Marine
PROTECTED AREAS
WWF's Role in their Future Development

WWF INTERNATIONAL
Discussion Document

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The document represents a consensus of many opinions, but does not necessarily imply agreement with all those involved in marine activities in WWF.

Executive summary

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1. Introduction

There are now some 1,300 marine protected areas (MPAs), but there is an urgent need to establish more and to ensure that existing ones are effectively managed. WWF has been involved in such efforts for many years at national, regional, and international levels. The WWF/IUCN (World Conservation Union) Marine Policy lays out five objectives covering fisheries, threatened marine species, integrated coastal management (ICM), pollution, and MPAs. The objective for MPAs is:

- The establishment and implementation of a comprehensive global network of ecologically representative, well-managed marine protected areas designed to conserve areas of high biological importance and productivity.

This document outlines some of the key issues involved in MPA establishment and management, in order to provide a basis for setting priorities and developing WWF's role.

2. Protecting marine environments

Ecological boundaries are often less well defined in the ocean than on land and tend to be less static. Linkages between marine ecosystems are often more complex and occur on a larger scale, with nutrients and larvae, as well as pollution, being carried over large distances on ocean currents. Cetaceans, large pelagic fish, turtles, and other species migrate enormous distances, to breeding and feeding grounds. These characteristics of the marine environment require the designation of networks of MPAs which can respond to changing ecological conditions, and take long-distance processes into account, based within a broad framework of ICM.

In comparison with terrestrial systems, very little is known about ocean processes and populations, which may lead to inappropriate management decisions being taken. Throughout much of the world, the oceans have historically been perceived and managed as an open-access commons, and are often subject to multiple, conflicting use, which makes MPA establishment particularly challenging.

3. Definitions and categories of MPAs

As human uses of the marine environment expand and intensify, the aims, definitions, and management approaches of MPAs are becoming increasingly flexible. The term 'MPA' now means different things in different places, a point which is reflected in national legislation and, to a lesser extent, in global treaties and agreements. IUCN uses 'MPA' as a generic term and provides the following definition:

- Any area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical, and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment.

This definition is intentionally very broad and encompasses areas established for

a variety of purposes (including fisheries management), provided they have a conservation objective. This definition also covers areas protected by 'effective means' other than statutory legislation, and thus includes areas set up under customary tenure or voluntary agreements, provided these are deemed 'effective'. For the purposes of this document, the IUCN definition is being followed and the term MPA is used generically to describe all types of MPAs.

IUCN has developed a system of categories, based on the primary management objective of the protected area, which provides a common international language for protected areas, facilitating communication, information sharing, comparison, and analysis, as well as providing a useful basis for planning national protected area systems. The six categories, applicable to marine and terrestrial protected areas worldwide, range from areas managed as strict nature reserves to multiple-use areas managed mainly for sustainable use. Concerns have been raised about whether some of these categories provide adequate biodiversity protection, although if the objectives of a protected area clearly meet the criteria, this should not be an issue.

Effective national systems of protected areas are most likely to need a combination of categories, established and managed strictly according to the criteria. The key issues may be judging the proportion of a protected area system that should fall under each category to ensure that all ecosystems are represented and that a range of ecological and social goals is met, and ensuring that all areas are effectively managed to meet their management objectives.

No-fishing zones (NFZs)

An increasing number of studies are demonstrating the benefits of NFZs both to fisheries and to the ecosystems that maintain them. These benefits include: increased abundance and size of individual fish within NFZs; emigration of target species to adjacent fishing grounds; increased production of eggs and larvae and export of these to adjacent fisheries; increased fertilization success due to density effects; and protection of habitat for spawning and settlement of eggs and larvae.

NFZs may thus serve as an insurance policy against failure of other fishery management measures. It may also be easier and less expensive to enforce an NFZ than to enforce other regulations, since any observed fishing is a proof of breach. Furthermore, once fishers find that NFZs result in increased catches outside the area, they may enforce the NFZ themselves. Where these benefits have been demonstrated, NFZs are being established with relative ease, particularly when alternative sources of income are available through tourism. They can be designated as stand-alone measures under protected area or fisheries legislation, or as zones within larger multiple-use protected areas.

Modelling suggests that a wide variety of fisheries will benefit from NFZs, but most field research has been carried out in coral reef environments, where fish are relatively sedentary. For highly mobile and migratory species, an NFZ will directly protect individuals only while they are inside an area. This can be of major benefit, however, if the NFZ is established at the location of a spawning site, or at some other site where seasonal aggregations occur. Given that the establishment of an NFZ is likely to cause a redistribution of fishing effort, it is essential that NFZs are established within the context of a broad fishery management and MPA plan.

MPAs for pollution prevention

MPAs cannot play a major role in addressing threats from marine pollution because of the fluid nature of water. However, several mechanisms are available to designate marine areas in which discharges from shipping are banned or regulated and routeing measures imposed. Such areas include Special Areas, which may be declared under MARPOL 73/78, and Particularly Sensitive Seas Areas (PSSAs) which are designated through the International Maritime Organization (IMO).

Offshore MPAs

The majority of MPAs have been established close, if not adjacent, to shore but many offshore areas are equally diverse and productive, are important spawning areas, nursery grounds, and migration routes, and are as threatened. Several offshore MPAs have already been established but the need for such MPAs is not widely recognized. Implementation and enforcement may be particularly difficult offshore. Nevertheless initiatives are under way, for example in the northeast Atlantic, to establish such areas.

MPAs beyond national jurisdiction

MPAs are generally established under national jurisdiction, within a nation's territorial waters or exclusive economic zone (EEZ). Growing recognition that marine ecosystems do not respect political boundaries, and increasing access to the deep sea via improved technology, mean that such designations alone may no longer be sufficient. Designating MPAs in international waters presents particular legal and institutional challenges, as nations can regulate only the activities of their own citizens and flagged vessels in such waters. The International Whaling Commission (IWC) has the mandate to establish whale sanctuaries. The difficulty of enforcing the Indian Ocean Sanctuary and the Southern Ocean Sanctuary illustrates the challenges involved in managing MPAs on the High Seas. Several regional agreements may provide models for international cooperation, such as the Antarctic Treaty Environmental Protocol and the Barcelona Convention.

Transfrontier MPAs and regional MPA networks

Transfrontier MPAs are protected areas that adjoin each other across international boundaries. These areas require good cooperation between participating states to be effective, and legislative, institutional, and political differences are often major obstacles. Jointly formulated networks of MPAs, where states collaborate to select and manage sites, are another form of transboundary cooperation. These demand high levels of cooperation between the states involved, as illustrated by efforts to protect the Waddensee.

4. WWF's involvement in MPAs

WWF is involved with over 120 MPA-related projects in nearly 60 countries, in a wide variety of roles including:

- site identification
- preparation of management plans, and ongoing management
- education and interpretation
- monitoring and surveillance
- working with local communities in and around MPAs

- capacity building and training
- policy work
  (lobbying for MPAs at national, regional, and international levels)
- research
- funding.

Current WWF activities relating to MPAs are described for each region.

5. Effective management of MPAs – lessons learned

The benefits of any protected area can only be realized when technical planning and designation have been turned into successful long-term implementation. While there remains an urgent need to create more MPAs, many – if not the majority – of existing areas fall far short of achieving their objectives, and fewer than 50 per cent of existing MPAs are considered effectively managed. The experience of WWF (such as that described in the six case studies included in this report) and others in establishing and managing MPAs has provided some clear 'lessons learned' that will benefit future work and help set priorities and targets:

- MPAs must be tailored to local conditions, attitudes, and needs, and designed to achieve specific objectives, which should evolve according to changing circumstances if necessary
- stakeholders must be involved at all stages of MPA planning and management
- MPAs should normally have a legal basis
- all MPAs need a management plan
- local communities have a role in enforcement
- MPAs require sufficient, well-trained personnel
- MPAs must be financially sustainable
- MPAs should be established within a framework of ICM
- MPA management effectiveness should be monitored and evaluated.

6. A strategic approach to WWF's MPA work

WWF and IUCN have identified three main activities to meet the objective in their marine policy relating to MPAs.

- Ensuring the establishment of a comprehensive global network of ecologically representative MPAs.

Protected areas are most effective if established as part of a 'system' in which all ecosystems are represented. Under the Convention on Biological Diversity (CBD), governments are required to plan such systems at the national level, and this approach should be extended to the regional and global levels. WWF's 'ecoregion-based' conservation methodology provides an opportunity to promote this. To ensure a comprehensive network, it will be necessary to address the important linkages, created for example by currents and migratory species, between ecoregions themselves, and between ecoregions and areas outside them, and to ensure representation of offshore areas and the High Seas.

For an effective protected area system, whether at national, regional, or global level, guidelines on the number, size, and location of sites are needed. This is difficult with MPAs, given the poor knowledge of marine ecosystems and species,

and the lack of an accepted marine biogeographical classification. It has been recommended that 10 per cent might be an appropriate figure to aim for in terms of world coverage of protected areas. However, for the marine environment, there have been recommendations that a higher percentage should be protected, particularly in the context of fisheries management. Whatever the outcome of these debates, it is clear that more MPAs and NFZs are urgently needed.

• Improving the management of MPAs.

With the poor record of effective MPA management, it is vitally important that as much effort goes into improving management as into establishing new MPAs. Given the particular vulnerability of MPAs to pollution and other 'downstream' effects, it must be emphasized that they should be established within a framework of integrated coastal and marine management. A further mechanism for improving management effectiveness would the development of a system to assess and verify management of protected areas at the global level, both terrestrial and marine. This issue is currently being addressed in international fora.

• Assisting in the development, strengthening, and implementation of regional and international agreements for the establishment and management of MPAs.

Numerous global and regional treaties and frameworks are available to promote the establishment and management of MPAs and NFZs. These can be used to: achieve consensus on definitions and minimum global standards; secure commitment to MPAs; promote effective implementation of existing agreements; and ensure effective monitoring and reporting. WWF is paying particular attention to the role of the CBD in protected area establishment and management, since MPAs are accorded a high priority under the Jakarta Mandate. WWF also works closely through several regional agreements, for example in the northeast Atlantic and the Mediterranean.

1 Introduction

2. Protecting marine environments

Marine protected areas (MPAs) are an essential tool for helping to conserve and restore marine ecosystem health, and in many places are considered to be effective fishery management tools. There are now some 1,300 MPAs (Kelleher et al., 1995), but there is an urgent need to establish more and to ensure that existing ones are effectively managed. WWF has been involved in such efforts for many years at national, regional, and international levels, and sees MPAs as an essential element in achieving the goals of its marine programme, which are:

- to maintain the biodiversity and ecological processes of marine and coastal ecosystems
- to ensure that any use of marine resources is both sustainable and equitable
- to restore marine and coastal ecosystems where their functioning has been impaired.

The WWF/IUCN Marine Policy (WWF/IUCN, 1998) lays out five objectives covering fisheries, threatened marine species, integrated coastal management (ICM), pollution, and MPAs. These objectives are closely linked. For example, MPAs are an essential tool for protecting threatened species, and are most successful when managed as part of an ICM strategy, but are vulnerable to pollution from within and beyond their boundaries.

WWF's objective for MPAs is:

- The establishment and implementation of a comprehensive global network of ecologically representative, well-managed marine protected areas designed to conserve areas of high biological importance and productivity.

This document outlines some of the key issues involved in MPA establishment and management, provides a brief description of WWF's involvement, and presents selected case studies to illustrate lessons learned. It aims to provide a basis for setting priorities and targets, and addresses the following important questions:

- what are the implications of increasingly broad aims, definitions, and management approaches for MPAs?
- given the lessons learned in WWF's involvement in MPAs, how can it best promote establishment and more effective management of MPAs?
- what priorities should be set for WWF's global and regional MPA work?

The document does not provide specific guidelines on MPA site selection, establishment, or management, as there is already a large body of literature that addresses these topics. Discussion of MPA objectives can be found in Jones (1994); advice on site selection is given in Kelleher and Kenchington (1992), and other references; and information on all aspects of managing protected areas is available in Kenchington (1990), Kelleher and Kenchington (1992), Salm and Clark (1984), Agardy (1997), Gubbay (1995), and Harmon (1994), among others.

Marine ecosystems differ in certain ways from those found on land. There are also significant differences in how humans interact with the marine environment, including how they manage access to it and use marine resources. Although most of these are differences of degree rather than of kind, they must be kept in mind when designing individual MPAs and planning MPA systems.

2.1 Ecological differences between marine and terrestrial environments

Conservation science and practical experience show that marine and terrestrial protected areas are most effective when they encompass complete ecological units. However, the nature of water is such that marine ecological boundaries are often less well defined than terrestrial boundaries, and tend to be less static. For example, the boundary between fresh water flowing out of a river and salt water in the receiving ocean changes shape and location depending on the amount and speed of the fresh water flow, which can change on a daily, a seasonal, and an annual basis. The design of MPAs must take this variability into account, which may require designating larger areas and using flexible management approaches which can respond to changing ecological conditions. MPAs cannot be 'fenced in', as protected areas on land can be.

Linkages between marine ecosystems are often more complex and occur on a larger scale than those between terrestrial ecosystems. Nutrients and larvae can be carried over large distances on ocean currents and transferred between many different ecosystems. Some larvae may even move directionally. The design of individual MPAs and MPA systems must take these long-distance processes into account. For example, if giant clams in one area grow from larvae produced many kilometres away, it will be necessary to protect both the adult habitat and the source of larvae. Additionally, even though terrestrial protected areas can be damaged by pollution produced hundreds or thousands of kilometres away, MPAs are especially vulnerable to this and other 'downstream' effects.

Highly migratory species are particularly prevalent in the oceans. Cetaceans, large pelagic fish, and turtles migrate enormous distances, both as adults and during different growth stages in their life cycles. These migrations are often linked to feeding and breeding behaviour. Many species are also closely associated with large ocean current systems, and migrate annually, following a current to stay in water of a suitable temperature or to find sources of food. In the Atlantic, for example, bluefin tuna follow the warm waters of the Gulf Stream. Protecting such species requires the establishment of MPAs at key sites (e.g. feeding and breeding areas) along the migratory routes. Nevertheless, migratory species also require broader regulations outside protected areas to ensure their long-term survival. Furthermore, some of the richest ocean communities, such as those in water column gyres, are carried along in major currents such as the Atlantic Drift and East Australian currents, and thus cannot be protected by MPAs.

3. Definitions and categories of MPAs

The creation of marine protected areas is only one tool for MPAs to be established within a framework of integrated coastal and marine management. Well-designed networks of effectively managed MPAs are essential, but alone they will not result in adequate conservation of marine biodiversity, any more than national parks alone can conserve terrestrial biodiversity.

2.2 Managing marine ecosystems

Attempts to protect marine environments and manage use of marine resources are influenced by two fundamental aspects of humankind's relationship with the oceans: our lack of knowledge about them, and widespread open access to them. Filling the gaps in information is costly and complex compared with carrying out similar research on land. Lack of scientific knowledge on which to base sound management may lead to the wrong decisions being taken; and it can also be used as an excuse to delay or obstruct the establishment of an MPA.

Unlike land, the oceans have historically been perceived and managed as an open-access commons, and are often subject to multiple, conflicting use. Frequently the same resource or population is targeted by a variety of user groups, such as recreational fishers, long-liners, scuba divers, and traditional fishers. Thus establishment and management of MPAs, particularly in coastal areas, often involves a greater number of stakeholders and consideration of a wider range of issues than is common for terrestrial protected areas. Furthermore, the High Seas (all areas of the oceans outside the 200-mile exclusive economic zones (EEZs)) are defined as open-access commons under the United Nations Convention on the Law of the Sea (UNCLOS), and international cooperation is required to establish MPAs in such areas (see section 3.3).

Private ownership of the seabed and marine resources is rare although in some regions, such as the South Pacific, systems of communal customary tenure exist in coastal waters. The highly developed sense of ownership and responsibility for resources that may result from these systems can assist in the establishment of MPAs. However, it may conflict with MPA objectives, unless customary rights of access are recognized and incorporated into the management approach.

A particularly high degree of inter-agency cooperation is usually necessary to protect marine areas effectively. Many MPAs include terrestrial as well as subtidal areas which often come under the jurisdiction of different government agencies. Even where the entire area is intertidal or subtidal there may be conflicts. For example, a protected area managed by a national parks department may contain mangroves subject to the regulations of a forestry department, and fish fry that are the responsibility of a fishery department. The difficulties that this creates is exemplified by the Galapagos Islands Marine Reserve where, until recently, jurisdiction was disputed between the National Parks Service and the Fishery Department. The conflicting objectives of these two government agencies significantly hindered management (see case study 7.3).

The main objective of most legally designated MPAs is biodiversity conservation, including protection or restoration of depleted populations, endangered species and critical habitats. However, MPAs also have other roles. Large, zoned, multiple-use areas, such as Australia's Great Barrier Reef Marine Park, play a role in reducing conflict between different uses of the marine environment; many, such as the Galapagos Marine Reserve and Banc d'Arguin National Park (see case studies in section 7), play an important role in regulating resource use. As human uses of the marine environment expand and intensify, the aims, definitions, and management approaches of MPAs are becoming increasingly flexible. Contemporary MPA designations represent a continuum of approaches, with 'no-disturbance' zones and strict protection at one end of the scale and 'multiple-use' management areas at the other (Agardy, 1997).

These changes have been accompanied by new approaches to MPA establishment and management, including:

- alternatives to statutory designation, such as customary tenure and voluntary protected areas
- management by local communities, with or without active participation of government
- increasing use of zoning schemes within MPAs to balance conservation and human use
- participation of the private sector, including tourism and fisheries.

Although these trends have been welcomed in many cases, they have also raised concern that the conservation objectives of an MPA may not be adequately met. In order to ensure that the global network of MPAs adequately protects marine biodiversity, national systems must be designed so that they protect the full range of marine ecosystems and species whilst, at the same time, taking into account different cultural, economic, and political situations.

3.1 Defining MPAs

The term 'MPA' tends to mean different things in different places, a point which is reflected in national legislation and, to a lesser extent, in global treaties and agreements. In some countries, such as Canada, a dichotomy has arisen between MPAs established for fisheries management, and those designated to serve broader conservation objectives. In Europe, the EU (European Union) Habitats Directive recognizes as MPAs only those sites designated to protect biodiversity, representative habitats, or threatened species, and does not consider as MPAs areas established under fisheries legislation for fisheries management. Recent calls by scientists for the establishment of MPAs have further confused the picture, as the basis for these statements has been fisheries research into the specific benefits of MPAs to fisheries management (e.g. Anon, 1997). To avoid confusion, especially in the international context, the objectives and management of an MPA must be carefully described.

IUCN uses 'MPA' as a generic term and provides the following definition:

- Any area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical, and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment (IUCN, 1994).

This definition is intentionally very broad and encompasses areas established for a variety of purposes (including fisheries management) provided they have a conservation objective. The definition also covers areas protected by 'effective means' other than statutory legislation, and thus includes areas set up under customary tenure or voluntary agreements, provided these are deemed 'effective', a qualification that has yet to be defined. In some countries, these may be the only sites accepted by local communities and effectively managed, although they are often not recognized by governments as contributing to national protected area systems.

For the purposes of this document, the IUCN definition is being followed and the term MPA is used generically to describe all types of MPAs.

3.2 IUCN protected area categories

IUCN has identified over 140 names (e.g. national park, sanctuary, nature reserve, etc.) for marine and terrestrial protected areas around the world. Australia alone uses 45 different designations (IUCN, 1994), and the range of terminology for MPAs worldwide can be seen in Annex 2. The same names are often interpreted very differently in different countries, with many variations in the application of terms such as 'national park'. IUCN has therefore developed a system of categories which provides a common international language for protected areas, facilitating communication, information sharing, comparison, and analysis, as well as providing a useful basis for planning national protected area systems. Under this system, protected areas are categorized according to their primary management objective. However, they should be established to meet objectives consistent with national, local, or private goals, and only then given an IUCN category (IUCN, 1994). Categorization does not involve any assessment of management effectiveness and is not intended to do so.

The six categories, applicable to marine and terrestrial protected areas worldwide, cover areas ranging from those managed as strict nature reserves to multiple-use areas managed mainly for sustainable use (Annex 1). All categories require long-term conservation of biological diversity, regardless of the levels and types of human activities permitted inside the protected areas. Recommendations for specific management objectives, selection criteria, and organizational responsibility are provided for each category. These cover a broad range of management approaches, including management by national government agency, co-management, and community-based management (IUCN, 1994).

Categories Ia-III cover the stricter forms of protected area, such as nature reserves, national parks, and natural monuments. Category IV is for areas subject to active intervention to ensure the maintenance of habitats or to meet the requirements of particular species. Categories V (landscape/seascape conservation and recreation) and VI (sustainable use of natural resources and fisheries management) recognize protected areas where cultural values and sustainable resource use are important management objectives. Concerns have been raised about whether these two

categories provide adequate biodiversity protection although, if the objectives of a protected area clearly meet the criteria, this should not be an issue. The specific conservation criteria for Category VI are that:

- the area must be managed so that the long-term protection and maintenance of its biodiversity is assured
- at least two-thirds of the area should be in its natural state, and planned to remain so
- a management authority must be in place.

Indeed, Category V and VI protected areas could be highly effective as they tend to encompass larger areas and a greater range of interdependent ecosystems than more strictly protected areas. In some cases, Categories I and II may provide less protection if they are small, isolated areas vulnerable to outside influences and if stringent regulations are difficult to enforce. Category V areas closely fit the Biosphere Reserve model of a highly protected core area, surrounded by a less stringently protected buffer zone, surrounded in turn by a transition area which may contain human communities. Some MPAs in Category VI similarly have core areas with strict protection, in a larger area of integrated management. Many multiple-use MPAs are zoned and, if IUCN categories were to be applied separately to each zone, a clearer picture of the management objective of the area could be obtained. Thus the Great Barrier Reef Marine Park has been given Category VI, but includes some zones that meet the criteria for a number of other categories (Tanzer, 1998).

In the marine environment, one of the strictest forms of protection is total prohibition of fishing, and the need for no-fishing zones (NFZs) for fisheries management is currently the subject of much debate (see section 3.3.1). Most currently designated MPAs have either no or very few components which are NFZs. Only Category Ia (Strict Nature Reserves), where the management objectives include preserving species in as undisturbed a state as possible, theoretically covers NFZs. Category Ib (Wilderness Areas) allows subsistence fishing by indigenous communities, as long as the wilderness qualities of the area are not adversely affected. All the other categories permit fishing, where this is consistent with the conservation objectives of the designation.

Potential, and sometimes actual, abuse of the categories (e.g. claiming that an area is more strictly protected than is the case in practice) has raised the question of whether minimum standards should be established for protected areas. For example, WWF-Canada's Endangered Spaces Campaign has suggested that minimum standards for MPAs should include, as well as statutory designation, the prohibition of activities such as non-renewable resource development, bottom trawling, and dredging. However, such criteria might discourage the establishment of new MPAs and there is a need for further discussion (e.g. Roechert and Wells, 1998).

Effective national systems of protected areas are most likely to require a combination of categories. The key issues may be: judging the proportion of a protected area system that needs to fall under each category to ensure that all ecosystems are represented and that a range of ecological and social goals is met; and ensuring that all areas are effectively managed to meet their management objectives (Dudley and Stolton, 1998). The need for a mechanism to assess the effectiveness of individual protected areas and overall protected area systems is addressed in sections 5.9 and 6.2.

3.3 Specific types of MPAs

This section discusses other types of marine management areas which play major conservation roles but are often not recognized formally as MPAs or given IUCN categories. These include NFZs, areas of ocean set aside for protection from shipping pollution, and MPAs in offshore waters and on the High Seas.

3.3.1 No-fishing zones

Once, technological and economic constraints made some fish populations inaccessible, providing de facto NFZs, but modern boats and gear (such as factory trawlers, sonar, deep-water nets, and rock-hopping gears) leave few stocks out of reach. For centuries, subsistence fishers in the tropics recognized the value of enforcing seasonal or permanent area closures to minimize the risk of overexploiting fisheries resources (Johannes, 1978). Today, such areas are gaining increasing attention, as the need to find mechanisms to reduce the decline in fish stocks increases. Several terms are used for areas in which fishing is excluded: NFZs, fishery reserves, harvest refugia, and no-take zones. They can be designated as stand-alone measures under protected area or fisheries legislation, or as zones within larger multiple-use protected areas. Such areas vary in the extent to which non-extractive activities such as scuba diving are allowed, and as to whether extractive activities such as dredging and oil production are permitted. In this document, 'NFZ' is used to describe an area closed to all fishing activities on a permanent basis, regardless of whether other activities (extractive or non-extractive) are allowed.

Fisheries benefits that have been predicted or hypothesized for NFZs include (Roberts, 1994):

- increased abundance and size of individual fish within NFZs
- emigration of target species from reserves to adjacent fishing grounds – 'the spillover effect'
- increased production of eggs and larvae and export of these to adjacent fisheries, and increased fertilization success due to density effects
- protection of habitat for spawning and settlement of eggs and larvae.

Empirical evidence for some of these benefits is limited as there are few well-documented studies but, where research has been carried out, the results have often been positive. In Sumilon Island Marine Reserve, in the Philippines, populations of Serranidae (basses) were as much as 25 times more dense than at two sites outside the reserve. During a lapse in protection of the reef, wide changes in community structure took place within the reserve's boundaries, and the density of species subject to fishing decreased (Russ, 1985). In New Zealand's Leigh Island Reserve red moki are significantly larger and twice as dense as in adjacent areas (McCormick and Choat, 1987), and lobsters are larger, more abundant, and produce much greater numbers of larvae (McDairmid and Breen, in press). Similar changes have occurred in other marine reserves in New Zealand (Ballantine, 1995), and have been documented in NFZs elsewhere in the world (Sobel, 1996).

There is also evidence for improved populations outside the boundaries of NFZs. At Apo Island, in the Philippines, a significantly higher density of large predatory reef fish was found in areas adjacent to the reserve after a period of nine years' protection, and fishers unanimously agreed that their yields had increased since the reserve was established (Russ and Alcala, 1996). Anecdotal evidence of this

spillover effect is also provided by increased fishing effort experienced along the edges of NFZs, for example in the Great Barrier Reef Marine Park (Craik, 1991) and the Leigh Island Reserve in New Zealand (Ballantine, pers. comm. in Rowley, 1994).

NFZs may thus serve as an insurance policy against failure of other fishery management measures. It may also be easier and less expensive to enforce an NFZ than to enforce other regulations (e.g. on gear or quantities taken), since any observed fishing is a proof of breach. Furthermore, once fishers find that NFZs result in increased catches outside the area they may enforce the NFZ themselves. Like all MPAs, NFZs contribute to the protection of biodiversity. They also maintain ecosystem structure and function by preventing direct fishing impacts such as bottom trawling and trap damage, and indirect impacts such as removal of predators. They may help to improve public understanding of the marine environment and the need for its management, and provide opportunities for economic diversification, for example, through recreational activities. Where these benefits have been demonstrated, NFZs are being established with relative ease, particularly when alternative sources of income are available through tourism, for example in Belize and the Philippines.

Location	Areal Extent of NFZs
Bermuda	*20% of Continental Shelf (Bohnsack, 1997a)*
Belize	*19% of existing MPAs (Wells et al., 1995)*
Great Barrier Reef Marine Park, Australia	*4.6% of the MPA[1] (Prideaux et al., 1998)*
Florida Keys National Marine Sanctuary, USA	*0.5% of the Sanctuary (Bohnsack, 1997b)*
State of California, USA	*0.14% of the area of 104 MPAs (McArdle, 1997)*

[1] *While in only 4.6% of the Great Barrier Reef Marine Park is no fishing of any kind permitted, in other zones line fishing is limited to recreational use only, and approximately 21% of the area excludes trawling.*

Establishing NFZs, however, remains a controversial issue. In the USA, where MPAs have not traditionally involved closure to all fishing, there has been immense resistance. The draft management plan for the Florida Keys National Marine Sanctuary proposed a network of closed areas covering 6-8 per cent of the sanctuary but this was reduced through public pressure to one NFZ covering 0.5 per cent (Bohnsack, 1997b). In California, where some rockfish fishers are calling for designation of NFZs to protect their fishery, the proportion of MPAs providing protection from fishing is very limited (McArdle, 1997).

There are a variety of reasons for this resistance. Although modelling suggests that a wide variety of fisheries will benefit from NFZs (Hall, 1998; Lauck et al., 1998), there is clearly a need for further research into their application outside reef environments. Most research into NFZs has been carried out on coral reefs, where fish are relatively sedentary and entire populations can theoretically be protected. For highly mobile and migratory species, an NFZ will directly protect individuals only while they are inside the area. In some of these cases, a seasonally closed area may be as valuable, for example protecting locations where seasonal aggregations

occur, such as grouper spawning sites (Johannes, 1998). Seasonal closures have long been part of fishery management measures in many parts of the world – for example, for cod in the Atlantic (Hutchings, 1995) – but have met with varying degrees of success.

The difficulty of determining the benefits of NFZs to fisheries for mobile species is illustrated by the 'Plaice Box', an area in the North Sea. This is closed seasonally (for the second and third quarters of each year) in order to protect juvenile plaice. The relative abundance of under-sized plaice has increased since 1989, but fishing effort has grown markedly within the Box during the fourth quarter of each year (Gubbay, 1996a). Seasonal closures of this kind are unlikely to provide many of the conservation benefits predicted for permanent closures. Indeed, as this example illustrates, they may increase fishing effort (and the impact of fishing gear such as trawls) in the area during the open season.

Establishing an NFZ is likely to cause a redistribution of fishing effort outside its boundaries, since initially there will be a reduction in yield for those who traditionally use the area. Modelling by Nowlis and Roberts (1997) suggests that losses are worst within the first year or two of protection, and increased catches outside the NFZ may not appear for three to five years. This lag time may lead to pressure to reopen the fishery before the benefits appear, or demands for compensation. It is therefore essential that NFZs are established within the context of broader fishery management plans and regulations.

Careful consideration is needed in the design and site selection of NFZs. Small areas may provide adequate protection for largely sedentary species or for critical habitat (e.g. nursery areas or spawning grounds) of more mobile species. However, for many species such 'critical habitat' is hard to identify. When species use one habitat as juveniles and another as adults, both areas may need protection. As with MPAs in general, a network is essential, providing an insurance mechanism if one site is degraded, by pollution for example, and reflecting larval dispersal patterns where these are known (Ballantine, 1998; Roberts, 1997).

There is clearly a need to establish demonstration NFZs in those areas where their benefits are not widely recognized. WWF-UK is working to promote pilot schemes in the North Sea (Gubbay, 1996a; McGlade et al., 1997) and WWF's Endangered Seas Campaign, which was launched in 1996 to raise public awareness about fisheries and find innovative ways to halt and reverse the effects of overfishing, will be promoting this concept during its second phase (1998-2001).

3.3.2 Marine 'protected areas' for pollution prevention

MPAs cannot play a major role in addressing threats from marine pollution because of the fluid nature of water. However, the UN International Maritime Organization (IMO) allows marine areas to be identified as Particularly Sensitive Sea Areas (PSSAs) in which discharges from shipping may be banned or routeing measures imposed. The Great Barrier Reef in Australia is a PSSA, and WWF is assisting with the designation of an area in Cuba. A proposal was drawn up for a PSSA in the Galapagos but it was never submitted to the IMO (Kenchington, pers. comm. to WWF, 1998), while the potential for a PSSA in the Baltic has been investigated for WWF by Ebbeson (1997). Under the MARPOL 73/78 Convention, Special Areas can be declared in which more stringent regulations are imposed on shipping; many of the world's semi-enclosed seas have been so declared (see Annex

3). Both PSSAs and Special Areas can lie either within or beyond the limits of a country's territorial sea and EEZ (WWF-UK, 1997a), but no designation can interfere with a ship's right to freedom of navigation.

3.3.3 Offshore MPAs within national jurisdiction

So far, the majority of MPAs have been established close or adjacent to shore but there is a clear need for protection of offshore areas. Areas of high productivity and diversity exist offshore, as do critical habitats such as spawning areas, nursery grounds, and migration routes (WWF-UK, 1997b). Offshore areas are also subject to similar threats as inshore areas – overfishing, dumping, and oil pollution, for example – and, owing to the interconnectedness of marine environments, may indirectly suffer from negative impacts such as pollution originating from land or coastal waters.

Several offshore MPAs have been established, examples being Elizabeth and Middleton Reefs in Australia, the Flower Gardens National Marine Sanctuary in the USA, and Hertha's Flak in Denmark (Gubbay, 1996b). However, in many countries the need for offshore MPAs is still not recognized, and the distant nature of offshore sites may mean that it is hard to gather public support for them. Implementation and enforcement may be particularly difficult in offshore MPAs, particularly in relation to determining, marking, and enforcing boundaries. Routine matters such as observation, monitoring, enforcement, education programmes, and community involvement can also be more complex and costly. Perhaps even more of a constraint is the issue of freedom of navigation which, under existing international regimes, must be maintained within EEZs and may even apply in some territorial waters (Wall, 1996).

WWF is supporting a number of efforts to establish offshore MPAs. In Europe, the EU Habitats Directive applies only to the 12-nautical-mile territorial seas. With other organizations, WWF-UK and the WWF Northeast Atlantic Programme are therefore promoting offshore MPAs through the OSPAR Convention (see Annex 3) (Birdlife and WWF, 1997). A number of sites have been proposed in the northeast Atlantic. WWF-Canada is similarly promoting protection of the Gully, an offshore canyon in Canadian waters (case study 7.5).

3.3.4 MPAs beyond national jurisdiction

Even more problematic is the question of MPAs on the High Seas. MPAs are generally established under national jurisdiction, within a nation's territorial waters or EEZ. Growing recognition that marine ecosystems do not respect political boundaries, and increasing access to the deep sea via improved technology, mean that such designations may no longer be sufficient. In addition, there are features of the High Seas that are unique and make them particularly deserving of protection. Deep-sea and open-ocean ecosystems include vast plankton blooms and swarms of krill, act as nursery areas for great and small whales, and include little-understood geological features of scientific interest such as geothermal vents and deep trenches (McCloskey, 1996).

However, designating MPAs in international waters presents particular legal and institutional challenges. Nations can regulate only the activities of their own

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citizens and flagged vessels in such waters. Two or more nations can agree by treaty to regulate their national and flagged vessels in international waters which they have agreed to protect, but this only applies to ships subject to their control under their own national legislation.

The International Whaling Commission (IWC) has a mandate to establish whale sanctuaries and there are now two: the Indian Ocean Sanctuary and the Southern Ocean Sanctuary. Together these provide a permanent 'no-take zone' for whales of approximately 100 million square kilometres (km^2) (approximately 30 per cent of the world's oceans), largely in international waters (Phillips, 1996). However, enforcement is limited to the commitment of IWC member nations to the sanctuary. Japan continues to exploit the IWC provision for scientific research, and plans to hunt as many as 438 minke whales from the Southern Ocean Sanctuary in 1998-99. The IWC sanctuaries also do not provide any habitat protection.

UNCLOS contains provisions for the International Seabed Authority to place parts of the sea floor off-limits for mineral extraction if and when this poses an environmental threat, and so would be one global treaty under which MPAs on the High Seas could be designated (McCloskey, 1996). The Conference of the Parties of the Convention on Biological Diversity (CBD) has requested a study of the relationship between the CBD and UNCLOS with regard to the conservation and sustainable use of the genetic resources on the deep seabed, but this has not yet been undertaken.

Several regional agreements are now addressing the issue of MPAs on the High Seas, and may provide models for international cooperation. For example, the Antarctic Treaty Environmental Protocol (Annex 3) includes a provision for designating special areas for protection and scientific study to protect species or habitats, including areas in the High Seas under its jurisdiction. The Barcelona Convention also allows for MPAs on the High Seas in the Mediterranean. However, High Seas MPAs have not yet been established in either area.

Clearly, the legal aspects of establishing MPAs in international waters need further consideration, as well as the roles of UNCLOS, the Commission on Sustainable Development (CSD), the CBD, and regional agreements.

3.3.5 Transfrontier MPAs and regional MPA networks

Transfrontier protected areas adjoin each other across international boundaries, and their value is being increasingly recognized (Zbicz and Green, 1997). They are particularly important in the marine environment given the interconnectedness of marine ecosystems, processes, and populations, and the prevalence of migratory species.

These areas require good cooperation between participating states to be effective, and legislative, institutional, and political differences are often major obstacles. Such problems have been encountered in several of the transboundary MPAs that WWF has helped with, such as the Turtle Islands Heritage Protected Area which is shared between the Philippines and Malaysia, the proposed Ligurian Sea Cetacean Sanctuary which will straddle the territorial waters of France, Italy, and Monaco, and the management area being established for the Odra/Oder Lagoon between

Germany and Poland.

Such MPAs may evolve from two areas managed in parallel on either side of a frontier, to a jointly managed area where enforcement activities and scientific monitoring are coordinated under a single agency or commission. Legal precedents for states to cooperate in managing and conserving marine resources that straddle their boundaries can be found in the joint exploitation zones designated as temporary or permanent solutions to intractable boundary disputes. These include a joint fishing zone between Colombia and the Dominican Republic, and the Joint Red Sea Common Zone for mineral exploitation between Saudi Arabia and Sudan (Blake, 1987). The WWF Mediterranean Programme is helping to develop a legal framework for the proposed Ligurian Sea Cetacean Sanctuary, which would be a joint initiative between France, Italy, and Monaco, and which may provide a model.

Jointly formulated networks of MPAs, where states collaborate to select and manage sites, are another form of transboundary cooperation. These demand high levels of cooperation between the states involved. Despite a declaration by Denmark, Germany, and the Netherlands to protect the Waddensee in 1982, the complex jurisdictional and administrative differences between the three states have proved hard to overcome (case study 7.6). Such initiatives may result in protection over entire ecosystems or regions, and become an increasingly important issue for WWF to address, as it develops its 'ecoregional' planning approach to conservation (see below).

WWF is involved in over 120 MPA-related projects in nearly 60 countries (Annex 2), in a wide variety of roles including:

- site identification
- preparation of management plans and ongoing management
- education and interpretation
- monitoring and surveillance
- working with local communities in and around MPAs
- capacity building and training
- policy work
  (lobbying for MPAs at national, regional, and international levels)
- research
- funding.

The following overview provides background for the 'lessons learned' that are described in Section 5.

4.1 Africa and Madagascar

Priority sites for the Africa and Madagascar Programme are Kiunga Marine Reserve (Kenya), Mafia Island Marine Park (Tanzania), Menai Bay Conservation Area (Zanzibar), Bazaruto National Park (Mozambique), the Gamba Reserves Complex (Gabon), and Parc National du Banc d'Arguin (Mauritania) (case study 7.1). WWF is carrying out preliminary work to help develop MPA systems in Madagascar and Cameroon. WWF-South Africa has played an important role in the development of MPA policy in South Africa (Marine Reserves Task Group, 1997) and provides funding for several individual MPAs.

Following principles outlined in this region's Strategy for Marine and Coastal Conservation (Gawler, 1996), efforts are directed at providing 'hands-on' support for management, establishing legitimacy and support for MPAs in local communities, and promoting effective enforcement. Strong partnerships with local non-governmental organizations (NGOs), such as the Fondation Internationale du Banc d'Arguin in Mauritania, and with local communities, for example in Bazaruto (Mozambique), have proved particularly effective. Experience in East Africa has highlighted the need for a clearly defined and well-understood role for WWF in relation to other agencies involved in establishing and managing MPAs, and for realistic investment of time and resources in seeking community support. The programme plans to take lessons learned from MPAs and their role within ICM planning, and encourage the application of these to national-scale ICM policies.

4.2 Asia and Pacific

The Asia and Pacific Programme is currently involved in over 30 MPA projects. The marine component of its strategy is to be expanded, and in the meantime a fundraising document outlining existing and proposed marine projects in the region has been produced (WWF, 1998).

ASEAN (Indonesia, Malaysia, Philippines, Thailand, Vietnam)

WWF has carried out numerous MPA projects in these countries. WWF-Indonesia is assisting the Indonesian government in its objective of placing 10 million hectares of marine area in protected areas by providing technical assistance with park management and protection, ICM planning, conservation, education, and community-based projects. This effort involves several MPAs such as Take Bone Rate National Park, Aru Tenggara Marine Reserve, Teluk Cenderawasih National Marine Park, and Wasur National Park. WWF has also had long-standing involvement with Kepulauan Seribu Marine National Park, and has recently been working on marine turtle protection in Bali.

WWF-Philippines is involved in several MPA projects. WWF's work with the Philippines-Malaysia Turtle Islands Heritage Protected Area has been ongoing since 1989; it is also working in El Nido Marine Reserve, Tubbataha Reef National Marine Park, and with proposed MPAs for dugongs and cetaceans.

WWF-Malaysia has been involved for many years in developing MPAs in Peninsular Malaysia, and assisted the Department of Fisheries in the preparation of the Marine Park Island Management Conceptual Plan for Peninsular Malaysia.

WWF has advised on the impact on tourism on MPAs (case study 7.2) and other management issues. Efforts have now been expanded to Sabah, where Semporna Island is being established as an MPA under a joint initiative between WWF-Malaysia and other national and international organizations.

WWF-Thailand assisted in the development of a management plan for Tarutao National Park in southern Thailand and now supports a local NGO, Wildlife Fund Thailand, in marine conservation activities including efforts to establish a 3-kilometre coastal conservation zone, where trawling is banned, to protect artisanal fisheries.

In Vietnam, WWF (with the National Institute of Oceanography) carried out survey work between 1992 and 1995 to provide the basis for a national system of MPAs. Since then its MPA work has focused on Con Dao National Park. Future work will involve the preparation of an MPA systems plan and testing management approaches at a demonstration MPA, with other agencies, as part of a project funded by the Asian Development Bank.

East Asia (China, Hong Kong, Japan)

In China, WWF is working to strengthen the management of Yancheng and Shuangtai Hekou Nature Reserves, which protect the rare Saunders' gull, by training reserve staff to help implement management plans. In Hong Kong, WWF has played a central role in the establishment of MPAs, lobbying for legislation and then the establishment of the first sites (Hoi Ha Wan, Yan Chau Tong, Sha Chau, Lung Kwu Chau, and Cape d'Aguilar) which were designated in 1996. WWF-Hong Kong plans to develop Hoi Ha Wan as a demonstration MPA project, which will include a Marine Life Centre to promote public awareness of marine conservation (Moreton and Ruxton, 1997). WWF has also provided long-term support to, and now manages, Mai Po Site of Special Scientific Interest, a key area of coastal marshland where traditional forms of aquaculture have been practised for centuries.

WWF-Japan is working to ensure the survival of Shiraho Reef, one of the last pristine reefs in the Nansei Shoto islands, which faces severe threats from large-scale industrial development projects such as road building, dam construction, and poor agricultural practices. Ultimately it is hoped that an MPA will be established there.

Oceania

The WWF South Pacific Programme Office is helping to establish community-based MPAs in Fiji, the Cook Islands, and the Solomon Islands. Two pilot marine conservation areas are under way in Raratonga (Cook Islands) and Kadavu (Fiji). In Papua New Guinea, WWF is providing assistance to local communities in mangrove areas, including implementation of the Wildlife Management Area in the Kikori River Delta. WWF is also looking at the potential for a marine programme on the north coast, where one priority is to support the Wildlife Management Area at Sinub Island in Madang Lagoon. Building on this work, WWF-Indonesia and WWF-South Pacific, together with WWF-Australia and WWF-New Zealand, are developing a collaborative programme to promote customary resource management in the region.

Although Australia has over 300 MPAs covering an area in excess of 463,000 km², much of this lies within just one MPA – the Great Barrier Reef Marine Park. WWF-Australia is therefore lobbying for the establishment of a more comprehensive MPA system based on a recently completed review of biogeographic zones and the Australian government's National Oceans Policy. One of the major outcomes of this has been the establishment of a 229 km² MPA in the Great Australian Bight.

WWF-New Zealand is supporting research work on Hector's Dolphin in the Banks Peninsula Marine Reserve, and similar work on Southern Right Whales is linked to their overwintering in the Auckland Islands. New Zealand's application for the Auckland Islands to be given World Heritage status was supported by WWF. At the policy level, work continues to permanently halt 'scientific whaling' within the Southern Ocean Whale Sanctuary.

South Asia (India, Pakistan)

WWF has no specific MPA projects in these countries, but some of its marine conservation work is site specific and involved with protection of critical habitat and species. WWF-India is working to support the restoration of Pulicat Lake in Andhra Pradesh, a large brackish-water coastal lagoon which is threatened by unsustainable development activities, notably aquaculture. It is also involved in work with the Sundarbans mangroves, one of the largest mangrove protected areas in the world, through its efforts to conserve the Bengal tiger. WWF-Pakistan is implementing a mangrove conservation programme, promoting community-based management in the Indus River delta.

4.3 Europe and Middle East

WWF is involved in numerous MPA projects in Europe through its sub-regional programmes. A more strategic approach to MPA establishment and management is being developed through the work of the Pan-European Oceans and Coasts Team. This work is closely linked to the various regional frameworks that exist in Europe for promoting MPAs, such as the EU Habitats Directive, and the regional conventions for the Mediterranean, Baltic, and northeast Atlantic. Particular focus is on implementation of Natura 2000 (the proposed protected area network under the Habitats Directive), the establishment of networks of offshore MPAs in all European regional seas, and the application of the Emerald Network approach in non-EU countries.

Arctic

WWF's Arctic Programme is promoting MPAs through field projects and policy work, with the aim of "protection of the full range of ecosystems and habitats by 2015". Current priorities include establishment of the Barents Sea International Park (Norway and Russia), Svalbard National Park and Bear Island National Park (Norway), expansion of the Lena Delta Reserve (Russia), and work in the Bering Sea. Policy work involves supporting the Programme for Conservation of Arctic Flora and Fauna (CAFF), established under the Arctic Environmental Protection Strategy (AEPS) (Annex 3), and adopted by Canada, Denmark/Greenland, Finland, Iceland, Norway, Russia, Sweden, and the United States in 1991. CAFF is responsible for developing a protected areas network plan.

Baltic

In a project similar to WWF-Canada's Endangered Spaces Campaign (see below), the WWF Baltic Programme is advocating the establishment of a network of coastal and offshore MPAs representing all major ecosystems. This is also an obligation under the Baltic Convention (which requires a system of Baltic Sea Protected Areas – BSPAs – to be established). WWF is therefore working closely with the Helsinki Commission (HELCOM) on the implementation of the Convention (Annex 3). A Programme Task Force has been formed under HELCOM to coordinate and develop management plans for several coastal lagoon and wetland areas. WWF has played a central role in preparing the plans, acting as secretariat for the Task Force, and supervising Area Task Teams. Although the role of protected areas is recognized, at most sites – such as those in Estonia, Latvia, and Lithuania – the emphasis is on sustainable development for land use, tourism, and fisheries, and the introduction of ICM (Gladh, 1997).

Mediterranean

One of the targets of WWF's Mediterranean Programme strategy is the protection in MPAs of 10 per cent of the marine and coastal zone of this region by the year 2010 (Guglielmi, 1994). The programme is currently focusing on the creation of a trinational cetacean sanctuary in the Ligurian Sea, and is also working through the Barcelona Convention (see Annex 3) to promote MPA establishment. WWF-Greece is involved in two MPA projects protecting turtles, in Zakynthos and the Northern Sporades. WWF-Italy is directly involved in the management of five marine reserves, of which the most important is probably the Miramare Reserve in Trieste. Dogal Hayati Koruma Dernegi (DHKD), WWF's associate organization in Turkey, has played a major role in protecting turtles and monk seals in Turkey, and has ensured the establishment and implementation of MPAs at Dalyan-Koycegiz and Belek, two of the main turtle-nesting areas in the country, and at five sites for monk seals.

Northeast Atlantic

The WWF Northeast Atlantic Programme has a target to establish and implement a network of MPAs covering at least 10 per cent of the region by 2005 (WWF, 1995). In order to achieve this, WWF is promoting implementation of the EU Habitats Directive. For example, legal designation of MPAs has been particularly difficult to achieve in UK waters, although voluntary marine conservation areas, supported by WWF-UK, have been successful (case study 7.4). Following adoption of the Directive in 1992, involvement of the statutory bodies has increased, and WWF is now helping the UK to meet its obligations for the establishment of MPAs under this directive. WWF-Germany is involved with a number of MPA projects but its main focus is on the Waddensee MPA network. Trilateral Management Principles developed for this area may prove a useful model for managing large complex areas and MPAs nested within broader ICM projects (case study 7.6).

This Programme is also encouraging the establishment of offshore MPAs through the new Annex 5 of the 1992 OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic (Annex 3), and advocating the use of seasonal or permanent NFZs in the North Sea, with particular support from WWF-UK. It is also promoting the implementation of the 1992 ASCOBANS Agreement,

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which covers small cetaceans, for example, WWF-Germany is promoting the seawards extension of the boundaries (to 12 nautical miles) of MPAs in the Waddensee to protect harbour porpoises (IUCN, 1997).

4.4 Latin America and Caribbean

WWF is working on over 20 MPA projects (some of which are still proposals) in over 15 countries in this region, including two regional initiatives, ENCORE (funded by USAID and implemented by WWF-US) and PROARCA (a joint programme between WWF-US, the Nature Conservancy, and the University of Rhode Island).

The PROARCA-Costas project, or Central America Regional Environmental Project, is aimed at developing policy, strengthening capacity, and improving monitoring and evaluation at a number of important sites that straddle the boundaries of two or more countries. WWF, through the LAC programme at WWF-US, is leading efforts at two of the sites: Cayos Miskitos (Nicaragua and Honduras), which is already a protected area, and the Gulf of Fonseca (El Salvador, Honduras, and Nicaragua). ENCORE (Environment and Coastal Resources) is helping to set up protected areas with community involvement in Dominica and St Lucia, in the eastern Caribbean, and is designed to demonstrate the potential for collaboration between public, private, and community interests to protect biodiversity while encouraging viable economic development.

Following on from its support for the establishment and management of Sian Ka'an Biosphere Reserve, WWF-Mexico is focusing its marine work on the Great Maya Barrier Reef on the Yucatan, where the Banco Chinchorro Biosphere Reserve is a priority, and also in the Sea of Cortez on the Pacific coast. In the Galapagos, WWF lobbied extensively for the passing of the Galapagos Special Law (case study 7.3) which provides greatly improved protection to the Marine Reserve, particularly in relation to fishing. WWF is also supporting a participatory planning process to develop a management plan for the Reserve, working closely with local communities, fishers, the National Parks Authority, and the Charles Darwin Research Institute.

In the Dutch Antilles, WWF-Netherlands has played a major role in the establishment and management of Bonaire and Saba Marine Parks, considered model MPAs and emulated in many other countries. Both parks have developed self-financing mechanisms, involving user fees and visitor donations. WWF-Canada has developed a draft five-year plan (1997-2002) to extend its work in Cuba, with the primary objective of expanding and improving the country's National System of Protected Areas. Marine areas are to be included once resources are available (WWF-Canada, 1997). WWF is also supporting a range of MPA efforts in South American countries including Argentina, Brazil, Chile, Colombia, French Guiana, Guatemala, Peru, and Venezuela.

4.5 North America

WWF-Canada's Endangered Spaces Campaign is aimed at completing a national network of ecologically representative marine and terrestrial protected areas, a goal which Canada's federal, provincial, and territorial governments are committed to achieving. WWF-Canada is preparing a framework document which will provide a classification system for identifying representative areas of the oceans (and Great Lakes) (Day and Roff, 1998). It is also promoting the establishment of several MPAs, including the Gully (a vast underwater canyon about 200 kilometres off Canada's east coast (case study 7.5), Gwaii Haanas (in the Queen Charlotte Islands), and Igaliqtuuq (in the Arctic), as flagship sites, where WWF would like to see the strictest forms of protection. WWF-Canada also plays an important role in ensuring effective management of protected areas in the country, and 'grades' the governments on their progress towards the completed protected areas system each year. Emphasis is also on ensuring that human activities inside and outside MPAs are managed to avoid damaging the integrity of designated sites.

WWF-US is a member of the Florida Keys National Marine Sanctuary's Advisory Council and is thus involved in the development and implementation of the Sanctuary's management plan, which established 17 'special protected areas' and an ecological reserve (Dry Tortugas), all considered MPAs, within the Sanctuary itself. Through the work of its Florida office, WWF-US is helping to develop the Dry Tortugas Ecological Reserve. WWF-US has contributed to the work of the Committee on Marine Area Governance and Management, which was set up by the National Research Council to review marine management areas (a generic term for a range of types of MPAs) in the US, and make recommendations for their improved management and governance (CMAGM, 1997).

4.6 Southern Ocean

The main MPA activity in this region is strengthening of the Southern Ocean Whale Sanctuary, which is an important priority for both WWF-Australia and WWF-New Zealand. WWF is also working with other organizations to ensure that MPAs and NFZs are considered under the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) (IUCN Antarctic Advisory Committee, 1998), and is involved in initiatives to establish protected areas for the sub-Antarctic islands and their associated marine ecosystems.

The benefits of any protected area can only be realized when technical planning and designation have been turned into successful long-term implementation. While there remains an urgent need to create more MPAs, many – if not the majority – of existing areas fall far short of achieving their objectives. The frequent appearance of the term 'paper parks' in MPA literature emphasizes the extent of the problem. Fewer than 50 per cent of existing MPAs are considered effectively managed (Kelleher et al., 1995); WWF's Mediterranean Programme estimates that 70 per cent of the Mediterranean's MPAs are 'protected' in name alone, and many of Indonesia's parks are reported by WWF to be in the same condition.

The experience of WWF and others in establishing and managing MPAs has provided some clear 'lessons learned' (many similar to those learned in terrestrial areas) that will benefit future work and help set priorities and targets, as outlined below.

5.1 MPAs must be tailored to local conditions, attitudes, and needs, and designed to achieve specific objectives, which should evolve according to changing circumstances if necessary.

No single MPA model will fit all situations. Establishing MPAs based on customary tenure systems in the Solomon Islands is a very different challenge from managing tourism in government-run MPAs in Malaysia, or establishing NFZs in the northeast Atlantic. It is therefore essential that the socio-cultural, economic, and ecological contexts of each site are reflected in management plans and design, bearing in mind that for the site to meet the criteria for a protected area it must have a strong conservation objective.

Some MPAs have one, narrow objective, such as protecting a single threatened species; others, such as multiple-use areas, have a number of objectives and aim to manage conflicts between diverse interests. The objectives of an MPA may also change over time. For example, increased acceptance of an MPA may mean that broader objectives can be introduced. This has been the case with the Philippines-Malaysia Turtle Islands Heritage Protected Area, which was initially designed to protect turtle nesting beaches and has now expanded into a broader conservation initiative involving ICM and a bilateral transboundary park. Similarly, management objectives may need to evolve to address new threats or changing conservation priorities.

Changing the objectives of an MPA may be difficult if they are defined in national legislation or policy. In Peninsular Malaysia, MPAs were established in the 1980s as NFZs protecting only the marine habitat (a federal responsibility), but now have an important biodiversity protection objective. Furthermore, the parks have become such tourist attractions that the management of visitors and of activities on the adjacent land (the responsibility of local government) is equally important (case study 7.2). In Indonesia, most MPAs have been designed using recommendations made by IUCN

in the early 1980s (Salm and Clark, 1984). WWF-Indonesia is now working to persuade the government to consider new approaches and to involve local communities in management, in order to reflect more recent recommendations (as discussed above) that IUCN and other agencies have made.

5.2 Stakeholders must be involved at all stages of MPA planning and management.

All stakeholders should be involved from the outset in an MPA and should not be thought of as the recipients of a management plan, but rather as partners who will share in the responsibility of planning and implementation. Wherever possible WWF should use its independence to facilitate dialogue and cooperation between stakeholders, government agencies, and local NGOs.

In Menai Bay, Zanzibar, local communities took the initiative to form their own management committee, and subsequently to establish a conservation area. WWF was invited to help when it was found that external assistance was needed to deal with the threat of dynamite fishing. In the Galapagos, WWF is working with Fundacion Natura to help set up a multi-stakeholder participatory process to develop a new management plan for the Marine Reserve. This process is steadily gaining the trust of local communities and government agencies. In the Parc National du Banc d'Arguin in Mauritania, the interests of the local indigenous community, the Imraguen, were incorporated into the management plan and they now have exclusive rights to fish, using traditional methods, within the park boundaries. As a result, the Imraguen have become 'defenders' of the park and provide voluntary surveillance (case study 7.1).

Full participation invariably takes time. In some instances, particularly in developing countries, basic needs must be met before conservation will be considered by a community. For example, in the Bazaruto Archipelago in Mozambique, WWF is developing a community programme for sustainable use alongside its more traditional protected area work. Such approaches involve long-term commitment and investment of resources, but are likely to build the kind of relationships with local stakeholders that can facilitate the establishment and enforcement of an MPA.

Stakeholders must not be coerced into participation, as it is only if participation is voluntary (rather than mandatory) that full support will be given. A minimum of five years may be necessary to gain the trust of local stakeholders (Burbridge and Burbridge, 1992), a time span that is generally longer than most projects. For example, WWF-Indonesia has successfully involved local government agencies and communities in the management of Take Bone Rate National Park, but funding for the project is now being phased out, leading to concern that the investment in a more participatory approach will be wasted.

The objectives and anticipated benefits of an MPA should be communicated to all stakeholders in a language that they can understand, particularly when the site is being established at the initiative of the government or an outside agency. In Mafia Island, Tanzania, the benefits of the Marine Park and of the time frame for its establishment were reportedly exaggerated in the early stages of the project, resulting in disappointment.

5.3 MPAs often benefit from having a legal basis.

Despite the move to community-based management in many countries, a sound legal basis is often essential to ensure the long-term survival of an MPA and to support the efforts of local people. For example, in Samoa the government supports village initiatives in establishing customary conservation areas by passing by-laws, in consultation with customary owners, to protect community rights and regulations (Schuster, 1998). In Zanzibar's Menai Bay, local communities asked WWF to help with formal designation of the area, which was needed to provide the legislation necessary to halt dynamite fishing. In certain situations, statutory designation may not be so necessary, particularly if there is strong customary tenure or voluntary community involvement (e.g. the Voluntary Marine Conservation Areas in the UK – case study 7.4).

Like all protected area legislation, that for MPAs should reflect national conservation policy and reinforce regional and international obligations. Wherever possible, legislation should be consistent with traditional or customary laws, and provide definitions of legal terms that can be understood by local stakeholders. Given the multiplicity of government agencies that are often involved (Section 2.2), legislation should define clearly the roles and precedence of relevant agencies, government departments, and other legislation. Jurisdictional problems in the Galapagos Marine Reserve have been resolved by the passing of the Galapagos Special Law (case study 7.3).

5.4 All MPAs need a management plan.

A management plan is an essential framework for the success of an MPA. However, many MPA management plans have been prepared but never implemented (as was the case with the 1992 Management Plan for the Galapagos Marine Reserve), and many MPAs lack a plan altogether. WWF has helped to prepare a number of management plans for MPAs, and experience has shown that plans which incorporate the basic lessons described in this section will have a better chance of being successfully implemented.

A checklist for drawing up a management plan is provided in Kelleher and Kenchington (1992). In brief, all plans should clearly describe the conservation objectives of the MPA and the actions needed to ensure that they are achieved. The roles of different agencies involved must be defined, and a monitoring process developed that will evaluate how well the objectives of the MPA are being achieved. All stakeholders should be involved in the development and implementation of the management plan and their opinions should be taken into account. Issues such as the need for an ICM framework should also be addressed.

5.5 Local communities have a role in enforcement.

Few countries can afford the cost of effective enforcement in the presence of a hostile public. However, where public support has been successfully generated,

6. A strategic approach to WWF's MPA

enforcement costs can be low (Kelleher and Kenchington, 1992). Communities which have a sense of ownership of an MPA, having been involved in its establishment, and who receive direct benefits from it are more likely to adhere to the regulations voluntarily. This is illustrated particularly well in the Helford and other Voluntary Marine Reserves in the UK, where there is no government enforcement at all (case study 7.4).

In the Banc d'Arguin, Imraguen fishers have a vested interest in enforcing MPA regulations as they have exclusive fishing rights within the boundaries of the park. Similarly, artisanal fishers in the Galapagos Islands commonly report illegal fishing by mainland Ecuadorian vessels within the marine reserve to the National Parks Service. WWF can help local communities in this role by providing training, education, and communications equipment.

However, addressing external threats is usually beyond the capacity of local communities, and these have to be tackled by government agencies. WWF can provide support, advice, funding, and equipment for the necessary enforcement activities. For example, in Tanzania, WWF has provided funding and technical expertise for a patrol boat in the Mafia Island Marine Park. In the Philippines, WWF is collaborating with the Navy's Special Warfare Action Group, providing funding and equipment for the surveillance of Tubbataha Reef National Park. A boat provided by WWF was recently used to apprehend a Taiwanese vessel fishing for sharks within the Park.

5.6 MPAs require sufficient, well-trained personnel.

A major constraint on long-term effective management is the lack of skilled, trained park managers and other personnel. WWF is therefore involved in capacity-building work in many countries. For example, WWF arranged for staff from Con Dao National Park in Vietnam to undertake a three-week training programme in the Philippines at the WWF project in the Turtle Islands. Such joint initiatives between WWF MPA projects are extremely beneficial.

5.7 MPAs must be financially sustainable.

MPAs are unlikely to be successful unless they are financially self-sustaining or have a sustainable source of external funding. Where MPAs are linked with spectacular scenery or are popular recreational diving destinations, they may attract sufficient visitors to cover the costs of management through entrance or user fees, as in Bonaire or Saba (Dixon et al., 1993). Such examples are rare but, nevertheless, tourism is a major source of income for many MPAs. In the Philippines, WWF is investigating the potential for community-based whale shark watching as a potential revenue-generating activity, which would help to encourage the establishment of an MPA for this species.

The capacity of an MPA to accommodate tourism while protecting biodiversity, however, may rapidly be exceeded, at which point the values that attracted tourists in the first place are degraded. Further work is needed to resolve this conflict. WWF-Malaysia is trying to identify ways in which MPAs may become self-financing without damage from tourism, since there have been cuts in government

MPA funding (case study 7.2; Aikanathan and Wong (1994); Lim (1995 and 1997)).

Many MPAs, particularly those in temperate areas where visitor numbers are much lower, are unlikely to become self-financing through tourism, and for those in particularly sensitive areas attracting visitors may not be desirable. In such cases, funds will have to come from external sources such as governments, intergovernmental organizations, and conservation organizations.

Trust funds are an increasingly common means of financing protected areas and have proved successful in Belize (McField et al., 1996) and other areas (Hooten and Hatziolos, 1995). WWF is proposing a Conservation Trust Fund for the Galapagos which would help to finance a range of environmental activities, including contributions to the Marine Reserve and also to the Navy for support of its patrolling activities. With such mechanisms, it is important that revenue from the protected area does not go into central government funds but is reinvested in the protected area for management or support of local communities.

5.8 MPAs should be established within a framework of ICM.

An ICM framework is increasingly recognized as essential to the successful management of MPAs. ICM addresses the interconnected nature of marine systems and the lack of coordinated jurisdiction between national agencies (GESAMP, 1996; Sorensen, 1997), and WWF is encouraging its adoption as an underlying principle in all marine and coastal conservation activities worldwide. Where MPAs are established in isolation, impacts from outside their boundaries and beyond the control of the responsible agencies may rapidly undermine their effectiveness (Allison et al., 1998). For example, in Malaysia many MPAs are now threatened by increasing tourism development, which is causing pollution from sewage and pesticide run-off from golf courses, among other things. In this case, WWF-Malaysia is lobbying for integration of state and federal management, and for the islands associated with MPAs to be made into state parks.

In other areas, efforts are directed more at introducing an overall ICM approach. The Philippines-Malaysia Turtle Islands Heritage Protected Area started as an initiative to protect turtle nesting beaches. However, given the migratory nature of turtles and the range of impacts on them, an integrated and a much broader approach is required. Similarly in Turkey, the protection of turtles has evolved from the designation of protected nesting beaches to the introduction of ICM programmes (DHKD-WWF, 1996). In the Waddensee, ICM has been identified as a means to approach the complex jurisdictional and administrative challenges provided by the MPA systems of three different countries (case study 7.6).

5.9 MPA management effectiveness should be monitored and evaluated.

Methods for monitoring and evaluating management effectiveness and the health of the ecosystems and resources within an MPA should be identified in the management plan, and a monitoring and evaluation programme should be put in place as early as possible. Information from this provides essential feedback for managers, and permits 'adaptive management', whereby management

interventions are refined and modified when conditions change or if they are found to be inadequate. Monitoring and evaluation methodologies should be kept simple, and should be appropriate not only for the indicators that are selected for monitoring, but also for the available institutional and manpower capabilities (Agardy, 1995; Margoluis et al., 1997).

WWF and IUCN have identified three main activities relating to MPAs to meet the objective in their marine policy (WWF/IUCN, 1998):

- ensuring the establishment of a global network of ecologically representative MPAs
- improving the management of MPAs
- assisting in the development, strengthening, and implementation of regional and international agreements for the establishment and management of MPAs.

6.1 Ensuring that a truly ecologically representative network of MPAs is established.

Most MPA designation advances on a site-by-site basis, commonly as a response to a crisis, such as impending development of a sensitive area, or an opportunity, such as identification of a particularly critical habitat for an endangered species. However, protected areas are most effective if established as part of a 'system' or 'network' in which all ecosystems are represented. Under the CBD, governments are required to plan such systems at the national level, and IUCN has recently produced guidelines for this process (Davey, 1998). WWF is helping in a number of countries. For example, WWF-Canada is developing a framework for determining a representative Canadian MPA network (Day and Roff, 1998). WWF-Indochina will be assisting with a system plan for Vietnam, and WWF-Australia is lobbying for the establishment of a national system in Australia, where the need for such an approach is widely recognized (e.g. Brunckhorst and Bridgewater, 1995).

The network or protected area system approach must also be extended to the regional and global level. WWF offices in Europe, for example, are helping to develop regional networks of MPAs in the Mediterranean, Baltic, and northeast Atlantic. This process can be facilitated through an ecoregion-based conservation approach. Using information available on ecosystem classification, biogeography, species diversity, and endemism, WWF has identified over 200 priority ecoregions (the Global 200) where, if appropriate conservation actions are carried out, a large proportion of the world's biodiversity, ecological, and evolutionary processes will be preserved (Olson and Dinerstein, 1997). Each ecoregion is a relatively large parcel of land or water that harbours a characteristic set of species, communities, dynamics, and environmental conditions, and is thus a biogeographic unit appropriate for achieving regional and ecosystem representation. More detailed, finer-scale analyses of biological, social, and economic factors are needed within each ecoregion to identify key sites and assess the timing, sequence, and level of effort needed for different conservation activities.

Many of WWF's existing MPA projects are located within Global 200 ecoregions and, for some parts of the WWF network, future work on MPAs will focus increasingly on these priority areas. In all areas, the ecoregional approach to marine management will be promoted. In order to meet the objective of "a comprehensive, representative, global system of MPAs", it will be necessary to

address the important linkages between ecoregions themselves, and between ecoregions and areas outside them as a result of currents, migratory species, etc. More MPAs in offshore areas and on the High Seas will also be needed, since these are under-represented at present.

This can be achieved by working closely with partner organizations at the local and international level, and by linking the ecoregional approach with other marine regional analyses. IUCN, with the World Bank and the Great Barrier Reef Marine Park Authority, has analysed the status of MPAs around the world and identified 115 regional priority MPAs (both existing and proposed) (Kelleher et al., 1995), 98 of which lie in Global 200 ecoregions. IUCN, with the National Oceanic and Atmospheric Administration (NOAA) and the Intergovernmental Oceanographic Commission (IOC), is also looking at the feasibility of using 'large marine ecosystems' (large biogeographic units, similar in concept to WWF's ecoregions) as a basis for management (Sherman and Laughlin, 1992).

For an effective protected area system, whether at national, regional, or global level, guidelines on the number, size, and location of sites are needed. This is difficult for MPAs, given the poor knowledge of marine ecosystems and species, and the lack of an accepted marine biogeographical classification.

The question of how much of the marine environment should be included in protected areas, and whether such a figure should be used as a WWF target, is also difficult to answer. In 1994, at the World Parks Congress in Caracas, it was recommended that 10 per cent might be an appropriate figure to aim for in terms of world coverage of all protected areas. This was intended to provide a general guide or minimum figure to help countries develop their national protected area systems. This figure has subsequently been adopted as a target by the WWF Forest Programme (the establishment of an ecologically representative network of protected areas covering at least 10 per cent of the world's forest area by the year 2000, demonstrating a range of socially and environmentally appropriate models), and has been a very useful tool. Targets provide a benchmark from which to measure and communicate progress and they can stimulate commitments from governments. For example, working in partnership with the World Bank, the Forest Programme was able to publicize the Brazilian government's commitment to protect 25 million hectares of rainforest as a contribution to the global forest target.

However, for most parts of the world there are, as yet, no accurate figures for areal coverage of MPAs. Excluding the two IWC whale sanctuaries, less than 1 per cent of the oceans is currently protected in MPAs, and much less than this in NFZs. A further problem is that, although 10 per cent has been widely accepted as a good 'ballpark' figure, higher percentage coverage of marine waters has been recommended in recent years. At the World Conservation Congress in 1996, a draft resolution was tabled proposing that 15 per cent of each marine and coastal biogeographic region should be protected under IUCN categories I and II, but this was subsequently reworded (and passed) as a general, non-quantified call for more MPAs.

In addition, fisheries scientists and others have proposed that 20 per cent (or more) of the oceans (or of EEZs or other geographical units) should be set aside as NFZs

to benefit fisheries as well as to improve biodiversity protection. This figure is based on recommendations made by the US South Atlantic Snapper-Grouper Plan Development Team in 1990. Models indicate that if the overall weight of reproductively active fish in a stock falls below about 20 per cent of their unexploited weight, then the risk of stock collapse increases sharply (PDT, 1990); an assumption is then made that the area protected corresponds to the stock size protected. The area to be protected is measured by the surface of the ocean, but it is recognized that it should include representative areas of all habitat types, depth zones, etc.

Other concerns about the use of such targets for protected area coverage are relevant to both marine and terrestrial protected areas, and relate to issues of management and representation. If the focus is on designating a certain areal coverage of protected areas, the need for effective management may be overlooked. A small area of effectively managed MPAs may provide more conservation benefits than a large area of poorly managed MPAs. Furthermore, without associated criteria, a percentage figure does not necessarily ensure that sites in greatest need of protection (because of their species diversity, uniqueness, threat, etc.) will be included, or that the resulting protected area system will be representative. This can be addressed by using the IUCN categories to ensure that a range of protected area types are included in any system, with a minimum area under strict protection to ensure adequate biodiversity protection (section 3.2).

Despite these debates, it is clear that more MPAs and NFZs are urgently needed and that we are a very long way from meeting even 10 per cent coverage (excluding the whale sanctuaries). Two of WWF's marine sub-regional programmes have therefore chosen to use the 10 per cent figure in their objectives: the Mediterranean Programme (the establishment of new protected areas in the Mediterranean so that the total protected area coverage for the marine and coastal zone will be 10 per cent by the year 2010); and the Northeast Atlantic Programme (the implementation of a network of ecologically representative coastal and marine protected areas covering at least 10 per cent of the northeast Atlantic by the year 2005).

6.2 Improving the management of MPAs.

With the poor record of effective MPA management, it is vitally important that as much effort goes into improving this as into establishing new MPAs. Section 5 provides some general recommendations based on experience with WWF projects which can be summarized as follows:

- MPAs must be tailored to local conditions, attitudes, and needs, and designed to achieve specific objectives, which should evolve according to changing circumstances if necessary
- stakeholders must be involved at all stages of MPA planning and management
- MPAs should normally have a legal basis
- all MPAs need a management plan
- local communities have a role in enforcement
- MPAs require adequate trained personnel
- MPAs must be financially sustainable

- MPAs should be established within a framework of ICM
- MPA management effectiveness should be monitored and evaluated.

There needs to be greater sharing of experiences between programmes and projects involved in setting up and implementing MPAs, and between those working on MPAs and those involved in other protected areas.

A further mechanism for improving management effectiveness would be the development of a system to assess and verify management of protected areas at the global level, both terrestrial and marine (Dudley and Stolton, 1998; Allison et al., 1998). This would require the development of a globally recognized system of international standards, and Dudley and Stolton (1998) suggest various options. Individual governments or protected area agencies could be responsible for assessments; they could be carried out as part of an international system under an existing convention; or a new body could be established to undertake evaluations. This issue is currently being addressed in international fora, and the CBD could provide one tool for taking it further. In order to address this effectively for MPAs, closer scrutiny of the IUCN categories as they apply to MPAs is also required.

WWF-Canada's Endangered Spaces Campaign system for assessing Canada's national system of protected areas provides one model. Annual report cards are issued which assess government progress in completing the national system. Each region is graded on performance, and the federal government is graded on development and implementation of national policies. Five criteria are used to assess progress:

- whether ecological criteria have been applied to protected area system planning
- development of strategies to advance protected areas
- completion of a system plan
- annual rate of progress in designating new sites
- application of protection standards.

In this case the only protected areas that are counted are those which meet the strict WWF-Canada definition: areas with long-term legal designation prohibiting non-renewable resource use, bottom dragging and trawling, and other activities likely to cause long-term, large-scale habitat disruption. Marks are deducted if management practices inside or adjacent to protected areas are judged to be detrimental to maintaining their ecological integrity.

A similar assessment of MPAs was carried out in Australia by WWF-Australia and other national and state environment groups, using as a basis an annual report card which is produced for terrestrial protected areas. The performance of each government (state, territory, and commonwealth) was assessed in five subject areas (science-based criteria, new MPAs established, actions contributing to a national system, adequacy of management, and the role of indigenous people in management). Other models include an assessment of the effectiveness of Biosphere Reserves by IUCN (Dudley and Stolton, 1998), and a six-point scoring system which has been applied to protected areas in Ghana (Hawthorne and Abu-Juam, 1995).

6.3 Assisting in the development, strengthening, and implementation of regional and global agreements for the establishment and management of MPAs.

The international arena can be used to:

- achieve consensus on definitions and minimum global standards
- secure commitment to MPAs
- promote effective implementation of existing agreements
- ensure effective monitoring and reporting.

There are numerous global and regional treaties and frameworks that promote establishment and management of MPAs (Annex 3), and these have been reviewed and commented on in several WWF documents (e.g. Gjerde and Ong, 1995; de Fontaubert et al., 1996). The associated meetings and conferences provide the opportunity to educate policy makers and international media about effective MPAs, and to ensure appropriate approaches to, and guidelines for, MPAs are included in these agreements. WWF is paying particular attention to the role of the CBD in protected area establishment and management, since MPAs are accorded a high priority under the Jakarta Mandate.

NFZs may also be promoted through global agreements. For example, one of the options being considered to improve management of the largely illegal Patagonian toothfish fishery in the Antarctic is the establishment of NFZs under the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR). Agreements such as the International Commission on the Conservation of Atlantic Tunas (ICCAT) and the South Pacific Fisheries Forum have yet to consider NFZs, although the Ocean Wildlife Campaign in the US has called upon ICCAT to set up a system of NFZs to protect juvenile swordfish.

Some conventions play a very specific role by allowing for the listing of sites of international importance. This process enables individual countries to continue to make their own decisions about protected areas, but to benefit in various ways from funding, international support, and reinforcement of legal status. WWF has helped with several nominations for the World Heritage Convention, and there is potential for using this convention to improve protection of the Global 200 ecoregions. This could provide an opportunity to promote MPA establishment in some areas, and address the gap in marine representation under this convention (Thorsell et al., 1997), although it applies only to the 12-nautical-miles territorial sea limit. WWF is also involved in the implementation of the Ramsar Convention and has helped to list wetland sites, including coastal areas. For example, WWF-UK is currently involved in discussions over listing part of the Chagos Archipelago under Ramsar, and in looking at the potential of this area for World Heritage nomination.

7.1 Mauritania – working with stakeholders in the Banc d'Arguin.

The Banc d'Arguin, a site of unparalleled importance for marine biodiversity and ecological processes, is the largest marine park in Africa. It also constitutes Mauritania's most important reproduction and nursery area for fish and crustaceans – the country's major economic resource. As catches decline along the African coast, fishers are increasingly attracted to this legally protected area, where most resources are still abundant.

An early management strategy, dating from the creation of the park in 1976, was to maintain – within the limits of the park – the small communities of resident fishers, the Imraguen, and to give them exclusive fishing rights to the area, using traditional non-motorized methods. By protecting their own resources vis-à-vis other fishers, the Imraguen have become the 'defenders' of the park, providing a level of surveillance from their own sailboats that the park administration would be unable to carry out alone.

In order to address the ever-increasing threats to marine resources, the Parc National du Banc d'Arguin, with the technical and financial support of WWF, adopted a ten-year master plan, negotiated with all major stakeholders. To implement the plan, new park regulations were needed, and the draft legislation was defined directly with the representatives of the Imraguen communities during a three-day workshop. One important accomplishment of this participatory planning was reaching agreement to limit the total number of Imraguen boats to 100, in the interest of ensuring a sustainable level of fishing effort. The park is now waiting for the legislation to be passed by the government.

Here, having people within the park is a solution, rather than a problem. The Imraguen, key stakeholders in the park's future, were involved from the outset of the management planning process. Their needs have been balanced with conservation objectives, and as a consequence they are playing an important role in securing the park's future. However, not all problems have been solved, and among the most thorny are the pirate fishers, both small scale and industrial. Demand for mullet roe ('poutargue') in the Mediterranean has led to overfishing of the stock in Mauritania, and to local fishers targeting other species, including sharks. During the last decade, rapid growth of the Asian shark fin market has led to the development of a highly sophisticated and targeted industry, severely threatening a number of shark populations in the region.

These external threats, driven by distant markets, are beyond the enforcement capacity of the Imraguen. Promoting an effective enforcement regime and adequate legislation to protect the area has thus become the priority for WWF. High-speed patrol boats have been purchased, but greater international cooperation and assistance, such as tackling subsidies that encourage foreign fishing fleets, will be needed to help Mauritania safeguard this complex and beautiful World Heritage site.

Prepared by Meg Gawler, WWF International Africa and Madagascar Programme

7.2 Marine parks in Peninsular Malaysia – adapting management to changing priorities.

Marine parks in Malaysia were originally set up primarily for fisheries management purposes, and are NFZs. However, those in Peninsular Malaysia have increasingly become associated with tourism as more and more people, both from abroad and from within the country, visit them to enjoy the many pristine beaches and coral reefs. At Pulau Payar Marine Park, annual visitor numbers jumped from 1,373 in 1988 to 90,307 in 1997 – on an island where visitors mainly congregate at the Marine Park Centre where there is one main beach less than 100 metres long!

Although tourism is important for revenue generation, especially for the island communities, marine park managers are ill-equipped to handle this huge increase. Management objectives and park legislation have not been sufficiently adapted to address the growth of tourism, and still reflect the original objective of protecting fisheries. Potential impacts from tourism include damage due to careless snorkellers and divers, collection of corals and shells, boat anchoring, and littering. Indirect impacts include siltation and sedimentation from land clearing and construction of tourist facilities, nutrient enrichment from sewage and fertilizers used on golf courses, and oil and hydrocarbon pollution from boats. The park legislation covers the water only, and the responsible agency for this is the federal government. Land matters are the responsibility of the various state governments, and so development on the adjacent land is not therefore required to comply with park legislation.

WWF-Malaysia has used the concept of carrying capacity and 'limits of acceptable change' to generate appropriate management recommendations for two of Malaysia's marine parks, Pulau Tioman Marine Park and Pulau Payar Marine Park. Key lessons learned include:

1. The need for reconciliation of federal-state policy differences. *Given the conflict arising from the fact that development on land is not required to comply with any marine park regulations or management plan, state governments should consider gazetting islands adjacent to marine parks, either in part or as a whole, as protected areas under appropriate state legislation, and measures should be taken to ensure sufficient cooperation between state and federal agencies.*

2. The need for planned tourism development. *Much of the tourism development which has occurred in Malaysia's marine parks is haphazard, with no proper waste treatment and disposal facilities. Tourism planning and promotion for the islands and the adjacent tourist areas on the mainland should incorporate the needs and objectives of the marine parks and target environmentally aware tourists. The implementation of existing legislation, which makes environmental impact assessments mandatory for all development on marine park islands, could help ensure appropriate tourism development. The marine parks are multiple-use areas and the legislation provides for the development of regulations for zoning. Zoning schemes should therefore be used to reduce conflicts between tourism and*

conservation.

3. Implementation of marine education and awareness programmes. *Pre-departure programmes in the countries of origin of tourists could encourage visitors to consider the effects of their visits in advance, and to minimize their negative impacts. Information should be multilingual, to cater for the main nationalities that visit the marine parks. Tour and dive operators must brief visitors on marine park regulations. The education of local communities, especially fishers, on the long-term benefits of marine parks is also crucial in encouraging community participation in the planning and management of marine parks.*

4. Provision of adequate facilities. *Particularly crucial to marine parks will be the implementation of adequate sewerage and solid-waste disposal facilities. Laying moorings at popular reefs to reduce anchor damage is also necessary.*

5. Limiting visitor use. *Given the steady increase in visitors, it will be essential for the management authorities to limit their numbers. The participation of tour and dive operators in this exercise will be essential for success. A number of mechanisms could be used, including limits on:*

- the number of tourists visiting a marine park each day
- the size of a tour group that may enter a marine park
- the number of boats that may enter a marine park each day
- the number of licensed tour and dive operators that may bring visitors into a marine park
- the number of divers that may enter a marine park each day
- the number of divers in a dive group at any one time.

Zoning systems could also be used, for example, to limit the number of visitors that may enter a certain zone. Another mechanism would be to introduce user fees.

Prepared by Lim Li Ching, WWF-Malaysia

7.3 The Galapagos Marine Reserve – managing conflicting jurisdiction.

An island archipelago still relatively untouched by human impact, the Galapagos Islands' historical and biological importance makes them an attraction for tourists worldwide, and a source of great national pride and revenue for the people of Ecuador. The Galapagos National Park was created in 1959, and the archipelago was designated as one of the first natural World Heritage Sites by the United Nations Educational, Scientific and Cultural Organization (UNESCO). However, only the terrestrial sections were included in the designation. Furthermore, when the marine area finally received management status in 1986, it was not as a protected area, but as a fisheries reserve under the Undersecretary for Fisheries, as the Fisheries Department is the government agency representing commercial fishing interests.

The first management plan for the Galapagos Marine Reserve (1992) was never implemented. In November 1996, INEFAN (the Ecuadorian Institute for Forestry and Protected Areas) designated the existing marine reserve as a "reserve of biological resources" and included it within Ecuador's National System of Protected Areas. This meant that both INEFAN and the Fisheries Department

had authority over the area, a situation resisted by the Undersecretary for Fisheries, leaving the management of the marine reserve in dispute.

Lacking a clear legal status or administrative framework, and without a recognized management plan, the marine reserve was subject to increasing threats during the 1980s. International demand for products such as shark fin and sea cucumbers drove increased fishing effort by island fishers and mainland boats, threatening local extinctions of some sea cucumber species and the marine biodiversity of the MPA as a whole.

In January 1998, through the Galapagos Special Law, the Ecuadorian parliament approved a series of important protective measures for the islands. The law places the marine reserve under the jurisdiction of the National Parks Service, extends the reserve's limits to 40 nautical miles from the archipelago's baselines, and ensures that 50 per cent of revenue generated from tourists visiting the Galapagos will be invested in local biodiversity conservation. Within the 40-nautical-mile limit, access to fishing is limited to local fishers, while industrial fishing by mainland and foreign fleets is prohibited.

WWF has been assisting for several years in the resolution of the park's status and undertook a series of actions to promote effective management of the marine reserve. These have included:

1. *Support of the process to develop the Galapagos Special Law Bill and advocacy work at the ministerial, executive office, and parliament levels to ensure that the bill was passed.*

2. *Ensuring the participation of three key interested sectors in the islands (artisanal fishermen, tour operators, and the scientific community) in the development of a new management plan, through a permanent consultative body called the Junta Participativa. This process not only defined the basis for a new plan, but also provided key input into the definition of the Galapagos Special Law Bill.*

3. *Identification and analysis of fishing threats, strengthening of the managerial and enforcement capacities of the National Park Service, and strengthening of the monitoring capacities of the Charles Darwin Research Station.*

4. *Promoting acceptance of management decisions using an integrated strategy including participatory approaches to ecoregion-based conservation, and media relations and advocacy through tactical coalitions. It has proved especially important to understand community needs and the need for sensitive timing of efforts to involve local people, i.e. to avoid 'mandatory' participation.*

Prepared by Miguel Pellerano, WWF-Galapagos Programme Office

7.4 Helford Voluntary Marine Conservation Area in the United Kingdom – gaining support for MPAs through community participation.

The Helford River is a drowned river valley, flooded by the sea at the end of the last ice age, and receives very little freshwater input. Fishing, shellfish collection, transport, and farming settlements are the main human impacts on the valley. In the late 1970s, local scientists expressed concern over declines in the rich local

flora and fauna, particularly in the intertidal zone. This concern coincided with a greatly improved national transport network affording increased access to the area, particularly for tourists. As a result of efforts by individuals and organizations associated with the Helford River, and with the support and funding from WWF-UK, the Duchy of Cornwall, and Cornwall County Council, the Helford Voluntary Marine Conservation Area (HVMCA) was founded in 1985. The objective of the HVMCA is to monitor the quality of the marine environment and maintain harmonious use of the river by voluntary means.

In establishing the HVMCA, full transparency between all users and interested parties was seen to be essential. The HVMCA advisory group includes local authorities, statutory bodies, societies and businesses, marine biologists, scientific advisers, and other interested individuals. This ensures that information flows quickly between decision makers responsible for the river valley and the local community affected by their decisions. The advisory group meets annually to receive and discuss the reports from a working group, which initiates and oversees all activities within the HVMCA. The enthusiastic and meticulous coordinating role of the group's secretary is paramount to the ongoing success of the project. Subjects considered by the working group range from sewage schemes, bait-digging problems, and oil-pollution protection exercises, to studies of the Helford Bass nursery area and National River Authority pollution strategies.

The HVMCA has played an important role in fostering pride in and a sense of ownership of the river in the local community, and translating this into action. Realization that voluntary action will safeguard 'their' river by achieving 'common' conservation goals for all users has led to committed support. Public awareness exercises and videos, shore walks, lectures, educational boat trips, publications, media coverage, information boards, fundraising, and scientific studies have all resulted from this commitment. Key lessons learned include:

- community, commerce, and conservation need to work together
- all stakeholders must be regularly and fully informed of progress and activities
- skilful chairmanship is required to ensure productive larger meetings
- people most directly associated with the site as well as the officers of large organizations must be involved
- hidden opposition may need to be tackled tactfully
- increased awareness and wider recognition rapidly generates more work for the group
- there must be a reliable point of contact or a coordinator available at all times
- working and advisory groups must be able to accommodate changes in personnel
- adequate financial support is essential.

WWF-UK and English Nature (England's statutory conservation organization) have together provided a level of funding which it would otherwise have been impossible to generate or match in this area, given limited industrial activity, low income levels, and high local unemployment. This support is partly responsible for the high degree of enthusiasm for the project in the local community.

The HVMCA group is now working at full capacity to maintain the status quo of the Helford River. In the future, the group will need to address external pressures and larger numbers of visitors. Any alterations in local planning policy may mean less stringent control on development adjacent to the river. Farming practices continue to change, and the potential impact of climate change needs consideration.

Many local fishermen working outside the river do not feel the need to become involved in the HVMCA, even though the river may contain critical spawning grounds for their target species.

There are weaknesses in the voluntary management regime. While the majority of activities within the area can be effectively managed using voluntary means, the extent to which bait digging and shellfish collection can be controlled in this way is debatable. The surrounding region of the Helford River (Falmouth Bay and Estuaries) has been submitted to the European Commission as a Consultation Special Area of Conservation (cSAC) under the Habitats Directive. This directive is aimed at managing habitats and species within a listed area, and some habitat types within the HVMCA voluntary designation, such as Atlantic salt meadows and mudflats exposed at low tide, are therefore now subject to statutory protection. Thus the adverse effects of shellfish collecting and bait digging on exposed mudflats can now be addressed through legislation.

Monitoring work undertaken by the voluntary working group with WWF-UK's assistance will provide extremely useful baseline data for management under the Habitats Directive, and a representative from HVMCA will sit on the SAC Advisory Group to assist with development of a management scheme for the area. The data, and a knowledgeable representative, might not have been available if the option of establishing a voluntary MPA had not been open to Helford in 1985. However, unlike in the UK voluntary marine conservation areas, the Habitats Directive does not require that conservation goals are balanced with local business needs. The effectiveness of the HVMCA is largely due to the involvement and support of local stakeholders. As statutory protection develops, the area will provide an interesting case study to investigate arguments for and against the need for legal protection of all MPAs, and to see the extent to which legal protection can complement voluntary efforts.

Prepared by Sarah Jones and Sian Pullen, WWF-UK

7.5 The Gully – a potential offshore MPA for Canada.

The Gully is a steep-sided, 80 kilometre-long, marine canyon, wider (30 kilometres) and deeper (down to 3,000 metres) than the USA's Grand Canyon. It is the largest submarine canyon on the east coast of North America, and its diversity of habitats and species is related to its spectacular depth and variable contours, temperature, and currents. The area is one of the most important habitats for a population of northern bottlenose whales, which is classified as vulnerable by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The need to protect this population against growing industrial threats provides an example of the urgent need for MPAs to protect offshore waters.

The Gully is also adjacent to the Sable Basin, the site of extensive offshore gas reserves, where the Sable Offshore Energy Project (SOEP), headed by Mobil and Shell, will develop six sites. SOEP has been reviewed by a Joint Public Review Panel, and the project has been given approval. WWF-Canada participated in a public review and urged the panel to consider the impacts of the project on existing and future protected areas. WWF's position stems from a recent federal government statement confirming that any project subject to the Canadian Environmental

Assessment Act must take into consideration its impact on existing protected areas, and on the opportunity to complete a network of protected areas in the region. Recommendations made by WWF to the panel included:

- restriction on future oil and gas development activity any closer to the Gully than the SOEP Venture field (the nearest field) until an MPA is established to protect the Gully and its inhabitants
- zero discharge policy on all wastes produced during the course of the project and on any future development
- expansion of the proposed Gully vessel exclusion zone to better protect the whales from collision and the underwater noise that will be generated by the project.

Following WWF's participation at the Sable hearings and a national public awareness campaign, the federal Department of Fisheries and Oceans (DFO), in cooperation with the Canadian Wildlife Service (CWS) and Canadian Heritage (Parks Canada), initiated a process in July 1997 to develop a conservation strategy and management plan for the Sable Gully. This may lead to the designation of the area as an MPA under Canada's new Oceans Act.

A report prepared for WWF-Canada noted the strong belief among interviewees from the region's fishing industry, particularly the seafood processors, that designation of MPAs should be driven by industry not conservation groups. Some industry spokespeople recognized a role for such groups but expressed reservations about working with them. NGOs have had to work hard to earn the trust and support of fishers, and the success of local NGOs in their efforts to establish the Gully as an MPA will depend, in many cases, on the extent of support shown by fishers and their organizations.

In Canada, MPAs have historically been viewed as management tools for fisheries and, as a result, there has essentially been no public constituency for biodiversity issues and protection. The immediate challenge for WWF in meeting the agenda of its Endangered Spaces Campaign is to shift the public discussion on MPAs from fisheries management to the broader one of protection of biodiversity. Any effort to move the process forward will require more discussion with, and cooperation between, fishers, coastal communities, industries, conservationists, and government agencies. Furthermore, the need for an ICM framework will become increasingly urgent as activities such as oil and gas exploitation, shipping, fishing, and tourism increase in the area.

Prepared by Inka Milewski, WWF Atlantic MPA Coordinator

7.6 The Waddensee – learning to manage transboundary MPAs.

The Waddensee extends along the North Sea coasts of the Netherlands, Germany, and Denmark. Covering approximately 13,500 km², this highly dynamic ecosystem includes the largest area of tidal flats in the world, with associated channels, salt marshes, beaches, dunes, and estuaries. Every year 10 to 12 million birds visit the area during migration. The wetlands are vital for about 50 bird species and home to some 10,000 seals.

Despite international recognition of the Waddensee's significance, construction of dikes and coastal defence work has led to the loss of some 160 km² of

saltmarsh within the past 50 years. Mussel banks and seagrass beds, key habitats within the ecosystem, are steadily declining, but mussel and cockle fisheries continue, especially in the Netherlands. Shrimp fishing is carried out throughout the Waddensee, and the extensive tourism industry continues to grow. At ports such as Hamburg and Bremerhaven, river mouths have been drastically altered to meet the demands of the shipping industry. In spite of existing conservation agreements, gas and oil are still extracted. Proposals for extensive extraction of gas in the Netherlands also pose a major threat.

A joint declaration was adopted in 1982, in which Denmark, Germany, and the Netherlands declared their intention to coordinate comprehensive protection of the Waddensee region. A trilateral working group composed of civil servants and regional authorities is responsible for implementation of decisions, and a Common Waddensee Secretariat (CWSS) has been established to initiate and coordinate activities. Further milestones have included:

- the adoption, in 1991, of a guiding principle (that "natural processes should proceed in an undisturbed way") and of common management principles and objectives for human use
- the adoption, in 1994, of agreed boundaries to the cooperation area and of common ecological targets
- the adoption, in 1997, of a Trilateral Waddensee Plan (as a blueprint for common management) and a package of monitoring parameters.

Protection regimes in the Waddensee are regulated by national and, in Germany, federal law, creating many obstacles to consistent decision making, as judicial and administrative systems in the three states are very different. Furthermore, trilateral political declarations are not legally binding, and national or federal priorities and economic interests may therefore overrule conservation objectives. The conservation community has proposed a Waddensee Treaty to give the declarations a binding character.

WWF-Germany has been involved in this process since the beginning, in particular promoting and supporting the implementation of three national parks covering large parts of the German Waddensee. Site-based work and political lobbying for these and the wider Waddensee area remain a centrepiece of WWF-Germany's coastal and marine conservation work. Together with partner organizations in Denmark and the Netherlands, WWF-Germany represents NGOs at governmental conferences in the Waddensee Team.

In all three countries, large protected areas have been implemented under national law, and other areas have been included in the cooperation area. But despite these efforts, the area is still at risk. For example, the geographical scope of cooperative activities needs amendment, as in Germany and the Netherlands it stops at the main dike and excludes inland coastal areas. The political mandate is also vague in cases where environmental policy conflicts with other priorities outside areas protected by national law.

The Waddensee illustrates clearly the importance of integrating MPAs into a broader management context. This will require the extension of the cooperation mandate from conservation of the Waddensee itself to integrated management of the whole coastal region. As a result of an initiative of the Waddensee Team during the last

Annex 1 IUCN protected area categories

Category	Title/Definition
Ia	**Strict Nature Reserve/Wilderness Area:** *A protected area managed mainly for science or wilderness protection. An area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features, and/or species, available primarily for scientific research and/or environmental monitoring.*
Ib	**Wilderness Area:** *A protected area managed mainly for wilderness protection. A large area of unmodified land and/or sea, retaining its natural character and influence without permanent or significant habitation, which is protected and managed so as to preserve its natural condition.*
II	**National Park:** *A protected area managed mainly for ecosystem protection and recreation. A natural area of land and/or sea, designated to a) protect the ecological integrity of one or more ecosystems for present and future generations, b) exclude exploitation or occupation inimical to the purposes of designation of the area, and c) provide a foundation for spiritual, scientific, educational, recreational, and visitor opportunities, all of which must be environmentally and culturally compatible.*
III	**Natural Monument:** *A protected area managed mainly for conservation of specific natural features. An area containing one, or more, specific natural or natural/cultural feature which is of outstanding or unique value because of its inherent rarity, representative or aesthetic qualities, or cultural significance.*
IV	**Habitat/Species Management Area:** *A protected area managed mainly for conservation through management intervention. An area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats and/or to meet the specific requirements of specific species.*
V	**Protected Landscape/Seascape:** *A protected area managed mainly for landscape/seascape conservation and recreation. An area of land, with coast and sea as appropriate, where the interaction of people and nature over time produced an area of distinct character with significant aesthetic, ecological, and/or cultural value, and with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance, and evolution of such an area.*
VI	**Managed Resource Protected Area:** *A protected area managed mainly for the sustainable use of natural ecosystems. An area containing predominantly unmodified natural systems, managed to ensure long-term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs.*

Annex 2 MPA site-based projects with WWF involvement (1997/1998)

This annex lists only site-based WWF MPA projects, but the term 'MPA' is used in its broadest sense. It is not a complete list but provides an overview. General lobbying, educational, or other policy-related projects are not listed here, although they may be referred to in the text. Many of the following projects are carried out in partnership with other NGOs and agencies.

INTERNATIONAL

Indian Ocean Whale Sanctuary *Ligurian Sea Cetacean Sanctuary, Mediterranean*
Southern Ocean Whale Sanctuary *(proposed)*
Barents Sea International Park (proposed) *Celtic Shelf Break, Northeast Atlantic (proposed)* *Bering Sea (proposed)* *Rockall Bank, Northeast Atlantic (proposed)*

AFRICA

Gabon
GA0007 *Gamba Reserves Complex*
Kenya
KE0087 *Kiunga Marine Reserve*
Madagascar
MG0081 *proposed sites being identified*
Mauritania
MR0002 *Parc National du Banc d'Arguin*
Mozambique
MZ0006 *Bazaruto National Park/(proposed Greater Bazaruto National Park)*
South Africa
ZA220 *West Coast National Park*
ZA417 *Tsitsikamma Marine Reserve*
ZA420 *Cape Peninsula National Park*
GT45 *Marine reserves between Hanglip and Hermanus*
GT49/50/73 *Greater St Lucia Wetland Park*
Tanzania/Zanzibar
TZ0057 *Mafia Island Marine Park*
TZ0066 *Menai Bay Conservation Area, Zanzibar*

ASIA AND PACIFIC

Australia
Great Australian Bight Marine Park
Tasmanian Seamounts (proposed)
Bangladesh
(concept) *Sundarbans (tiger project)*
Cambodia
KH0004 *Mekong River project (watershed/wetlands)*
China
CN0062 *Mangroves in Hainan and Guanxi*
CN0058 *Yancheng Nature Reserve*
Shuangtai Hekou Nature Reserve
Cook Islands
9P0027 *Raratonga (pilot marine conservation areas)*
Fiji
9P0027 *Kadavu (pilot marine conservation area)*
Hong Kong

HK0001	*Mai Po Site of Special Scientific Interest*
	Hoi Ha Wan Marine Park
	Sha Chau Marine Park
	Lung Kwu Chau Marine Park (dolphin sanctuary)
	Yan Chau Tong Marine Park
	Cape d'Aguilar Marine Reserve
India	
IN0068	*Andamans & Nicobars (biodiversity hotspot programme)*
IN0084	*Pulicat Lake*
Indonesia	
ID0113	*Kepulauan Seribu Marine National Park*
ID0119	*Take Bone Rate National Park*
ID0120	*Bali – monitoring and protection of turtles*
ID0131	*Aru Tenggara Marine Reserve*
ID0143	*Teluk Cenderawasih National Marine Park*
(concept)	*Jamursba Medi Turtle Beach*
ID0105	*Wasur National Park, Irian Jaya*
Japan	
	Shiraho Reef (recommended protected area)
Malaysia	
	Pulau Payar Marine Park
	Pulau Redang Marine Park
	Pulau Tioman Marine Park
	Semporna Marine Park (proposed)
New Zealand	
	Banks Peninsula Marine Reserve
Papua New Guinea	
PG0023	*Collingwood Bay, Oro Province*
PG0015	*Lasanga/Kamiala Island*
PG0023	*Tonda/Maza Wildlife Management Areas*
	Sinub Island Wildlife Management Area
	Kikori River Delta Wildlife Management Area
Pakistan	
PK0048	*Indus River Delta (mangrove projects)*
Philippines	
PH0851	*El Nido Marine Reserve*
PH0033	*Turtle Islands Heritage Protected Area*
PH0034	*Tubbataha Reef National Marine Park*
PH0035	*Dugong Conservation, Busuanga, Palawan*
PH0022	*Pamilacan I (community-based whale-watching)*
Solomon Islands	
SB0002	*Several community resource conservation sites in Marovo*
	Areas around Vella Lavella, Gizo and Simbo
Thailand	
	*Coastal conservation zone projec*t
Vietnam	
VN0011	*Con Dao National Park (marine conservation)*
VN0029	*Cat Ba National Park (strengthening environmental education)*

EUROPE AND MIDDLE EAST

Estonia	
9E0048	*Matsalu Bay (part of Matsalu Nature Reserve, in the Gulf of Riga)*
	Kaina Bay (ICM project in the Gulf of Riga)
Finland	
	Moyly (proposed MPA for seals)
	Snipansgrundet-Medelkalla (proposed MPA for seals)

	Sodra Sandback (proposed MPA for seals)
	Grimsoarna and Mastboden (proposed MPA for seals)
	Sandkalen (proposed MPA for seals)
	Liminganlahti Bay (proposed protected area for birds)
Germany	
	Schleswig Holstein National Park (Waddensee)
	Jasmund National Park
	Oder/Odra Lagoon (ICM project with Poland)
	Cetacean Sanctuary, west of Sylt/Anrum (proposed)
	Heligoland (proposed)
Greece	
GR0043/3225	*Zakynthos (Sekania Beach/Laganas Bay)*
	Northern Sporades
Iceland	
9E0077	*Breidafjordur Reserve*
Italy	
	Gianola Marine Reserve
	Monte Orlando Marine Reserve
	Torre Guaceto Marine Reserve
	Scogli de Isea Marine Reserve
	Miramare Reserve, Trieste
Jordan	
JO0007	*Jordan Marine National Park*
Latvia	
9E0048	*Pape Lake and Jurkalne*
	Kemeri National Park/Engure Lake Ramsar Site
Lithuania	
	Nemunas River Delta Regional Park/Curonian Lagoon (transboundary
park	*with Russia)*
Norway	
	Sula Ridge (proposed)
Romania	
RO0003	*Danube Delta*
Russia	
RU0011	*Novaya Zemlya*
RU0011/0032	*Okhotsk Sea/Shantarsky Archipelago*
RU0004	*Lena Delta Reserve*
	Vistula (with Poland)
	Curonian Lagoon (transboundary park with Lithuania)
Spain	
	Canary Islands (proposed)
Sweden	
	Kattegat project
Turkey	
TR0015	*Foca*
	Additional sites for turtles and monk seals
Ukraine	
9E0060	*Ukrainian Danube Delta Biosphere Reserve*
United Kingdom	
	Chesil Bank and Fleet Nature Reserve
	Helford Voluntary Marine Conservation Area
	Looe Voluntary Marine Conservation Area
	North Devon Voluntary Conservation Area
	Polzeath Voluntary Marine Wildlife Area
	St Mary's Island Voluntary Marine Nature Reserve
	Lundy Marine Nature Reserve

Skomer Marine Nature Reserve
Calf of Man
Dogger Bank (proposed)
Western Irish Sea Shelf Front (proposed)
Race Bank (proposed)
Orkney and Shetland Channel (proposed)
Cardigan Bay Sarns (proposed)

LATIN AMERICA AND CARIBBEAN

Argentina
AR0852 *Campos del Tuyu Reserva de Vida Silvestre*

Brazil
BR0908 *Fernando de Noronha National Park*

Chile
CL0851 *Otway Bay penguin protection*

Colombia
CO0018 *Conservation and Community Development in Malaga Bay*
CO0014 *Utria Sound National Park*

Cuba (WWF-Canada – activities have not yet started)
Desembarco del Gramma NP
Los Indios Ecological Reserve
Punta Frances Marine National Park (proposed)
Hatibonicao Ecological Reserve (proposed)

Dominica
9L0767 *Cabrits National Park (ENCORE)*

Dutch Antilles
Bonaire Marine Park
Saba Marine Park
Lac Bay (management plan for wetland area)

Ecuador
EC0056/0086 *Galapagos Marine Reserve*

French Guiana
PF 174091 *Hattes Beach (turtle project)*

Guatemala
9l0704 *Manchon-Guamuchal (proposed private reserve)*

Honduras
9l0780 *Gulf of Fonseca (PROARCA)*

Mexico
MX0851 *Biosphere Reserve of the islands of the Gulf of California*
MX0851 *Laguna San Ignacio*
MX0853 *Sian Ka'an Biosphere Reserve*
MX0853 *Banco Chinchorro Biosphere Reserve*

Nicaragua
9L0780/NI0851 *Cayos Miskitos (PROARCA)*

Peru
PE0853 *Paracas Marine Reserve*

St Lucia
9L0767 *Soufrière Marine Management Area (ENCORE)*
Canaries Anse-la-raye Marine Management Area (ENCORE)

Venezuela
RWNEW20/21 *Morrocoy National Park*
Cuare Wildlife Refuge

NORTH AMERICA

Canada
The Gully

United States

Gwaii Haanas (proposed)
Igaliqtuuq (proposed)

Florida National Marine Sanctuary

Annex 3 Global and regional agreements relevant to MPAs

GLOBAL AGREEMENTS

1. Agenda 21, 1992 United Nations Conference on Environment and Development

This instrument is not binding but signatories have a strong moral obligation to ensure its full implementation. Chapter 17 of Agenda 21 requires that:

> "States should identify marine ecosystems exhibiting high levels of biodiversity and productivity and other critical habitat areas and should provide necessary limitations on use in these areas, through *inter alia* designation of protected areas".

2. UN Convention on the Law of the Sea (UNCLOS) (Entry into force: 1995)

While this treaty makes only limited reference to MPAs, the preservation and protection of the marine environment and the conservation of marine living resources, both within and beyond national jurisdiction, are fundamental obligations. For example, it contains provisions for parts of the sea floor to be placed off-limits for mineral extraction, if and when this poses a threat.

3. Convention on Biological Diversity (CBD) (Entry into force: 1994**)**

The CBD requires each party, as far as possible and where appropriate, to:

- establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity
- develop guidelines for the selection, establishment, and management of such areas.

Plans to promote national protected area strategies and to identify a list of priority sites are being considered under the convention.

4. UN Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks

This agreement was opened for signature in December 1995 and will enter into force when ratified by 30 countries. It significantly extends the conservation measures contained in UNCLOS, and calls upon states to adopt plans to ensure the conservation of non-target species and those associated with or dependent on fishery species, and to protect habitats of special concern. However, there are no specific provisions for MPAs.

5. FAO Code of Conduct for Responsible Fisheries (Adopted 1995)

The Code, essentially a voluntary, non-binding instrument, aims to advance sustainable utilization of fishery resources consistent with preserving ecosystems, resources, and their quality, but also does not explicitly mention MPAs. The General Principles call for protection and rehabilitation of all critical fisheries habitats, specifically identifying wetlands, mangroves, reefs, lagoons, nursery and spawning areas.

6. 1973 International Convention on the Prevention of Pollution from Ships and 1978 Protocol Relating Thereto (MARPOL 73/78) (Entry into force: 1983)

Special Areas may be designated by the International Maritime Organization (IMO) under MARPOL, whereby more stringent application of the general provisions regarding discharges of oil, noxious liquid substances, and garbage may be applied to an area (WWF-UK, 1997). Under UNCLOS, coastal states are permitted to identify areas where Special Area status may be applied subject to approval by the IMO. UNCLOS also extends the criteria to include the "utilization of the protection of resources" of an area. Special Areas have been designated for the Baltic Sea, Mediterranean Sea, Red Sea, North Sea, Black Sea, Gulf of Aden, the Gulfs area, Wider Caribbean Region, and Antarctic Treaty Area. Several of these designations are not yet in force.

IMO can also authorize the designation of Particularly Sensitive Sea Areas (PSSAs). A PSSA is defined as an area needing special protection because of its significance for recognized ecological, socio-economic, or scientific reasons and because it may be vulnerable to damage by maritime activities. It provides a legislative basis for a significant reduction in risk from shipping impacts through compulsory pilotage and mandatory position reporting. Guidelines for the Designation of Particularly Sensitive Sea Areas and Other Related Measures were published in 1991.

7. Convention on Wetlands of International Importance, Especially for Waterfowl, Ramsar, 1971 (Entry into force: 1975)

The Ramsar Convention covers both freshwater and marine ecosystems. Designations may include areas of marine water to no more than six metres in depth at low tide, although if deeper marine waters lie within the wetland they may also be included. By 1996 the List of Wetlands of International Importance contained more than 800 wetlands covering over 500,000 square kilometres. Around 270 of these areas have a marine or coastal component. Efforts are being made to increase the membership of small island states and increase the representation of under-represented ecosystems such as coral reefs, mangroves, and seagrass beds.

8. Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention) (Entry into force: 1975)

The objectives of the World Heritage Convention are to protect outstanding examples of the world's cultural and natural heritage. Where parties have requested international assistance to protect the integrity of a site, the site may be put on a List of World Heritage in Danger. Potential threats are elaborated in the Operational Guidelines and include large-scale projects, rapid urban or tourist development, serious natural events, and changes in water level. Marine areas may be included as either natural or cultural heritage. Of 108 existing natural sites, 14 have a marine component and 17 a coastal component. Only properties situated in the territory of contracting parties are covered and thus marine areas beyond the 12-mile territorial sea limit are excluded.

REGIONAL AGREEMENTS

1. The Antarctic Treaty, Washington, 1959 (Entry into force: 1961)

This includes a Protocol on Environmental Protection, an Annexe on Area Protection and Management, and an Annexe on Conservation of Antarctic Flora and Fauna. The Environmental Protocol (Madrid 1991, entry into force 1998) covers the comprehensive protection of the Antarctic continent and its "dependent and associated ecosystems" which can be taken to mean the surrounding sea areas as far as the Antarctic convergence. Inter alia, the protocol declares the whole of Antarctica as a "natural reserve devoted to peace and science", bans all mining and oil extraction, and has annexes covering environmental impact assessment, conservation of fauna and flora, waste disposal management, prevention of marine pollution, and protected areas (specifically including provision for MPAs). The protocol has been ratified by all the 26 Antarctic Treaty member nations.

2. Convention on Conservation of Antartic Marine Living Resources (CCAMLR), 1980 (Entry into force: 1982)

This regulates exploitation of fish, krill, and squid south of the Antarctic convergence, and also obliges its Parties to adopt an ecosystem approach – i.e. to take into account the effect of exploitation of these resources on predator species including marine mammals and birds. It provides for designation of closed areas for purposes of conservation or scientific study. Measures have been adopted to close some areas but no efforts have yet been made to develop a system of representative protected areas (IUCN Antarctica Advisory Committee

1998).

3. Arctic Environmental Protection Strategy (AEPS), Rovaniemi, 1991

In 1997, AEPS came under the auspices of the Arctic Council. The working group established on Conservation of Arctic Flora and Fauna (CAFF) is responsible for developing a protected areas network plan including MPAs.

4. EU Habitats Directive

This requires the establishment of a network of Special Areas of Conservation (SACs) across the whole of the European Community. It covers marine waters up to the 12-nautical-mile territorial limit.

5. Convention for the Protection of the Marine Environment of the Northeast Atlantic, Paris, 1992 (OSPAR Convention) (Entry into force: 1998)

Annex 5, covering the Protection and Conservation of the Ecosystems and Biological Diversity of the Maritime Area, was adopted in 1998 and allows for the establishment of MPAs.

6. Convention on the Protection of the Marine Environment and the Baltic Sea Area, Helsinki, 1992 (not yet in force)

This calls for measures to conserve natural habitats and biological diversity and to protect ecological processes. In 1994, parties to the 1974 Helsinki Convention adopted a recommendation for the establishment of a system of 62 coastal and marine Baltic Sea Protected Areas (BSPAs). Offshore protected areas are also to be recommended. To date, very few BSPAs have been implemented.

7. Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas, 1992 (ASCOBANS)

Annex 1 of this agreement allows for the designation of areas of special importance for small cetaceans. ASCOBANS parties have recently addressed the need to review, by 2000, the criteria for identifying, establishing, and managing such protected areas in these two regional seas.

8. Convention for the Protection of the Mediterranean Sea against Pollution, Barcelona, 1976 (Entry into force: 1978)

The Mediterranean Protocol Concerning Specially Protected Areas and Marine Biodiversity (June 1995) extends the scope of a 1982 instrument on protected areas to cover all areas within national jurisdiction. Under Article 9, MPAs located wholly or partly on the High Seas are also addressed. The Protocol incorporates a number of principles laid down in the CBD, calling for:

- necessary measures for protecting areas of particular