefs, Mangroves and Fisheries: The Bottom of the J-Curve in Southeast Asia?' (2006) 49 *Ocean and Coastal Management* 764 p768.
[230] United Nations General Assembly (UNGA) Resolution 44/225 1989 '*Large Scale Pelagic Driftnet Fishing and its Impact on the Living Marine Resources of the World's Oceans and Seas.'* http://daccess-dds-ny.un.org/doc/RESOLUTION/GEN/NR0/549/84/IMG/NR054984.pdf?OpenElement Resolutions continue to reiterate their destructive nature. The most recent Resolution being 63/111 in 2008 http://daccess-dds-ny.un.org/doc/UNDOC/GEN/N08/477/45/PDF/N0847745.pdf?OpenElement.
[231] GJ Hewison 'The Legally Binding Nature of the Moratorium on Large-Scale High Seas Driftnet Fishing' (1994) 25/4 *Journal of Maritime Law and Commerce* 557.
[232] Conservation measures for the industrial longline industry have been successful and must be implemented by all longline fishers. See The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) conservation measures. http://www.ccamlr.org/pu/e/e_pubs/cm/drt.htm.

fishing industry.[233] It also expresses the international belief that unregulated fishing methods affect the whole ocean as well as the coastal communities because of its effect on the social and economic uses of the ocean such as stock depletion and damage to the environment.[234] The impacts of incidental catch[235] as a by product of wasteful fishing methods also has far reaching impacts upon the ocean and one that must be reduced to ensure each level of the coral reef ecosystem can function effectively.[236] By-catch is subject to constant review and is listed as one of the most serious problems faced by the fishing industry. [237] Controlling the methods of fishing is a promising start in the protection of coral reefs and has spread to other fishing methods[238] and in other areas of law.[239] Fishing methods must also be controlled at the local level through regulation on the artisanal fishers that utilise the fish stocks on the coral reefs. Gear types used by these communities can also damage reefs directly[240] and indirectly by overfishing the 'grazers' which clean algae off the coral aiding its growth and survival. [241] This would be more appropriate at a national level, but international guidance would ensure uniformity.

[233] A Gillespie 'Wasting the Oceans: Searching for Principles to Control Bycatch in International Law' (2002) 17/2 *The International Journal of Marine and Coastal Law* 161 p183.
[234] R Ovetz note227 p809-810.
[235] Also known as bycatch and includes all the species collected in addition to the one targeted fish stock.
[236] A Gillespie note233 p163.
[237] Agenda 21 chapters 17.45-17.46 and 17.50.
[238] Such as Bottom trawling which is hailed as 'one of the most destructive forms of fishing methods in common use.' See T Mullen 'The Convention on Biological Diversity and High-Seas Bottom Trawling: The Means to an End' (2006-2007) 14 *Baltimore Journal of Environmental Law* 135 p136. The legal framework protecting cold water corals is an interesting topic and one which, due to constraints, cannot be discussed here. See the UNEP and ICRI websites for more information.
[239] For example see the cases brought before the World Trade Organisation (WTO) by the USA in regard to the import of tuna and shrimp caught by destructive fishing practices. *United States – Restrictions on Imports of Tuna (Tuna/Dolphin I)* (1991) 20 ILM 1598 *United States – Restrictions on Imports of Tuna (Tuna/Dolphin II)* (1994) 33 ILM 839 *United States – Import Prohibition of Certain Shrimp and Shrimp Products (Shrimp/Turtle)* (1999) 28 ILM 118.
[240] E Jones et al 'The Impact of Artisanal Fishing on Coral Reef Health in Hat Thai Mueang, Phang-Nga Province, Southern Thailand' (2009) doi:10.1016.j.marpol.2008.12.003 p9 notes that beach seine nets are dragged over the reef and contain large amounts of dead coral.
[241] JE Cinner et al 'Gear Based Fisheries Management as a Potential Adaptive Response to Climate Change and Coral Mortality' (2009) 46 *Journal of Applied Ecology* 724 p730. A change from spear guns and traps to line fishing would improve the number of grazing fish caught thereby improving the health of the coral from algae. In addition, damage from the line method is far less than nets and traps although economic factors must be taken into account.

Overfishing

Conflict between fisheries for the remaining stock has led to 'fish wars' where the smaller fisheries '... do not see the sense of protecting the remaining stocks just so commercial fishers can fish them out.'[242] With commercial fishing such a large industry, an organisation has been created by the United Nations in an attempt to provide guidance and safe, responsible fishing practices. The Food and Agriculture Organisation (FAO)[243] has written several legally binding treaties to promote conservation while fishing on the high seas[244] in addition to the straddling Stocks Agreement which supplements UNCLOS and aims to control fish stocks found on the high seas and the EEZ ensuring conservation measures are at an international level.[245] Although these relate mainly to the high seas, the link to the ecosystem approach and therefore to all parts of the ocean is important to recognise with an understanding that negative effects can be felt for many miles and therefore could impact upon coral reefs. The non binding Code of Conduct on Responsible Fishing 1995[246] emphasises the need for ecosystem approach as well as cooperation between all users of the marine environment to ensure habitats are managed, conserved and rehabilitated.[247] Emphasis on responsible fisheries continues[248] and has seen the creation of joint programmes between organisations especially in regard to the control of fishing gear where lost equipment or abandoned nets and cages cover the reef killing the reef structure and all associated marine organisms.[249] Responsible fishing methods have been supplemented with a scheme that restricts the movements of the fishing industry through the designation of marine protected areas.

[242] E Jones note240 p7.
[243] The FAO was created in 1945 in order to coordinate regional fisheries. Its constitution, drafted at its creation sets down its responsibilities and objectives. http://www.fao.org/docrep/x5584E/x5584e0i.htm.
[244] Agreement to Promote Compliance with International Conservation Measures and Management Measures by Fishing Vessels on the High Seas 1993 (the Compliance Agreement).
[245] Op cit note53.
[246] FAO Code of Conduct for Responsible Fisheries Rome, FAO (1995) www.fao.org.
[247] Code of Conduct Article 6.8 and Article 7.5.
[248] For example the Reykjavik Conference on Responsible Fisheries in the Marine Ecosystem formed at the Reykjavik Conference on Responsible Fisheries in the Marine Ecosystem 2001 at the FAO 31st Session http://www.fao.org/docrep/meeting/004/Y2211e.htm.
[249] G Macfadyen et al 'Abandoned, Lost or Otherwise Discarded Fishing Gear' *UNEP Regional Seas Reports and Studies,* No. 185; FAO *Fisheries and Aquaculture Technical Paper,* No. 523. Rome, UNEP/FAO. 2009.

Marine Protected areas

Marine Protected Areas (MPAs) aim to protect diversity and stock against human impacts such as fishing in order to allow such stock to grow and for biodiversity to improve.[250] They were conceptualised under the Jakarta Mandate of the CBD[251] and defined by the IUCN as:

> A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values. [252]

Today there are around 5000 MPAs in the world although they only cover 0.7 percent of the world's oceans. [253] There are several types of MPA allowing for specific limitations and uses depending upon the given objectives.[254] The 'no-take' area or marine reserve is the most strictly managed area,[255] although an MPA can contain several zones with differing levels of conservation status along with a category designated by the IUCN in order to aid the international monitoring of comparable sites.[256] These efforts to provide international categories of MPA has proved worthwhile because no international Convention or legal instrument requires MPA designation, it is ultimately the decision of the State in question.[257]

The question of whether these MPAs are effective in conserving the coral reefs depends upon the success of their management. Good management is reliant upon the particular State however there is well documented evidence to suggest that management is poorly lacking and that the MPAs are 'paper parks'[258] with little success at conservation. Reasons for such poor management include a lack of

[250] PD Boersma and JK Parrish 'Limiting Abuse: Marine Protected Areas, a Limited Solution' (1999) 31/2 *Ecological Economics* 287 p296.
[251] Op cit note68.
[252] http://www.protectplanetocean.org/collections/introduction/introbox/mpas/story.html.
[253] The World Database on Protected Areas under the auspices of UNEP http://www.wdpa-marine.org/#/countries/about.
[254] These include restrictions on fishing methods or on quantity of stocks extracted. Full use by all industries can also be allowed within permit parameters or with research and education in mind.
[255] http://www.protectplanetocean.org/collections/introduction/introbox/reserves/story.html.
[256] The IUCN Protected Areas Categories System ranges from Ia Strict Nature Reserves to VI Protected Area with Sustainable Use of Natural Resources. For the interests of this paper, category V deals with Protected Landscape or Seascapes although all categories are relevant to the marine environment. http://www.iucn.org/about/work/programmes/pa/pa_products/wcpa_categories/.
[257] PD Boersma and JK Parrish note250 p291.
[258] P Sale 'Management of Coral Reefs: Where We Have Gone Wrong and What We Can do About It' (2008) 56 *Marine Pollution Bulletin* 805 p809.

education and capacity as well as a lack of finances and poor enforcement policies.[259] These reasons are further exacerbated by the fragmentation[260] and lack of coordination at each level.

The protection of coral reefs under MPA status therefore depends upon the type of protected area and upon the efficiency of the management scheme. Impacts upon coral reefs can also be reduced by prohibiting access to nursery sites which increases the fish stocks and the level of biodiversity[261] with a chance of a 'spillover' effect into the deeper water.[262] If protected, corals can recover especially if protected from fishing[263] Coral reefs are therefore indirectly protected from fishing in an MPA.

There is an understanding however, that due to the larval stages of coral and due to the ocean ecosystem being dynamic, an MPA network will only be effective if there are enough of them[264] and they are the right size.[265] The debate surrounding the size and number of MPAs has consequences for other users of the sea and for the State in question who may be incapable of enforcing and managing a larger area.

Do MPAs Protect Coral reefs?

The discussion above is only relevant if MPAs adequately cover coral reefs. If the majority of coral reefs are not covered by MPAs, or those that are covered are done so in an arbitrary manner, then protection is not possible. Although certain scholars believe that coral reefs are the most well protected habitat in the marine environment,[266] data suggests that around only 18 percent of all coral reefs are

[259] C Wilkinson note229 p770-771 Wilkinson also notes that poverty is a major reason for poor management particularly in the Asian Countries where the majority of reefs are located. Poverty alleviation therefore would enable improvement in all other factors.
[260] P Sale note258 p807.
[261] R Ovetz note227 p818.
[262] PD Boersma and JK Parrish note250 p298. However, See P Sale note258 p807 in which he states: 'sustaining or enhancing fishing yields in the unregulated spaces outside the MPA…evidence for this fishery sustaining effect remains almost non-existent…'
[263] Information by M Ford at Ars Technica http://arstechnica.com/science/news/2010/01/coral-reefs-show-that-they-can-rebound.ars.
[264] C Mora et al 'Enhanced: Coral Reefs and the Global Network of Marine Protected Areas' (2006) *314 Science* 1750 p1751.
[265] PD Boersma and JK Parrish note253 p294 where MPAs need to be over 50 percent of the total habitat in order to prevent overexploitation.
[266] M Spalding et al 'Letters' (2006) 314 *Science* 757 p758 in response to C Mora note 264.

protected by MPAs and of that number only around 2 percent are effectively managed.[267] Levels of effectiveness at the national scale will differ but there is evidence that coral reefs are still not properly covered by MPAs.[268]

Work has begun to see whether the increase in MPAs and related research has made a positive impact upon the protection of coral reefs. [269] It will be interesting to see its conclusions. Questions of whether the renaming of MPAs to marine Management areas[270] would provide more guidance and success for management would also be a welcome area of research.[271]

The chance of successful MPAs requires full international cooperation and coordination as well as collaboration with the local fishermen and the local community with whom the reefs are a necessary part of life. In addition to this a strengthening at management level through education would aid in the success of the MPA network. The MPA could be a strong tool but only for those threats that can be controlled through the use of boundaries and zones[272] such as fishing.

Part II – Trade

The Legal Framework

Certain fishing methods are linked to the trade industry where corals and fish are collected for souvenirs or for the Asian food market. Regulation of this industry

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[267] www.wdpa.org data collected through private correspondence with Amy Milam and Simon Blythe of the WDPA and The International Coral Reef Symposium 2008 held in Florida, USA www.nova.edu/ncri/11icrs/.

[268] For example Tanzania contains 2,130 square kilometres of reef of which only 1.9 percent is covered in 13 MPAs even though Tanzania has 32 MPAs in total. See www.wdpa-marine.org/#/country/TZ.

[269] Reefs at Risk: A Map-Based Indicator of Threats to the World's Coral Reefs. The original was drafted in 1998 by D Bryant, L Burke, J McManus and M Spalding http://www.wri.org/publication/reefs-risk-map-based-indicator-potential-threats-worlds-coral-reefs. It is to be 'revisited' by the World Resources Institute and research began in 2008 http://www.wri.org/project/reefs-at-risk/reefs-at-risk-revisited.

[270] See SC Jameson et al 'The Three Screen Doors: Can marine 'Protected' Areas be Effective?' (2002) 44 *Marine Pollution Bulletin* 1177 p1181.

[271] This has been pursued by the World Bank who continues to research poverty alleviation in developing nations along with promoting sustainable development and use of coral reefs. See 'Scaling up Marine Management. The Role of Marine Protected Areas' (2006) http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/EXTCMM/0,,menuPK:407932~pagePK:149018~piPK:149093~theSitePK:407926,00.html.

[272] MPAs will be of no use to other threats such as pollution or alien species which are not limited by borders. PD Boersma and JK Parrish note250 p290.

is effectively controlled by one of the 'big four'[273] Conventions: The Convention on International Trade in Endangered Species of Wild Fauna and Flora.[274]

CITES notes that individual State action and international cooperation is necessary for the protection of all fauna and flora for it is as an 'irreplaceable part of the natural systems of the earth including the oceans.'[275] The principles of CITES[276] are governed through a listing process whereby all species deemed in need of protection are listed on one of three appendices. These appendices are regulated by a strict permit system[277] that is administered by a Scientific Authority and a Management Authority at the national level. [278] Each annex contains a list of species depending on the level of protection required.

Appendix I contains those species that are threatened with extinction and which are prohibited from trade apart from 'exceptional circumstances.'[279] Appendix I provides in Article III(5) for any species from the marine environment. There are however, very few marine species on Appendix I. Mammals and turtles occur in a reasonable number but considering there are 953 listed species and subspecies, no coral species, and very few reef fish species are listed[280] although this is understandable given the fact that coral and reef fish species are not yet threatened with extinction.[281] This trade restriction would however be a welcome addition under the precautionary approach.

Appendix II is a list of those species which are not threatened but would become so if trade continued unabated. Marine species are mentioned specifically in Article IV(6)[282] with a specific provision stating that any Scientific Authority can authorise quotas[283] for import depending upon agreement and cooperation between authorities

[273] Op cit note101.
[274] 1973 in force 1975. Hereafter called CITES.
[275] Preamble.
[276] Article II.
[277] Article VI.
[278] Article IX.
[279] Article II(1).
[280] http://www.cites.org/eng/app/e-appendices.pdf.
[281] There is no definition in the Convention for 'extinction' and it is for the State parties at the COP to decide upon its placement in such a strict list.
[282] Following Article III(5).
[283] Quotas have been recorded for several species of coral. For example Fiji and Indonesia have recorded quotas of Anchor Coral (*Euphyllia ancora)* since 2000 either wild taken, alive or dead or

which must be reviewed annually.[284] Appendix II contains the majority of coral species controlled under CITES (230 species) but considering there are 33000 species of flora and fauna listed on Appendix II, corals are relatively underrepresented. Reef fish are present but again not in large numbers with the majority of organisms being shark, turtle and whale species[285]

Appendix III lists those species noted by a specific party which require international cooperation in regulating their trade.[286] The emphasis is on utilising the relevant States legislation and ensuring help from other member States. The issue remains for some as to the relevance of such an Appendix; for if the national legislation was effective then a listing would not be required.[287] Appendix III contains 171 species and sub species listed with the majority being mammals. In the marine environment, several turtle species and four sub species of coral have been listed by China[288] as well as one type of mollusc by South Africa.[289] It is unfortunate that this Appendix has not been fully utilised for it would be an opportunity for many States to provide more protection over certain coral species found in their waters.

Does CITES Protect Coral reefs?

Although CITES has been deemed a successful treaty because of its flexibility[290] and large number of members, [291] CITES is not a protectionist treaty and does not aim to fully conserve the species but limit its exploitation as part of sustainable development.[292] Successful as it is, gaps in enforcement have been discovered due to the number of species listed and their misidentification, the

farmed. Fiji has a quota of 300 pieces for the year 2009 and Indonesia has 32000 pieces for the same year. http://www.cites.org/common/quotas/2009/ExportQuotas2009.pdf.

[284] Article IV(7).

[285] Ibid.

[286] Article II(3).

[287] Op cit note1 p392.

[288] The Coral species are the *Corallium* family. See http://www.cites.org/eng/app/e-appendices.pdf.

[289] The Abalone (*Haliotis midae)*. One species of sea cucumber has also been listed by Ecuador.

[290]Particularly in its amendment process. Article XV.

[291] As of beginning of 2010 there were 175 member States.

[292] D Ong 'The Convention on International Trade in Endangered Species (CITES, 1973): Implications of Recent Developments in International and EC Law' (1998) 10/2 *Journal of Environmental Law* 291 p294.

exemptions[293] and the available reservations[294] (although as yet no State has opposed the listing of a coral species).[295]

The Conference of the Parties has noted that there is a need to control the trade in coral species. A Resolution was passed in 2000 to include 'live rock' and stony corals into the definition of coral allowing complete coverage by CITES.[296] Further resolutions were drafted to provide further guidance on the identification of coral rock and coral species.[297] The trade in coral is therefore recognised as requiring further refinement to allow proper regulation and one which the Secretariat continues to monitor.[298] These guidelines are useful to ensure clear definitions; however, at a local level education for the customs officials is necessary to avoid misidentification. CITES has provided seminars and training sessions in this regard especially in the developing countries where a lack of capacity and financial stability is another factor.[299] Implementation of an import permit scheme for Appendix II would be a welcome amendment[300] for it is widely known that trade moves in a north-south direction with the USA and the developed world importing the majority of coral species.[301] Further amendments should also include a permit scheme for transit States to curb the large Southeast Asian export market.[302]

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[293] Article VII. These exceptions include specimens in transit, specimens for non commercial use and specimens for scientific research as well as those species that are bred in captivity or artificially propagated.

[294] Article XXIII of CITES. Reservations allow any State to oppose a listing at the time of ratification or when any amendments to the Appendices are made. For some this is an inherent weakness of CITES which undermines the objective of such a Convention. The COP made note of this and provided further guidelines on the use of reservations at the 4th COP in 1983. See Resolution 4.25. http://www.cites.org/eng/res/04/04-25R14.shtml.

[295] http://www.cites.org/eng/app/reserve_index.shtml.

[296] Resolution 11.10 (Rev Cop12) http://www.cites.org/eng/res/11/11-10.shtml.

[297] See for example Resolution 11.17 (Rev Cop 12) http://www.cites.org/eng/res/all/11/E11-17R12.pdf and 12.3 (Rev Cop13) part X which discusses the use of a generic scientific name if the particular species name is not known. http://www.cites.org/eng/res/12/12-03R13.shtml.

[298] See Notification to the Parties 2003/020 *'Trade in hard corals' List of coral taxa that can be recognized at species and at genus levels* 4th April 2003. http://www.cites.org/eng/notif/2003/020.pdf this has since been reviewed by the Secretariat in Notification to the Parties 2006/030 *Annual Report* 2 May 2006. http://www.cites.org/eng/notif/2006/E030wAnnex.pdf.

[299] Op cit note23 p689.

[300] D Ong note292 P297-298.

[301] V Nijman 'An Overview of International Wildlife Trade from Southeast Asia' (2009) Printed in Biodiversity and Conservation but accessed online www.springerlink.com [30th December 2009].

[302] Ibid p3-4.

CITES has attempted to control the trade in coral species but it is not yet broad enough[303] with options of exemptions and mislabelling leading to several species of coral being traded outside the procedures of CITES. Other species integral to the health of the coral reef as an ecosystem including 'grazers' and organisms such as sea stars and sea cucumbers are poorly represented in CITES with only a few species listed[304] even though the trade in these has a direct effect upon the reef. [305]

Reporting and data collection of trade in listed species must be done by each management authority for CITES is 'entirely dependent upon the accuracy at which [member] parties report this data.'[306] Without such accurate data, information on the success of trade control is inadequate and could lead to large discrepancies to the detriment of coral reefs.[307]

Although many scholars believe that CITES is of limited help to marine species including coral,[308] it is a step in the right direction with the potential to be an effective tool if enforcement is strengthened and the permit system is fully complied with.[309] Although trade is not the most detrimental threat facing the coral reefs[310] it is an area that is linked to sustainable development and one that can evolve and increase if the market for it is present. The methods by which such species are collected for trade are extremely destructive and by decreasing trade, such methods will be decreased and will become less of a threat. CITES has recognised that as the main legal instrument regulating trade in endangered species, there is a lot that can

[303] Ibid.
[304] The seahorse is listed on Appendix II but trade still continues in this species at an alarming rate. 16 million seahorses were traded between 1998 and 2007; mostly wild caught from Thailand. This number is probably a conservative number with not all trade reported.
[305] Many States do not wish to list commercial fish species because of the implications upon income and freedom of trade. The trade in species such as seahorses is classed by some States as being commercial for they are required for human consumption. RS Pomeroy et al 'Evaluation of Policy Options for the Live Reef Food Fish Trade in the Province of Palawan, Western Philippines' (2008) 32 *Marine Policy* 55.
[306] Nijman note301 p4.
[307] The reported trade in 1998-2007 consisted of 18 million pieces of coral and 2 million kg of live coral exported from Indonesia and Vietnam. The main importers were the USA, the EU and Japan. For fish species Indonesia and Malaysia were the main exporters and Hong Kong and China the main importers. Nijman note305 p5
[308] SM Wells and JG Barzdo 'International Trade in Marine Species: Is CITES a Useful Control Mechanism?' (1991) 19 *Coastal Management* 135. It is limited because of the classification by genus and the varied ways it can be measured; volume or pieces or both.
[309] M Davidson note98 p537.
[310] D Ong note292 p295.

be done through education and stricter reporting rules. This is supported by not only a plethora of joint agreements[311] and Memorandum of Understandings (MOU) with other conservation treaties[312] but with Non Governmental Organisations (NGOs) which publicise proper documentation as well as up to date and accessible information for tourists regarding aquarium fish, jewellery and souvenirs.[313] Work between States has also increased with strong networks in place to report upon trade and fishing methods.[314] More needs to be done to provide opportunities for the developing countries to ensure development but not at the risk of losing the coral reefs completely. Further work should be done to provide full training and education on the long term value of coral reefs *in situ* and this could begin with management plans and assistance with conservation strategies[315] and perhaps reiteration on the important role Appendix III could have.

There is an understanding that the trade in such species, in particular those species for consumption will not abate and a ban will not be an effective option so cooperation must be adequate enough to ensure sustainable practices.[316]

Research into aquaculture and mariculture and the harvesting of such species could have a large role to play.[317] As regards to trade however, the monitoring and identification of farmed species as opposed to harvested species would lead to

[311] UNEP and the World Conservation Monitoring Centre which manages the CITES species database http://www.unep-wcmc.org/species/sca/scs.htm as well as organising a consultation process on the ornamental fish trade in 2008 http://www.unep-wcmc.org/species/OrnamentalFishTrade.aspx It works closely with the Marine Aquarium Council (MAC) http://www.aquariumcouncil.org/ to create a database for which all members can gain information on the aquarium industry and the effects of trade.

[312] Most importantly the CBD http://www.cites.org/eng/disc/sec/index.shtml. There are also MOUs with the FAO and other United Nations organisations and national government departments such as the UK Department for Environment Food and Rural Affairs, although no agreements exist with developing nations.

[313] The ICRI has passed resolutions regarding sustainable and equitable practices in the trade of coral species. 2001 http://www.icriforum.org/secretariat/cebu_reso.html.

[314] The Global Marine Aquarium Database (GMAD) http://www.unep-wcmc.org/marine/GMAD/background.html and TRAFFIC www.traffic.org.

[315] AW Brucker 'Tracking the Trade in ornamental Coral Reef Organisms: The Importance of CITES and its Limitations' (2001) 3 Aquarium Sciences and Conservation 79.

[316] RS Pomeroy note305 p64. The article talks about the Palawan Live Reef Fish Ordinance 2006 p63

[317] RS Pomeroy 'Farming the Reef: Is Aquaculture a Solution for Reducing Fishing Pressure on Coral Reefs?' (2006) 30 *Marine Policy* 111 p112.

further issues of enforcement[318] but could provide opportunity for both the fishing and souvenir industries within the confines of sustainable development.

Part III – Pollution

There is a vast amount of international legislation[319] dealing with pollution because there are many types, sources and complications leading to an overall fragmented and piece meal attempt at prevention and reduction. Pollution is a large subject and so only the main international conventions that deal with sources of pollution that directly affect coral reefs will be discussed. These are land based sources, pollution from vessels and alien species.[320] Recognition must be made from the outset of the general provisions of UNCLOS from which these Conventions stem.[321] General measures are drafted for each source of pollution governed by the relevant organisation.[322] Furthermore UNCLOS has placed obligations upon the States through coastal,[323] flag[324] and port[325] State jurisdictions of which the territorial sea and EEZ are the most pertinent in regard to coral reefs. The arbitrary division of the ocean has already been discussed as a negative aspect of UNCLOS but the roles of the States have a large part to play in whether such divisions can be advantageous.

[318] V Nijman note301 p11.
[319] Op cit note222 p395.
[320] As we have noted already, pollution does not recognise boundaries or political zones and so any type of pollution in the marine environment could have detrimental impacts upon the coral reefs. However, the three specific types of pollution have more direct consequences and will be concentrated upon accordingly.
[321] Part XII of UNCLOS contains the most used definition of marine pollution in Article 1. The general provision of Article 192 which is expanded in Article 194 subject to State sovereignty set down in Article 193.
[322] Article 197. Land based sources are set down in Articles 207 and 213 and pollution from ships is found in Articles 211 and 217. Alien species are mentioned in Articles 196.
[323] Article 220. The legislative jurisdiction held by coastal States over the EEZ is restricted as it must fall in line with international standards especially in dealing with construction, design and equipment provisions. Article 21.
[324] Article 217.
[325] Article 218.

Part IIIa Land based sources

Coastal State sovereignty has become a barrier in an attempt to control the nine[326] land based sources[327] of pollution under the main legal instrument The Global Plan of Action for the Protection of the Marine Environment from Land Based Activities[328] which was created in 1995 at the Global Conference in Washington.[329] Although coral reefs are not mentioned specifically in reference to the different sources, the term coastal environment is used in all noting that this area is subject to the most damage from each source.[330] Chapter I of the GPA contains an action plan regarding the 'Physical alteration and destruction of habitats (PADH).' The different impacts upon the coastal environment by the different pollutants are mentioned followed by activities and policies to reduce such impacts. Furthermore, cooperation between financial institutions,[331] regional agreements and related Conventions is recommended as well as the establishment of MPAs.[332] Integrated Coastal Zone Management (ICZM) aims to provide an overarching protectionist regime which is furthered by the PADH Programme[333] and which reiterates the need for research and cooperation in order to ensure a reduction in LBS.[334] Although there has been international consensus that the GPA is *the* main instrument regarding regulation of LBS[335] there have been questions over its inherently weak nature[336]

[326] These are sewage, persistent organic pollutants (POPs), radioactive Substances, heavy metals, oils, nutrients, sediment, litter and plastics. This list is in line with Agenda 21 chapter 17.18.
[327] Hereafter called LBS.
[328] Hereafter called the GPA www.gpa.unep.org/documents/full_text_of_the_english/pdf.
[329] Ibid.
[330] Chapter V of the GPA.
[331] The Global Environment Fund (GEF) is mentioned in particular. Chapter IV part B.
[332] Mentioned in Chapter I paragraph 152(d) and 153(a) relating to national and regional protected areas. However, we have already mentioned the inability for MPAs to protect against such pollution. Op cit note272.
[333] The Physical Alteration and Destruction of Habitats (PADH) Programme http://www.gpa.unep.org/content.html?id=199&ln=6.
[334] Ibid.
[335] D Hassan *Protecting the Marine Environment from Land Based Sources of Pollution: Towards Effective International Cooperation* (2006) p98-99 notes that the information exchange through the clearing house as well as the continued call for cooperation are strong methods which are relevant regardless of the legal status of the instrument.
[336] D VanderZwaag 'The Protection of the Marine Environment from Land Based Pollution and Activities: Gauging the Tides of Global and Regional Governance' (2008) 23 *The International Journal of Marine and Coastal Law* 423 p441.

because it 'falls short of the initial proposals for a binding global treaty...'[337] The soft law status of the GPA is also questionable as it shows a level of discretion by member States for 'States will not accept arrangements which will reduce their capacity within areas which their sovereign discretion to act or not has traditionally been unquestioned.'[338] *Any* treaty, by definition however, aims to control State activity thereby impinging upon sovereignty so why States have embraced other treaties[339]and avoided any similar treaty for land based sources is questionable.

The Intergovernmental Review (IGR-02) in 2006)[340] monitors the progress of the GPA[341] and it was noted that although there was greater impetus shown by all States in controlling LBS,[342] no real progress had been made. A report prepared for the IGR-2[343] reported that conditions of marine habitats were worsening[344] and coral reefs were the most affected coastal system. Nutrient rich water from agricultural runoff which causes eutrophication and oxygen depletion had not abated leading to an increase in the number of 'dead zones' which destroy coral reefs.[345] An increase in coastal populations and coastal developments meant that sewage levels have increased and progress in treating the sewage before it runs into the coastal waters is slow. Asia, which contains a large proportion of the world's coral reefs, disposes 85 percent of its sewage into the sea without treatment.[346] Disposal of litter into the ocean was also worsening causing death of marine species and suffocation of the reefs. Efforts to curb disposal of litter therefore has been unsuccessful[347] as has the

[337] Op cit note23 p465.
[338] T Mensah note24.
[339] For example the International Convention on the Prevention of Marine Pollution by the Dumping of Wastes and Other Matter (the London Dumping Convention) 1972.
[340] The Intergovernmental Review Meeting on the Implementation of the Global Plan of Action for the Protection of the Marine Environment from Land Based Activities. Second Session held in Beijing, China October 2006 www.gpa.unep.org/GPA/IGR.2/7.
[341] Established un Paragraph 77 of the GPA and recognised in Agenda 21 Chapter 17.26.
[342] www.gpa.unep.org/documents/igr-2_key_outcomes_english.pdf.
[343] UNEP/GPA, *The State of the Marine Environment: Trends and Processes* (The Hague, UNEP/GPA, 2006) http://www.gpa.unep.org/documents/global_soe_webversion_english.pdf.
[344] Ibid page vi.
[345] Page 19.
http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=486&ArticleID=5393&l=en
Reports estimate a 2.7 fold increase in eutrophication in coastal ecosystems by 2050.
[346] Ibid p4.
[347] See for example A Cummins 'Sea of Garbage' (2008) *New Internationalist* 14 www.newint.org and see below with respect to pollution from ships.

reduction of heavy metals. Further cooperation over levels of litter[348] and heavy metals [349] as well as further reduction of the remaining sources continues but with no obvious signs of improvement.[350]

Improvement and advancement in the control of LBS could occur if supplementary legal instruments are established as evidenced by action against oil pollution and radioactive substances[351] and the recent POPs convention which restricts the use of toxic substances, which have long term effects upon coral reefs due to their non-biodegradable nature and accumulation in the ecosystem.[352]

Coral reefs will continue to be exposed to the substantial threat of LBS until uniform agreement on State limitation regarding sovereignty and an effective international regime can be established. These Conventions need not be on specific sources although this is the present trend of treaties, but could attempt to control the reasons for such LBS levels. Regulation of the agricultural industry regarding toxic substances in freshwater[353] would be a welcome addition and would emphasise the need for ICZM. Coastal areas that are developing rapidly to accommodate the growing tourist industry should also be restricted through international guidelines measuring the environmental impact such growth would have on the coral reefs. If this area is managed correctly, tourism and recreation could bring welcome income[354] and publicity to the coral reefs at the same time as ensuring conservation through sustainable tourism[355] alongside sustainable fishing practices. Without such

[348] UNEP, 2009. *Marine Litter: A Global Challenge.* Nairobi: UNEP.
[349] An agreement between 140 countries has been formed declaring that the drafting of a legally binding treaty to reduce the effects of mercury will begin this year. http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=562&ArticleID=6090&l=en
[350] There seems to be no consensus on how to improve this situation. Hassan suggests a legally binding instrument but yet another instrument will not help especially as the same issues remain. - A Bisiaux 'Book Review' (2007) 16/3 *Review of European Community and International Environmental Law* 379 p380.
[351] Oil is dealt with in many conventions including MARPOL (see below) with radioactive substances effectively controlled under the International Atomic Energy Agency (IAEA).
[352] The Stockholm Convention on Persistent Organic Pollutants 2001 www.pops.int.
[353]Including the United Nations Convention on the Law of Non-Navigational Uses of International Watercourses 1997 www.un.org.
[354] Op cit note7 and Asafu-Adjaye and S Tapsuwan 'A Contingent Valuation Study of Scuba Diving Benefits: Case Study in Mu Ko Similan Marine Park, Thailand' (2008) 29 *Tourism management* 1122 p1130.
[355] SK Nepal 'Sustainable Tourism, Protected Areas and Livelihood Needs of Local Communities in Developing Countries' (1997) 4/2 *International Journal of Sustainable Development and World Ecology*' 1350.

management the coastal areas will not be able to cope with the number of tourists and neither will the coral reefs.

Part IIIb Pollution from ships

Pollution from ships affecting coral reefs can include the recreational boats for the tourism industry[356] but it is associated more with the commercial shipping industry. Through cooperation at an international level, the threat of vessel pollution has been controlled by virtue of the international Convention for the Prevention of Pollution from Ships.[357]

MARPOL, governed by the International Maritime organisation (IMO),[358] provides global standards for the prevention and reduction of specific types of pollution that occur through the operation of vessels and all of which can affect coral reefs. These standards are contained within six detailed Annexes.[359]

Operational discharge of pollution from vessels is therefore permitted within the confines of MARPOL with the exception of plastic which is prohibited under Annex V but each type of pollution is restricted in terms of distance from shore which reduces immediate impact to the coastal waters and therefore the coral reefs.[360] Additional port State control through a certification system [361] also provides extra enforcement powers for those States who wish to protect their coastal waters.

[356] Larger boats for the diving industry can lead to an increase in pollution as well as damage from anchors and from inexperienced divers. See H Hasler and JA Ott 'Diving Down the Reefs? Intensive Diving Tourism Threatens the Reefs of the Northern Red Sea' (2008) 56 *Marine Pollution Bulletin* 1788 p1792.
[357] 1973, amended in 1978 and called MARPOL 73/78. Hereafter called MARPOL.
[358] Hereafter called IMO. Created under the auspices of the United Nations in 1958. It currently has 169 members. www.imo.org.
[359] Annex I and II deal with oil and noxious liquids. Annex III deals with harmful substances in packaged form. Annex IV contains standards on sewage and Annex V controls garbage. Annex VI which was added in 2005 relates to atmospheric pollution which will be discussed in the next section. Annex I and II are obligatory for each State to ratify and the remainder are optional but have seen relatively widespread acceptance. Article 14 Of MARPOL.
[360] For example must be discharged over 50miles from land and noxious liquids 12miles from land. Treated sewage can be released within 3miles of land but untreated must be over 12miles away.
[361] Article 5 of MARPOL following Article 219 of UNCLOS. This scheme does not exist in relation to Annex V.

Strict measures for the shipping industry have been fundamental to the reduction of oil pollution[362] however while oil is damaging in the short term, its biodegradable nature means that long term effects are minimal, and for the interests of coral reef protection, the preventative measures to control oil spills such as dispersal are reported to be more dangerous and toxic to the coral reefs than the oil itself.[363] Degradation of coral reefs is more immediate from other types of pollution which MARPOL also aims to reduce. Treatment and reception facilities for the disposal of sewage are on IMOs agenda[364] and this must be applied to all vessels including recreational vessels that are located around coral reefs. In addition, Annex V must be strengthened and enforcement opportunities improved in order to curb the increasing threat from garbage.[365] Further initiatives by IMO[366] along with joint programmes[367] and cooperation with coastal communities[368] illustrate this need. Assessment of Annex VI must also continue so that atmospheric reductions are increased in line with the action on climate change.[369] The shipping industry is extremely large and although IMO continues to review this Annex[370] the omission of carbon dioxide from this treaty is glaring and one that must be rectified.[371]

Although atmospheric pollution must still be integrated with international regulations, coordination between IMO and other related organisations and

[362] GESAMP Reports and Studies No.50: *Impact of Oil and Related Chemicals on the Marine Environment* (London 1993) www.imo.org/environment/mainframe.asp?topic_id=1561.
[363] S Shafir et al 'Short and Long Term Toxicity of Crude Oil and Oil Dispersants to Two Representative Coral Species' (2007) 41 *Environmental Science and Technology* 5571.
[364] IMO has drafted further resolutions on the reception requirements and discharge of sewage. See Resolution MEPC.165(56) 2007 and Resolution MEPC.157(55) regarding rates of discharge for untreated sewage.
[365] A Cummins note347 in which she describes 'a gargantuan spinning gyre of plastic trash' discovered in the Pacific Ocean.
[366] IMO along with the United Nations General Assembly in its Resolution 60/30 www.un.org/ga have begun to review Annex V and to develop further guidelines for the its implementation. MPEC have established an Intersessional Correspondence Group which will assess the annex's effectiveness as well as areas which can be improved. the outcome is still forthcoming. www.imo.org/environment/mainframe.asp?topic_id=297.
[367] Op cit note348 p21 partners include the GPA, The Ocean Conservancy and IMO.
[368] Litter is collected from the coastline and from the sea bed especially around coral reefs and dive sites during 'clean up days' organized by Project Aware. http://www.projectaware.org/content/index.php?pid=42.
[369] See below.
[370] Annex VI was revised at the 58th meeting of MPEC in 2008 with further reductions required in specific substances including nitrous oxide (NOx).
[371] MPEC established a working group on Greenhouse Gas Emissions from Ships to investigate the viability of a legal instrument dealing with carbon dioxide emissions. It will meet again in 2010 to discuss its findings. www.imo.org/environment/mainframe.asp?topic_id=1320&doc_id.

treaties[372] has shown that a holistic approach to protection of the environment from vessel pollution is necessary and the designation of special areas under the Annexes of MARPOL is a welcome addition although special areas do not relate to coral reefs but are generally enclosed seas or semi enclosed seas where pollution cannot escape and therefore levels increase rapidly.[373] Special areas have been expanded by IMO to include particularly sensitive sea areas (PSSAs).[374] PSSAs illustrate a worldwide agreement that restrictions on certain areas of the ocean must occur because of their 'significance for recognised ecological or socio-economic or scientific reasons and which may be vulnerable to environmental damage...'[375] although these areas are restrictions on damage from vessels only and do not attempt to control any other damage originating from fishing or recreational uses of the ocean. These PSSAs are designated by the relevant State and although do not equate to legal designation, they allow the State in question to apply additional protective measures (APMs) against any vessel using the area including pilotage or further restrictions on pollution. Of the 11 PSSAs so far designated, six of them contain coral reefs[376] which provide a further level of protection at the State's discretion. Some States may see such a measure as too restrictive upon navigation and development[377] but they do serve a basic purpose which is to increase the coastal State power over an area of their territory and to ensure further protection for their environment if they so wish.[378] The environment will still be at risk from other sources of pollution even if APMs are required for vessels; biological pollution from vessels is becoming a serious threat to the coastal environments.

[372] In line with Article 194(5) of UNCLOS and through cooperation with associated instruments such as the The International Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal 1989 (Basel Convention) Article 4(2)(d) and the CBD Article 8.
[373] For example the Baltic Sea is a special area under Annex I, II, V and VI
[374] Created in 1991 and modified most recently in 2005 Resolution A.982(24) *'Revised Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas*.' http://www.imo.org/includes/blastDataOnly.asp/data_id%3D14373/982.pdf.
[375] Ibid Paragraph 1.2.
[376] Including the Great Barrier Reef, the Florida Keys and the Galapagos Archipelago. www.imo.org
[377] S Bateman and M White 'Compulsory Pilotage in the Torres Strait: Overcoming Unacceptable Risks to a Sensitive Marine Environment' (2009) 40 *Ocean Development and International Law* 184
[378] B Sage 'Precautionary Coastal States' Jurisdiction' (2006) 37 *Ocean Development and International Law* 359 p373.

Part IIIc Alien Species

The threat to coral reefs from alien species that are transported through ship's ballast water has increased with the number of vessels and the size of their ballast tanks.[379]

Coral reefs, being in the coastal areas and therefore often close to ports, have seen an increase in species that destroy the natural ecosystem by out competing local organisms, or bringing pathogens or toxic organisms which can kill local habitats and become a hazard to human health.[380] Guidelines were drafted by the IMO,[381] but further action was called for under both Agenda 21[382] and the CBD in 1992[383] which called for an international legal instrument to control the spread of such pollution. The International Convention for the Control and Management of Ships' Ballast Water and Sediments[384] was drafted by IMO and although it contains some strong provisions and minimum standards that States must follow,[385] it is still not in force.

There is concern that the Convention is biased in favour of the shipping industry which 'allows little room for measures protecting the biodiversity in

[379] Vessels take on water into ballast tanks and discharge depending upon their cargo in order to stabilise the ship while in transit. This water can contain organisms and toxic substances as well as large amounts of sediment.
[380] See for example the damage done to the black corals of Hawaii because of the introduction of the snow coral. JA McNeely 'Strangers in Our Midst: The Problem of Invasive Alien Species' (2004) 46/6 *Environment* 16.
[381] The 1991 International Guidelines for Preventing the Introduction of Unwanted Organisms and Pathogens from Ship's Ballast Water and Sediment Discharges. MPEC Resolution 50(31) www.imo.org.
[382] Chapter 17.30 asked for 'adoption of appropriate rules on ballast water discharge to prevent the spread of non-indigenous organisms.'
[383] Article 8(h) of the CBD notes that 'States should prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species.'
[384] 2004 not yet in force. Hereafter called the Ballast Convention. www.imo.org.
[385] For more information on this Convention and its provisions see M Tsimplis 'Alien Species Stay Home: The International Convention for the Control and Management of Ships' Ballast Water and Sediments 2004' (2005) 19/4 *The International Journal of Marine and Coastal Law* 411.

unpolluted areas.'[386] Restrictions on discharge zones are not as obvious as uptake zones which seemingly protect already polluted areas and not clean areas of the ocean.[387] Evidence suggests that the drafters did not want to inconvenience or alienate the shipping industry and so have left behind an 'innocuous' convention where 'major risks remain.'[388]

IMO has continued to draft guidelines for the implementation of the Ballast Convention[389] and further decisions by relevant international treaties recognise that the Convention should be in force regardless of the inadequacies.[390] Partnerships exist that continue to push for full ratification of the treaty but also aim to improve standards of ballast water use in the interim including the GloBallast Programme initiated by IMO, the GEF and the UNDP[391] as well as further work being done by the IUCN at a national level[392] In addition, other organisations, especially those involved in coral reef protection understand that further information on the dangers of alien species in the coastal ecosystems must continue.[393] It is questionable however, whether so much research can make an impact and reduce the damage done by alien species to the coastal habitats including coral reefs without the backing of a legal instrument. It has been six years since the Ballast Convention was drafted: the lack of worldwide agreement about its importance is of concern. In this specific area of pollution, there is still no legally binding agreement that can work towards the protection of coral reefs.

The threat of pollution in each of its different form is still an enormous threat to the world's coral reefs regardless of the legal provisions for its reduction. The Conventions we have mentioned above have had mixed results and there is still a real concern for the coral reefs against such a wide spread threat. This is

[386] Ibid p438.
[387] Regulation C-4.
[388] M Tsimplis note385 P444.
[389] The IMO Marine Environment Protection Committee (MPEC) has published guidelines at every Session since the Convention was drafted. See www.imo.org/mpec. These include monitoring and reporting on ballast water management systems at the 58th Session in 2008. There were none at the 59th Session in 2009.
[390] The CBD has continued to draft decisions regarding this topic. See for example COP 8 Decision VIII/27 *and* COP 9 Decisions IX/4 http://www.cbd.int/invasive/cop-decisions.shtml.
[391] http://globallast.imo.org/.
[392] For example see the Global Invasive Species Programme http://www.gisp.org/index.asp
[393] The ICRI http://www.icriforum.org/thailandGM/PDF/Reco_IAS_2009.pdf.

compounded yet further by the largest threat of all which is in essence a form of pollution; climate change.

Part IV Climate Change

The threats mentioned above are compounded further by the unpredictable nature of climate change.[394] Evidence has shown that the increase in anthropogenic emissions of carbon dioxide has changed the global climate and seen a change in the temperatures around the world. This change in climate has had huge impacts on the oceans and the coral reefs.[395] Sea level rise and a rise in sea level temperature can cause coral bleaching events that stress the corals and leave them fragile to other threats including disease, invasive species and extreme storms. Storms, tsunamis and changes in atmospheric conditions including El Niño[396] can damage the reef structure further. The excess carbon dioxide in the atmosphere is absorbed by the ocean in greater amounts causing acidification which affects the structure and growth of the coral reefs in addition to an increase in algae blooms.[397]

Although certain threats have been curbed successfully at the international level,[398] further work must be done by specific areas of industry[399] as well as global effort through the United Nations Framework Convention on Climate Change.[400] The continued concern of climate change has seen a wide ratification of the UNFCCC[401] with constant discussions on how to curb emissions and mitigate against continual degradation through the use of sustainable development. There is

[394] BD Keller et al 'Climate Change, Coral Reef Ecosystems, and Management Options for Marine Protected Areas' (2009) 44 *Environmental Management* 1069 p1074.
[395] JEN Veron et al 'The Coral Reef Crisis: The Critical Importance of <350ppm CO2 (2009) 58 *Marine Pollution Bulletin* 1428.
[396] The El Nino Southern Oscillation (ENSO) which is a shift in current patterns of the Pacific Ocean. C Birkeland *Life and Death of Coral Reefs* (1997) p91.
[397] For more information see D Herr and GR Galland (2009). *The Ocean and Climate Change. Tools and Guidelines for Action.* IUCN, Gland, Switzerland p16.
[398] For example, the Vienna Convention for the Protection of the Ozone Layer 1985 and the Montreal Protocol 1987 control the use of harmful substances that deplete the ozone layer including CFCs which affect ocean productivity through an increase in ultra-violet radiation. Op cit note396 p111.
[399] See above page 67.
[400] 1992 drafted at the Rio Conference. Hereafter called the UNFCCC.
[401] As of October 2009 there were 194 parties.

however, an emphasis on adaptation. Emissions are not to be prevented they are to be stabilised so that natural resources can adapt accordingly.[402] This adaptation by ecosystems would include coral reefs as an important 'sink'[403] for carbon dioxide absorption and would be an important factor in reducing threats to developing countries.[404] Management and conservation of these sinks is an important part of emissions control, especially for developing countries[405] but the provision is not expressed in mandatory language indicating that States must merely think about climate change policies in this regard.[406] If reefs were effectively protected and managed, then their health would be an indicator as to the health of the ocean[407] and the world. In addition, they would provide for the coastal communities in terms of sustainable development and controlled growth. However, reports and discussions have proved that this has not been the case with reefs continually being degraded and lost at a startling rate.[408] Research is continuing by many organisations regarding the diverse effects of climate change on coral reefs[409] and many international meetings ensure ocean conservation and coral reef protection are important factors.[410] However, the threats to coral reefs seem to be overwhelming and difficult to overcome. The World Conservation Congress noted that out of 900 resolutions passed by 183 countries; only one recommendation could be concluded regarding coral reefs.[411] Continuous discussion about the importance of coral reefs and their threatened existence ends with action plans but no action, although ocean

[402] Article 2.
[403] Defined in Article 1 as 'any process, activity or mechanism which removes a greenhouse gas…from the atmosphere.' The ocean as a whole is a 'reservoir' which is 'a component or components of the climate system where a greenhouse gas or a precursor of a greenhouse gas is stored.'
[404] Article 3(3).
[405] Article 4(1)(d) and 4(1)(8) which deals with islands and low lying coastal areas. Coral reefs are not expressly mentioned however.
[406] Op cit note23 p370.
[407] D Laffoley 'To Save the Planet, Save the Seas' (2009) http://www.iucn.org/what/climate/?4470/To-Save-the-planet-save-the-seas
[408] Op cit note6.
[409] D Oburra and G Grimsditch (2009). *Coral Reefs, Climate Change and Resilience – An Agenda for Action from the IUCN World Conservation Congress.* October 6-9 2008.
[410] The World Conservation Congress held in Spain, 2008 under the auspices of the IUCN.
[411] Recommendation 4.080 'Mobilising Action to Build Resilience and Assist Adaptation to Climate Change in Coral Reefs and Marine Ecosystems and People that Depend on them (2008). http://intranet.iucn.org/webfiles/doc/IUCNPolicy/Resolutions/2008_WCC_4/English/RES/res_4_080_mobilizing_action_to_build_resilience_and_assist_adaptation_to_climate_change_of_coral_reefs_and_marine_ecosystems.pdf.

conservation as a whole has increased in popularity through protected areas[412] and community initiatives.[413] Ocean preservation has also become the subject of strong cooperation and coordination between many States who recognise the need to protect the oceans in order to protect themselves against climate change. This interrelationship between protection and preservation of coral reefs and the human population is extremely important and became the main focus of the World Ocean Conference (WOC)[414] and the Manado Declaration[415] as well as regional work including the Coral Reef Initiative (CTI).[416] Future meetings will see further action on this interrelationship including the Sustainable Ocean Summit in 2010 which will be the first meeting of all businesses and industries that rely on the ocean.[417]

Although these meetings are welcomed and illustrate the international community's concern over the health of the oceans, they have not yet persuaded legal instruments to follow suit. The aim of Oceans Day[418] at COP 15 of the UNFCCC[419] was to ensure a place for the oceans in the fight against climate change. This was supported by over 40 countries, associated Conventions, [420] organisations[421] and government initiatives.[422]

What was achieved however was far from positive in respect to the coral reefs. While adaptation was an important part in proceedings, in particular ecosystem

[412] BD Keller op cit note394.
[413] JE Cinner op cit note241.
[414] World Ocean Conference (WOC-2009) held in Manado, Indonesia www.iisd/ca/oceans/woc2009/.
[415] The declaration was drafted by the Ministers who recognised the importance of the oceans and who aim for further research and cooperation and a reduction in all anthropogenic threats ensuring sustainable use of the coral reefs and other marine ecosystems. http://www.cep.unep.org/news-and-events/manado-ocean-declaration.
[416] The first CTI Summit was held at the same time as WOC-2009 and saw partnerships and coordination in order to facilitate the Manado Declaration. http://www.cti-secretariat.net/.
[417] www.oceancouncil.org although there is no mention of a representative solely for coral reefs.
[418] www.oceansday.org.
[419] 7th-19th December 2009 held in Copenhagen, Denmark.
[420] The CBD reported at Copenhagen that increases in Carbon dioxide emissions were causing irreversible damage to the marine habitats. http://www.cbd.int/doc/press/2009/pr-2009-12-14-marine-en.pdf.
[421][421] The IUCN presented a position paper at Copenhagen reiterating the utilisation of the oceans and the marine ecosystems as necessary tools against climate change. http://cmsdata.iucn.org/downloads/iucn_position_paper_ocean_and_coasts_unfccc_cop15_ddc_auv.pdf.
[422] For example the Global Forum on Oceans, Coasts and Islands (the Global Forum). www.globaloceans.org.

based adaptation supported by UNEP[423] and the IUCN[424] no mention was made of the oceans in the decisions[425] or in the final Copenhagen Accord.[426] Priority instead was given to forests and the need for forestation programmes under the Reduction of Emissions from Deforestation and Forest Degradation Programme (REDD)[427] with no consideration for the utility of coral reefs.

The Copenhagen talks were therefore disappointing for coral reefs in two respects. The general outcome of the COP was disappointing with no legal instrument forthcoming and one that failed to gain consensus throughout the world. Several countries were disappointed with the outcome especially developing countries who felt that although financial help had been presented by the developed nations[428] the lack of a binding agreement was of detriment to those States most at risk from climate change. Several States refused to sign the Accord including States containing coral reefs.[429] The failure of the international community to reach a legally binding decision in regard to climate change is a sign of political differences and economic priorities where future decisions hang in the balance. In addition, the lack of specific mention of coral reefs leaves a question mark as to the importance held for coral reefs in any adaption plan. It is understandable that forests are necessary to any climate change strategy because of their importance as a carbon sink, but with coral reefs deemed to be as important, and perhaps more biodiverse than forests,[430] their omission seems to be problematic.

[423] http://www.unep.org/climatechange/UNEPsWork/Adaptation/tabid/241/language/en-US/Default.aspx.
[424] R Watson 'Intelligent Decisions' (2009) 2 *World Conservation* discussed the increase in ecosystem capacity in order to reduce the stresses of climate change. www.iucn.org/knowledge/news/focus/2009_eba/?4140/Intelligent-decisions.
[425] Decisions and summary of the Copenhagen meeting accessed at www.climate-l.org.
[426] The Copenhagen Accord was the final agreement drafted by all member States at the COP which was to become 'operational immediately' for those who signed it. See paragraph 1. Http://unfccc.int/files/meetings/cop_15/application/pdf/cop15_cph_auv.pdf.
[427] Draft decisions CP.15 *Reducing Emissions from Degradation and Forestation Degradation* http://unfcc.int/files/na/application/pdf/cop15_ddc_auv.pdf and Paragraph 6 of the Copenhagen Accord.
[428] Paragraph 7 of the Accord notes the availability of 30 billion US Dollars for the developing countries and the small island developing States, followed by a further 100 billion US Dollars to finance mitigation actions especially forestation projects.
[429] For example Kiribati, Tuvalu and the Solomon Islands. http://unfccc.int/meetings_15/press/items/5222.php.
[430] Op cit note1.

What also seems to missing is any discussion on the rehabilitation of coral reefs, in a similar vein to the reforestation programmes. Research has shown that reef restoration could be a successful avenue for rehabilitating reefs so that they are given a stronger chance against the impacts of climate change.[431] Several projects have occurred in Thailand and include public participation by the local community.[432] Transplantation and reattachment of coral fragments have been attempted in addition to the creation of artificial reefs.[433] This has been taken one step further in Indonesia where electricity is pumped through artificial reefs as a catalyst for coral growth.[434] Indirect restoration projects exist elsewhere and include alternative options for fishermen reducing the overuse of the reefs.[435] Restoration projects along with strengthening capacity and management of coral reefs would therefore benefit the local communities, the health of the ocean and would provide action against climate change within the boundaries of sustainable development.

Regardless of the well attended conference in Copenhagen and its worldwide importance, climate change still remains a massive threat and one that the world cannot agree on. It remains to be seen whether the Copenhagen Accord will be a successful starting point for further action in adapting to climate change but the lack of legal instrument and unanimous decisions does not bode well. Nor, for the point of view of coral reefs does their omission from the Accord or from any worthwhile discussion.

[431] B Rinkevich 'Management of Coral Reefs: We Have Gone Wrong When Neglecting Active Reef Restoration' (2008) 56 *Marine Pollution Bulletin* 1821.
[432] Yeemin et al 'Coral Reef Restoration Projects in Thailand' (2006) 49 *Ocean and Coastal Management* 562 p566.
[433] Ibid p566.
[434] S Bennett 'It's Alive!' (2008) 52/2 *Asian Geographic* p38.
[435] Seaweed harvesting for the international market has become an important income for the inhabitants of Rinca: the main island in the Komodo National Park. http://www.gokomodo.org/people.html.

Chapter 5

CONCLUSION

There is no doubt that coral reefs are an important part of the world's biodiversity and an invaluable part of the ocean ecosystem. It is also apparent that coral reefs have become increasingly important in regard to the sustainable development of many developing countries and those communities that rely on them. However, their importance is obscured by evidence of their extremely threatened existence and their continual degradation.

There is no overarching legal instrument that solely protects coral reefs therefore the above discussion looked at several areas of international law that dealt with coral reefs by including them into their remit. Conventions that aimed to reduce threats to coral reefs, or the marine environment in general were also analysed.

There is a wealth of international law and a large amount of international cooperation regarding the importance of the marine environment but overall, coral reefs are not adequately covered by any of them. The CBD provides wide scope for the protection of biodiversity and programmes do exist for the marine and coastal environment, but as yet talk has not developed into worthwhile action. The CBD has however been a strong advocate for further research and coordination between other Conventions and organisations that are attempting full conservation of coral reefs.

While Conventions such as Ramsar and the World Heritage Convention have ample scope to fully incorporate coral reefs into their ambit, State practice illustrates a reluctance to do so. Whether this is due to the question of State sovereignty under UNCLOS or whether protection of the reefs would be of detriment to the coastal community in the short term is questionable, but this reluctance is also found within the Man and Biosphere Programme which is not even a legal document and which tries to incorporate the community into any protectionist scheme.

Marine Protected areas have been cited as the main tool with which to protect coral reefs but although on paper they are a worthwhile initiative, fragmentation, mismanagement and a lack of capacity has meant poor protection methods used in many of the most pertinent countries. This is in addition to the fact that MPAs simply cannot protect reefs from diffuse threats such as pollution.

Protected areas in theory should work for those threats that can be controlled by boundaries, and there has been a worldwide recognition that fishing methods and overfishing are causing a great deal of damage and this has seen international consensus over certain types of gear used. This is a welcome start, but more needs to be done regarding fishing gear that has a direct impact upon the coral reefs at both the commercial and artisanal level as well as those fishing methods linked to other industries including trade.

While fishing is a major threat, a multitude of factors have seen the health coral reefs deteriorate over the last decade. It is understandable that each threat is dealt with by a different legal regime because of their wide distribution and the variety of players involved but this has led to yet more fragmentation and poor enforcement.

All States agree that pollution is a growing threat and one that must be controlled. Nevertheless, the legal regime controlling this threat is piece meal. Sovereignty regarding land based sources of pollution has meant that a legally binding document is still not forthcoming even though reports illustrate the severity and seriousness of this type of pollution. The most successful in respect to pollution is MARPOL, but it deals only with vessels and even then the most success is in relation to oil. Garbage and sewage are still considerable threats to the health of the coral reefs.

There seems therefore to be a large gap in coral reef protection at the international level. Without a global regime, differences appear in the method and success of regional and national schemes. The common heritage of mankind principle means that loss of coral reefs and their biodiversity would be a worldwide loss which should, override State sovereignty as seen in other international Conventions such as the London Dumping Convention. Division of the ocean under

UNCLOS has also hindered such a worldwide attempt at ecosystem protection, providing impetus for non-action on economic or political grounds. This is unacceptable and will cause long term damage to the marine environment and further loss of coral reefs.

Whether future action includes a separate Convention specifically for coral reefs is doubtful even though this would provide a strong baseline from which State practice must act. A minimum threshold and uniform measures on how to preserve and conserve coral reefs through sustainable development alongside community cooperation would be the most positive outcome. This however will not occur due to a multitude of factors that have seen other Conventions lose momentum. State sovereignty, short term goals against poverty and political will are lacking in all aspects of international law in addition to poor enforcement capabilities by developing States. The other alternative therefore is a strengthening of current Conventions by providing financial assistance and capacity building along with full coordination between all relevant Conventions. Gradual acceptance of such collaboration is evident but the outcomes are still disappointing. What exists therefore is an unsatisfactory and ineffective legal regime and a situation where the state of the world's coral reefs continues to disintegrate.

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