Guidelines for Establishing Marine Protected Areas

CNPPA - COMMISSION ON NATIONAL PARKS AND PROTECTED AREAS

CNPPA - IUCN'S Commission on National Parks and Protected Areas serves as the principal source of technical advice to the Union, its members, and its collaborating organisations on all aspects of the selection, planning and management of protected areas. Its mission is to promote the establishment and effective management of a worldwide network of terrestrial and marine protected areas. To this end, CNPPA aims to demonstrate the value of protected areas within wider strategies for the sustainable use of the Earth's natural resources.

GBRMPA - GREAT BARRIER REEF MARINE PARK AUTHORITY

GBRMPA - The Great Barrier Reef Marine Park Authority is an independent Statutory Authority of the Government of Australia. The goal of the Authority is to provide for the protection, wise use, understanding and enjoyment of Australia's Great Barrier Reef in perpetuity. The Authority has developed a unique experience in managing this vast multiple use area of over 34 million hectares which includes tropical reef, continental shelf, estuarine and island environments; and has successfully implemented an extensive marine planning, management and research programme.

THE MARINE CONSERVATION PROGRAMME

IUCN'S Marine Conservation Programme was established in 1985 to promote activities which demonstrate how conservation and development can reinforce each other in marine and coastal environments; conserve marine and coastal species and ecosystems; enhance awareness of marine and coastal conservation issues and management; and mobilise the global conservation community to work for marine and coastal conservation. The Marine Conservation and Development Reports are designed to provide access to a broad range of policy statements, guidelines, and activity reports relating to marine issues of interest to the conservation and development community.

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Graeme Kelleher and Richard Kenchington
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1196 Gland, Switzerland

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1. Introduction

In the last century, there have been three principal approaches to marine conservation. The first and oldest consisted of regulation and management of individual marine activities, such as commercial fishing, by specialist agencies, with varying degrees of co-ordination of regulation between different agencies. Usually there was little or no co-ordination with management of adjacent coastal lands.

The second approach involved the creation of small marine protected areas which provided special protection for particularly valuable areas within the broad areas which were subject to regulation of the first type or, in some cases, to no regulation. This is the most common application of the concept of marine protected areas. It is usually the first stage in marine conservation initiatives which go beyond fisheries restrictions which limit gear, catches and effort.

The third approach is a recent development. It consists of the establishment of a large, multiple use protected area with an integrated management system providing levels of protection varying throughout the area. Ideally this integration should extend to co-ordinated management of marine and terrestrial areas in the coastal zone and beyond. However, in many circumstances, the complexity of boundaries and competition between governments and government agencies regarding jurisdictional responsibility effectively preclude this. This document concentrates on marine protected areas and does not attempt to deal with coastal zone management in all its facets because to do so adequately would require these guidelines to be expanded to book size.

It is conceptually possible for the same management results to be achieved with either of the last two approaches. However, the integrated multiple use protected area approach has the advantage that co-ordination of regulation of different human activities can be automatically achieved when the overriding responsibility for management rests with one agency. Co-ordination of management in the marine environment is in many ways even more important than it is in the terrestrial sphere. This is because the high degree of connectivity in the seas facilitates the transmission of substances and effects throughout the water column. In areas where traditional forms of sea tenure remain intact, and where human populations and impacts have not overwhelmed the capacity of ecosystems, there are effective mechanisms for limiting the use of resources to sustainable levels. Elsewhere the assumption of common property rights by the state has led to actual or potential conflict between users and between forrns of use. Under these circumstances there is a positive incentive for individual users to maximise their exploitation of the resource, even if destruction of the resource is an inevitable result - the tragedy of the commons.

This document deals with the latter two approaches. It recognizes that effective conservation of the marine environment can only be achieved by the creation of integrated management regimes which deal with all human activities and their effects. These regimes will consist either of general regulation of human activities affecting the marine environment supplemented by the

provision of special protection for particular areas - small Marine Protected Areas, or of the creation of a much larger Marine Protected Area with levels of protection varying within it according to a zoning plan. In this document the term Marine Protected Area (MPA) applies to marine and estuarine areas.

2. A Brief History

The need to devise methods to manage and protect marine environments and resources became apparent during the course of the 1950's and early 1960's. Thus, the First World Conference on National Parks (1962) considered the need for protection of coastal and marine areas.

The development of practical responses to this need required development of a legal framework for addressing the sovereignty and jurisdictional rights of nations to the seabed beyond the customary three mile territorial sea. In 1958 four conventions, known as the Geneva Conventions on the Law of the Sea were adopted. These were, the Convention on the Continental Shelf, the Convention on the High Seas, the Convention on Fishing and the Convention on Conservation of the Living Resources of the High Seas.

The High Seas Conventions formed the basis for the establishment of the Intergovernmental Maritime Consultative Organisation (IMCO) in 1959 - later to become the International Maritime Organization (IMO). These organizations have been engaged in developing and implementing measures for the control and prevention of pollution from ships.

Increasing technical capability to exploit mineral resources on or beneath the sea bed and to exploit fishery resources in deep waters led to the long-running Third United Nations Conference of the Law of the Sea between 1973 and 1977. The outcome of this was to enable nations to take a number of measures, including those related to regulation of fishing and the protection of living resources of the continental shelf, to a distance of 200 nautical miles from their national jurisdictional baseline. This provided a legal basis upon which measures for the establishment of marine protected areas and the conservation of marine resources could be developed for areas beyond territorial seas.

During the 1970's there was increasing recognition and mounting concern regarding the regional nature of the environmental problems of the marine living resources of the world. In" 1971, the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (known as the Ramsar Convention) was developed. In 1972, the Convention for the Protection of the World Cultural and Natural Heritage (known as the World Heritage Convention) was developed. Also in 1972, the Governing Council of the United Nations Environment Programme (UNEP) was given the task of reviewing the international situation in order to ensure that emerging environmental problems of wide international significance receive appropriate and adequate consideration by Governments. UNEP established the Regional Seas Programme to address problems on a regional basis, by the establishment of Action Plans with a particular emphasis on protection of marine living resources from pollution and over-exploitation. The first such Action Plan was adopted for the Mediterranean in 1975. There are now 14 Regional Seas Projects covering all of the world's marine environment regions.

There are many documents, protocols, international treaties and arrangements that address aspects of marine conservation in the contexts of fisheries, shipping, pollution and research.

Marine and coastal protected areas are important and interactive aspects of marine conservation which have been addressed in the IUCN "Orange Book" *(Marine and Coastal Protected Areas: A Guide for Planners and Managers,* Salm and Clark, 1984). There is, however, no short document which helps decision-makers, policy advisors, non-government organisations and scientists to appreciate the legislation, co-ordination and organisation needed to establish effective marine protected areas. This document is intended to perform that function. Ideally, this should have a companion paper or papers covering the other elements required for a comprehensive approach to conservation of marine environments and resources, including a comprehensive policy statement, an IUCN Marine Programme and linkages between coastal and marine protective regimes.

Also in 1975, IUCN conducted a conference on Marine Protected Areas in Tokyo. The report of that conference noted increasing pressures upon marine environments and called for the establishment of a well-monitored system of Marine Protected Areas representative of the world's marine ecosystems.

In 1980 IUCN, with World Wildlife Fund (WWF) and UNEP, published the World Conservation Strategy which emphasised the importance of marine environments and ecosystems in the goal of providing for conservation for sustainable development.

In 1983 UNESCO organized the First World Biosphere Reserve Congress in Minsk, USSR. At that meeting it was recognized that the Biosphere Reserve concept is potentially applicable to the marine environment and that an integrated, multiple use Marine Protected Area can conform to all of the scientific, administrative and social principles that define a Biosphere Reserve under the UNESCO Man and the Biosphere (MAB) Programrne.

There has been considerable progress. In 1970 there were 118 Marine Protected Areas in some 27 nations. By 1985,430 MPAs had been proclaimed by 69 nations with another 298 proposals under consideration. In all 85 nations have proclaimed or are considering proclaiming MPAs. (De Silva *et al.,* 1986). In 1981, a workshop was organised as part of the UNESCO Division of Marine Science - COMAR (Coastal and Marine) Prograrnme to consider research and training priorities for coral reef management. An outcome of this workshop, which was held in conjunction with the 4th International Coral Reef Symposium was the publication of the *UNESCO Coral Reef Management Handbook* (Kenchington and Hudson, 1984)

In 1982, the IUCN Commission on National Parks and Protected Areas (CNPPA) organised a series of workshops on the creation and management of marine and coastal protected areas. These were held as part of the 3rd World Congress on National Parks In Bali, Indonesia. An important outcome of these workshops was the publication by IUCN of *Marine and Coastal Protected Areas: A Guide for Planners and Managers.* That guide has been of great use in the development of marine and coastal protected areas around the world.

In 1986, the Australian Committee for IUCN (ACIUCN) published *Australia's Marine and Estuarine Areas - A Policy for Protection.* Also in 1986, the Canadian Government published *A National Marine Parks Policy* which had many similarities in approach to the ACIUCN publication. Major elements in these two policy documents appeared to us to be potentially applicable to many countries.

In 1987 the World Commission on Environment and Development (WCED) published its report *From One Earth to One World- Our Common Future.* In November 1987, the General Assembly of the United Nations welcomed the WCED report. At the same time, it adopted the *Environmental Perspective to the Year 2000 and Beyond,* which was prepared by the Intersessional Intergovernmental Preparatory Committee of UNEP'S Governing Council and developed in tandem with the WCED report. These and other publications have highlighted the serious threats which confront marine areas around the world. However, conservation efforts for the marine environment have lagged far behind those for the terrestrial environment, and an integrated approach to the management of the global marine ecosystem is yet to be implemented. As a result, many marine areas now face serious problems, including:

stress from pollution
degradation and depletion of resources, including species
conflicting uses of resources; and
damage and destruction of habitat

Recognizing these problems, the 4th World Wilderness Congress in 1987 passed a resolution, at our instigation, which established a policy framework for marine conservation. (Appendix 1). A similar resolution was passed by the 17th General Assembly of IUCN in February 1988. (Appendix 2). These resolutions adopted a statement of a primary goal, defined "marine protected area", identified a series of specific objectives to be met in attaining the primary goal and summarized the conditions necessary for that attainment. They form the framework for the IUCN policy statement on Marine Protected Areas that appears in Chapter 3 of these Guidelines.

The primary purpose of this document is to enable IUCN, UNESCO, UNEP, other international organizations and nations to foster initiatives in marine and estuarine protection, conservation and management at Government and agency levels and amongst non-government organizations and individuals. This purpose would not be achieved if the necessary guidelines were not widely available, at low cost. For this reason, this document has been kept short. It does not replace other more detailed guidelines. An important short-term goal is the co-operative development and implementation of a global, representative system of MPAs, recognizing that such a system will be but one component of a broader framework of integrated marine ecosystem management of renewable and non-renewable resources at both national and global levels.

3. IUCN Policy Statement on Marine Protected Areas

Introduction

This statement sets out the position of the IUCN General Assembly (1988) on the role of Marine Protected Areas in the protection of and sustainable utilization of the marine environment. It derives from Resolution GA17.38 of the 17th General Assembly of IUCN adopted at San Jose, Costa Rica in February 1988. This resolution recognized that the marine environment must be managed in an integrated way if it is to be able to sustain human use in the future, without progressive degradation. Integrated management can be achieved either by establishing areas of relatively small marine protected areas as a component of a broader framework of integrated ecosystem management or by establishing a large, multiple zone marine protected area encompassing a complete marine ecosystem.

This policy statement and these Guidelines were derived for application particularly to coastal marine areas that are within the jurisdiction of individual nations or groups of nations acting in concert.

Primary Goal

The primary goal of marine conservation and management is:

"To provide for the protection, restoration, wise use, understanding and enjoyment of the marine heritage of the world in perpetuity through the creation of a global, representative system of marine protected areas and through the management in accordance with the principles of the World Conservation Strategy of human activities that use or affect the marine environment".

Definition

The term "marine protected area" is defined as: "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".

Background

The area of sea and seabed is more than two and a half times as great as the total area of land masses of the world but less than one percent of that marine area is currently within established protected areas. Clearly, the extent to which the marine environment is conserved through the application of the protected area concept lags far behind the terrestrial environment.

The marine environment is an integral part of the natural and cultural heritage of the world with its vital diversity of marine and estuarine animals, plants, and communities which are vital components of self sustaining systems of local, regional, national and international significance.

While there are already areas which have become seriously degraded by the director indirect effects of human activities and the rate of degradation is increasing rapidly, it is important in any policy for marine protected areas that consideration is given for the continued welfare of people who have customarily used marine areas.

The nature of the marine environment is such that there are national and international responsibilities for the proper stewardship of the living and non-living resources of coastal and deeper ocean seas and the seabed to ensure their maintenance and appropriate use for the direct benefit and enjoyment of present and future generations. The development of such stewardship requires coordination and integrated management of a number of potentially competing uses at international, regional, national, and local levels. A number of initiatives have been taken at international, regional, and national levels for the establishment of marine protected areas and for managing the use of marine areas on a sustainable basis, including:

the Regional Seas Programme of the United Nations Environment Programme (UNEP) and the regional protocols on protected areas it fosters;

the Man and the Biosphere Programme of the United Nations Educational, Scientific and Cultural Organization (UNESCO);

the Marine Science Programme of UNESCO;

the South Pacific Regional Environment Programme;

initiatives of the Food and Agriculture Organization of the United Nations (FAO), the International Maritime Organization (IMO), the International Whaling Commission (IWC) and other international organizations; and

the establishment of marine protected areas by many nations.

However, there is much more that remains to be done and the establishment of a global system of marine protected areas is a key means of conserving the marine environment for its intrinsic values and its contribution to sustainable utilization.

Policy Statement

To meet this need, it is the policy of IUCN - The World Conservation Union - to foster marine conservation by encouraging governments, the non-governmental community and international agencies to cooperate in:

a. Implementing integrated management strategies to achieve the objectives of the World Conservation Strategy in the coastal and marine environment and in so doing to consider local resource needs as well as national and international conservation and development responsibilities in the protection of the marine environment;

b. Involving local people, non-governmental organizations, related industries and other interested parties in the development of these strategies and in the implementation of various marine conservation programmed.

It is also the policy of IUCN to recommend that, as an integral component of marine conservation and management, each national government should seek cooperative action between the public and all levels of government for development of a national system of marine protected areas.

Such a system should have the following objectives:

to protect and manage substantial examples of marine and estuarine systems to ensure their long-term viability and to maintain genetic diversity;

to protect depleted, threatened, rare or endangered species and populations and, in particular to preserve habitats considered critical for the survival of such species;

to protect and manage areas of significance to the lifecycles of economically important species;

to prevent outside activities from detrimentally affecting the marine protected areas;

to provide for the continued welfare of people affected by the creation of marine protected areas;

to preserve, protect, and manage historical and cultural sites and natural aesthetic values of marine and estuarine areas, for present and future generations;

to facilitate the interpretation of marine and estuarine systems for the purposes of conservation, education, and tourism;

to accommodate within appropriate management regimes a broad spectrum of human activities compatible with the primary goal in marine and estuarine settings;

to provide for research and training, and for monitoring the environmental effects of human activities, including the direct and indirect effects of development and adjacent land-use practices.

Implementation

The development by a nation of such a system will be aided by:

agreement on a marine and estuarine classification system, including identified bio-geographic areas; and

review of existing protected areas, to establish the level of representation of classification categories within those areas; which may require:

determination of existing and planned levels of use of the marine and estuarine environment and the likely effects of those uses;

delineation of potential areas consistent with the objectives listed above and determination of priorities for their establishment and management;

development and implementation of extensive community education programmed aimed at specific groups, to stimulate the necessary community support and awareness and to achieve substantial self-regulation;

allocation of sufficient resources for the development and implementation of management plans, for regulatory statutory review processes, interpretation, education, training, volunteer programmed, research, monitoring, surveillance and enforcement prograrnmes.

4. Marine Conservation and Marine Protected Areas

There are two primary purposes in IUCN resolution 17.38 (Appendix 2) and in this short document. The first is to focus global attention on the urgency of the need for Marine Protected Areas as part of broader programmed to conserve the marine heritage and life-support system of the world. The second is to focus on the various actions that are necessary to ensure that marine protected areas successfully make the transition from the technical processes of planning to the reality of long-term implementation.

The high degree of linkage between marine environments and their connection to terrestrial activities and impacts imposes an urgent need for integration of protected area management and overall conservation strategy.

The phenomenon of Acid Rain has demonstrated that long distance linkages can exist between distant terrestrial sites. Seawater has approximately 800 times the density of the atmosphere. It has a correspondingly greater capacity to suspend, sustain and transport molecules, particles, plants, animals, pollutants and debris. The density of seawater links distant areas to an extent that unless an area is very large it is rarely appropriate, even for the convenience of research and design, to consider it in isolation. So, despite the great length of coastlines and the vast distances of the oceans, marine ecosystems are closely linked to each other and to activities on land.

As a consequence, the creation of protected areas in marine environments is even more an integral part of overall resource management for conservation and sustainable use than has usually been overtly recognised on land.

The costs and benefits of creating or avoiding particular environmental impacts may be perceived very differently across geographic and jurisdictional boundaries and across a spectrum of socio-economic capacities and political philosophies. Usually, effective management for protection, conservation and sustainable use of marine environments will require collaboration and co-operation across jurisdictional boundaries within and between several nations. The linkage of management issues has been recognised in the creation of the UNEP Regional Seas Programme. The importance of marine environment conservation and management has been endorsed by the World Commission on Environment and Development.

The nexus between protected areas, conservation and resource management is reflected in the primary goal of the policy statement.

The ideal situation may be expressed as a nested hierarchy with co-ordinated management of catchments, coastal lands and waters linked to management of the deeper seas. There should thus be management to control and limit levels of inputs to the marine environment and to establish and implement sustainable levels of harvesting or extraction of renewable resources

from that environment. Under such an umbrella there should be some areas set aside for reference, research, non-extractive recreation, and others for subsistence of local residents.

The approach that may work in any particular situation depends very largely on the interaction of socio-economic and political factors within the various human communities that influence, impact on or use the marine area in question. It may, perhaps rarely, be approached through a single integrating legislative mechanism such as Australia's Great Barrier Reef Marine Park Act. More usually it will involve complex collaboration between many parties across national and international jurisdictional boundaries as is the case, for example with the Mediterranean Action Plan under the UNEP Regional Seas Programme.

There is no simple or "turn-key" solution. What works for one nation or group of nations can rarely be transposed unmodified to another ecological or socio-economic environment. Nevertheless there are strategic principles which are virtually universally applicable. One such principle is that a marine protected area is likely to be successful only if the local people are directly involved in its selection, establishment and management. Our approach in this short document is to list issues which should be considered in the development of implementable plans and to identify some important strategic principles. Also despite the risk of their being misinterpreted as immutable recommended procedure, we provide examples to illustrate the outcome of such consideration of issues and application of principles.

This document presents a framework and identifies components that must be addressed. It draws heavily on some particular examples, but we emphasise that for each marine area within each of the world's seas the issues, the opportunities and consequently the form of apparently effective solutions differ. The detail of approaches to marine conservation and the establishment of marine protected areas must be custom designed for each area. This document may help by discussing the issues which should be considered and by describing some common approaches to management problems. Those who would address the problems in more detail will need to turn to literature such as the *Marine and Coastal Protected Areas." A Guide for Planners and Managers* (Salm and Clark, 1984), *The Mangrove Management Handbook* (Hamilton and Snedacker, 1984) or the *Coral Reef Management Handbook* (Kenchington and Hudson, 1984).

5. Selection of Marine Protected Areas

Introduction

Defining the location and extent of marine areas for inclusion in MPAs involves a different emphasis on considerations than for terrestial protected areas, even though the primary reasons for creating them are likely to be the same - namely:

- to maintain essential ecological processes and life support systems;
- to ensure the sustainable utilization of species and ecosystems; and
- to preserve biotic diversity.

On land the concept of habitat critical to the survival of rare or endangered species often plays a decisive role in identifying areas worthy of protected status. The area of a distinctive habitat may be small, limited to a particular soil type or contained within a single catchment. Despite the exceptions of airborne seeds, spores and pollen and of birds and insects that fly or drift in the air, linkages for most land animals are generally short. As a consequence endemic species, critically dependent on particular habitat areas, are relatively frequent and there is a dismal history of extinctions. The case for protection of an area to save a species from extinction is usually powerful and likely to receive public support.

In the sea, habitats are rarely precisely or critically restricted. Survival of species cannot usually be linked to a specific site. Many free swimming species have huge ranges and water currents carry the genetic material of sedentary or territorial species overlarge distances, often hundreds of kilometres. The same genetic community is likely to be represented throughout a large geographic range, occurring wherever substrate and water quality are suitable. As a consequence endemism is rare and is usually confined to species which brood or care for their young rather than have them dispersed by currents. There is no authenticated record of recent extinction of a completely marine species with planktonic larvae. The concept of critical habitat of endangered species is thus restricted in application to areas critical to marine mammals, sea turtles and seabirds and to the habitats of the occasional endemic species. Therefore, in the sea, the ecological case for protection of an area can less often be based on concepts of critical habitat of endangered species or threat of extinction but it may more probably be based on protection of critical or important habitat for commercially or recreationally important species, or for protection of a particularly good example of a habitat type with its associated genetic diversity of its communities.

In most countries, there is a long history of public or sectoral use of marine areas close to the coast, often for subsistence. Attempts to exclude these uses from traditional areas may jeopardize the physical or economic survival of the people. Community opposition will, in such cases, be very strong and will jeopardize successful management of these areas. We believe

that it is better to create and manage successfully an MPA which may not be ideal in ecological terms but which nevertheless achieves the purposes for which it is established than it is to labour futilely and vainly to create the theoretically "ideal' 'M PA. It follows from these humanitarian, economic and pragmatic considerations that *where there is a choice of ecologically suitable areas,* as there often is in the sea, the dominant criteria for selection of MPA locations, boundaries and management systems will commonly be socio-economic.

Clearly, where there are few, if any alternative sites, ecological criteria should be critical and decisive.

All of these problems affecting choice of area and boundaries can be reduced where political, legal and social conditions allow the creation of large MPAs covering complete marine ecosystems. This allows integrated management regimes to be established which provide for continued human use while achieving the three primary objectives of the World Conservation Strategy, which are summarized in the first paragraph of this introduction.

Key Factors Affecting the Selection of MPAs

Conservation, protection and management of marine and estuarine areas are being addressed by a diversity of legislative and management approaches around the world. The aim of this section is to identify some key factors which lead to a different nature or scale of approach to marine, as opposed to terrestrial, environments.

MPA plans, like those for terrestrial national parks, are directed primarily towards the protection of the ecosystem of the area or of particular marine species or their habitats. Great awareness is needed of events outside the boundaries that readily impinge on the habitats within, because the effects of external influences on the marine environment tend generally to be pervasive rather than localised.

The concept of parks and reserves in terrestrial habitats is that of a closed cell of naturalness in a matrix of impact. A terrestrial park will be viable if this cell is sufficiently large, or if small, is linked to others. In contrast, it is very rarely possible for a closed cell of any kind to exist in the marine environment. Therefore the minimum size of an MPA necessary for viability is likely to be many times larger than the minimum viable size of a terrestrial reserve.

In the sea, currents constantly carry sediments, nutrients, pollutants and organisms through an area, but because of the ability of wind and tide generated currents to mix water masses, particularly in continental shelf areas, events originating outside the boundaries of a MPA may affect populations within it. However, partly for the same reasons, it is generally true that marine ecosystems have a capacity for restocking and regeneration exceeding that of terrestrial communities. '

The principle of a buffer zone protecting a core site from impact is well established, for instance in UNESCO's Biosphere Reserve system (see Chapter 8). It should be applied to MPAs. However, since coastal and continental shelf environments are often linear in nature and subject to heavy established use so buffering, although desirable, may be impracticable.

In marine areas, because of the open nature of the system, protection of some communities and fragile habitats may only be achieved by making protected areas sufficiently large so that the impacts are adequately buffered or diluted, thus leaving some part of the critical community relatively undisturbed.

On land, management plans for national parks usually preclude the removal of native biota, although management of national parks with large animals may involve controlled culling programmed. As has been pointed out previously, for ecological reasons it is desirable that MPAs be large. However, they will usually only be politically feasible if they provide for controlled exploitation of resources in some parts of the MPA. Of course, such uses should be allowed only if, and to the extent that, they are compatible with the protection of the resources for which theMPA was established and with the principles of the World Conservation Strategy.

It is thus generally the case that consideration of continuing human use within and adjacent to MPAs should play a major role in their selection, design and management.

Several countries have made significant progress in establishing "national representative systems of Marine Protected Areas" in accordance with IUCN Resolution G.A. 17.38. One of these is Canada. The biogeographic classification system used by a country in developing such a representative system need not be universally applicable. Indeed, if the world were to wait for general scientific agreement on the "best" such classification system, it would probably be a longtime before a start was made in establishing Marine Protected Areas. The important thing is that the biogeographic system used in a particular country suits that country's existing scientific heritage and information base. Appendix 3 is a description by Claude A. Mondor of Canada's Department of the Environment of the approach used by Canada to establish a national representative system of MPAs. The general principles and approach are suitable also to application in other countries.

The following list identifies factors or criteria that can be used in deciding whether an area should be included in an MPA or in determining boundaries for an MPA.

Naturalness	the extent to which the area has been protected from, or has not been subject to human-induced change
Biogeographic importance -	either contains rare biogeographic qualities or is representative of a biogeographic "type" or types. contains unique or unusual geological features
Ecological importance -	contributes to maintenance of essential ecological processes or life-support systems e.g. source for larvae for downstream areas integrity the degree to which the area either by itself or in association with other protected areas, encompasses a complete ecosystem

	contains a variety of habitats contains habitat for rare or endangered species contains nursery or juvenile areas contains feeding, breeding or rest areas contains rare or unique habitat for any species preserves genetic diversity i.e. is diverse or abundant in species terms
Economic importance	existing or potential contribution to economic value by virtue of its protection e.g. protection of an area for recreation, subsistence, use by traditional inhabitants, appreciation by tourists and others or as a refuge nursery area or source of supply for economically important species
Social importance	existing or potential value to the local, national or international communities because of its heritage, historical, cultural, traditional aesthetic, educational or recreational qualities
Scientific importance	value for research and monitoring
International or National - significance	is or has the potential to be listed on the World or a national Heritage List or declared as a Biosphere Reserve or included on a list of areas of international or national importance or is the subject of an international or national conservation agreement.
Practicality/feasibility	Degree of insulation from external destructive influences social and political acceptability, degree of community support accessibility for education, tourism, recreation compatibility with existing uses, particularly by locals ease of management, compatibility with existing management regimes

The next chapter deals with the form and content of legislation for the management and protection of marine resources, including the establishment of MPAs.

6. Legal Considerations for Protection of Marine and Estuarine Areas and Resources

This chapter is based largely upon a chapter entitled ''Review of Legislation" by Kelleher and Lauschein the Coral Reef Management Handbook (1984).

Introduction

For most countries a broad, integrated approach to conservation, management and protection of marine resources is a new endeavour which is not adequately covered in existing legislation. Thus review and revision of existing legislation and the development of new legislation are often necessary before a programme of management can be undertaken.

There are several prospective routes to the declaration and management of MPAs and the conservation of marine resources. These range from new specific purpose legislation to continued use of existing legislation with relatively minor modifications. In any country, the appropriate approach to developing law for conservation, management and protection of marine resources can only be determined by those with a detailed understanding of that country's culture, tradition and legal processes. There are, however, several general principles which should be carefully considered in developing or reviewing legislation under any system.

A fundamental question is whether to incorporate in national law a tight framework of administrative detail or only the broad basis for a management regime. In issues of natural resource conservation it is generally the case that the views of the most powerful local interests in an area are strongly biased to realising short-term economic benefits. This leads to strong local pressure for over-exploitation. For this reason it is strongly recommended that sufficient detail be written into law for management to be protected from unreasonable local pressures. Detail should however be carefully considered with regard to likely requirements of management because once such administrative detail is written into law there are limits to the flexibility of approach of management in addressing the unexpected.

Issues

Whatever the detail of the legal system, a number of issues need careful attention if satisfactory legislation is to be created.

A fundamental issue is whether to create large multiple use protected areas with umbrella legislation that identifies a single co-ordinating body for each MPA, or to create smaller, highly protected areas within the framework of general, activity-specific regulation, with appropriate co-ordination provisions. This issue has been addressed in previous chapters and is referred to under the heading Multiple Use Protected Areas, below.

The need for a policy

An overall policy on the management, sustainable use and conservation of marine and estuarine areas should be developed for the country as a whole, for regions of the country, where appropriate, and for any identified sites of particular significance at the national level. Ideally such a policy should also address co-ordination with management of coastal lands. The process of creating the policy, as well as its existence and provisions, will contribute to national recognition of the importance of conservation of marine and estuarine areas, to the selection and establishment of an appropriate system of MPAs and to the attainment of a primary goal of management - sustainable use. The policy may be established within a national or regional conservation strategy.

The World Conservation Strategy states that "each country should review and consolidate its legislation concerning living resources to ensure that it provides sufficiently for conservation. Each country should also review - and if necessary strengthen - its capacity to implement its conservation legislation, both existing and required".

The general policy statement in chapter 3 of this document can be used as a basis from which to develop acountry-specific policy statement. Such a statement would appropriately form part of any National Development Plan.

Statement of objectives

Objectives encompassing conservation, recreation, education and scientific research should be written into legislation. If this is not done and if conservation is not given precedence the setting aside of areas maybe an empty political gesture. A primary conservation objective in resource management legislation must be recognized as essential to sustained use and enjoyment of the resource.

Chapter 3 outlines some general objectives that can be used for the development of more specific objectives for an individual country.

Linkages between marine environments

The young of many marine animals and their food, as well as plant seeds, propagules and pollutants are transported in the water column, often over distances so great that they cover the territorial waters of several countries. Marine animals also often migrate over great distances. To the greatest extent achievable, legislation and policy should shape and take into account regional, international and other multi-lateral treaties or obligations. Such an approach attempts to ensure that the management initiatives of one country are not negated by the actions of others connected through the transport of recruits, food or pollutants, or through the migration of marine animals.

Sustainable use

The legislation should recognize the linkage between protection and maintenance of ecological

processes and states and the sustainable use of living resources. Explicit reference to the objectives and concepts of the World Conservation Strategy may reinforce the legislation and its effectiveness.

Multiple use protected areas

It is strongly recommended that legislation be based upon sustainable multiple use managed areas (e.g. the Biosphere Reserve concept), as opposed to isolated highly protected pockets in an area that is otherwise unmanaged or is subject to regulation on a piecemeal or industry basis. Such umbrella legislation can be justified on the grounds of world-wide experience of conventional piecemeal protection of small marine areas alongside conventional fisheries management. This usually leads to over-exploitation and collapse, perhaps irreversible, of stocks of exploited species and progressive deterioration of the protected area. In designing umbrella legislation the following goals merit consideration:

provide for conservational management over large areas;

provide for a number of levels of access and of fishing and collecting in different zones within a large area; and

provide for continuing sustainable harvest of food and materials in the majority of a country's marine areas.

Co-ordination

Co-ordination of planning and management, by all intragovernment, intergovernment and international agencies with statutory responsibilities within areas to be managed, must be provided within the legislation. Provision should be made to define the relative precedence of the various pieces of legislation which may apply to such areas. Because of the interconnectedness of species and habitats in marine ecosystems, the legislation should provide for control within protected areas over all marine and estuarine resources of flora, fauna, terrain and overlying water and air.

Activities external to MPAs

Because of the linkages between marine environments and between marine and terrestrial environments it is important that legislation include provisions for the control of activities which occur outside an MPA which may adversely affect features, natural resources or activities within the area. Often, low or high watermarks constitute a jurisdictional boundary. Other boundaries exist between MPAs and adjacent marine areas. A collaborative and interactive approach between the governments or agencies with adjacent jurisdictions is essential. The ideal is to have integration of objectives and approaches within a formal system of coastal zone management within each country, with collaboration between countries.

Legal powers

The power to establish any marine protection/conservation management system should be provided bylaw, with approval and any subsequent amendments to require endorsement by the highest body responsible for such legislative matters in the country concerned. Establishment in this context includes the requirement that the legislation contain enough detail for:

- proper implementation and compliance;
- delineation of boundaries:
- providing adequate statements of authority and precedence; and
- providing infrastructure support and resources to ensure that the necessary tasks can be carried out.

Management arrangements

If management is to succeed, interagency disputes, concerns, obstruction or delay must be minimized. It follows that legislation and management arrangements should grow from existing institutions unless there is overwhelming public and political support for completely new administrative agencies. Therefore:

creation of new agencies should be minimised;

- existing agencies and legislation should be involved by interagency agreements where practicable;

existing sustainable uses should be interfered with as little as practicable;

existing staff and technical resources should be used wherever practicable;

unnecessary conflict with existing legislation and administration should be avoided; and

where conflict with other legislation and administration is inevitable, precedence should be defined unambiguously.

Consistency with tradition

The form and content of legislation should be consistent with the legal, institutional and social practices and values of the nations and peoples enacting and governed by the legislation:

Where traditional law and management practices are consistent with the goals and objectives of the legislation, these traditional elements should be drawn upon to the greatest practicable extent. This applies to both the traditional, perhaps unwritten, law of

Aboriginal communities and the more recent traditions of a country or people; and

The customary or accepted ownership and usage rights of a marine area which is to be managed are critical considerations. Legislation should reflect this. There may be public or communal rights as well as private ownership. Customary fishing rights need careful consideration.

Definitions

The definitions and terminology in legislation should use words which reflect, in language clearly understood by those affected, the intentions, goals, objectives and purposes of the legislation. Terminology is likely to differ from country to country but where practicable there is some advantage in adhering to standard terminology.

Responsibility

Legislation should identify and establish institutional mechanisms and specific responsibility for management and administration of marine areas. Responsibility, accountability and capacity should be specific and adequate to ensure that the basic goals, objectives and purposes can be realised. As well as government agencies, local government and administration, traditional village community bodies, individual citizens, clubs and associations with compatible goals, objectives and responsibilities should be involved in management when practicable.

Management and Zoning Plans

For a small MPA, a single series of management provisions may apply uniformly to all parts of the area. For others, particularly multiple use protected areas, a more complex management plan or zoning will be needed to prescribe different management measures in different parts of the protected area. Legislation should require that a management plan be prepared for each managed area and should specify constituent elements and essential considerations to be addressed in developing the plan. It is particularly recommended that, where the multiple use protected area concept is to be applied, legislation include the concept of zoning as part of management. The legislation should require zoning arrangements to be described in sufficient detail to provide adequate control of activities and protection of resources. The provisions of zoning plans should over-ride all conflicting legislative provisions, within the constraints of international law.

Public participation

Involvement and active participation of users of marine environments in development of legislation and in establishing, maintaining, monitoring and implementing management of MPAs is almost always of key importance to the acceptability and success of management. It is thus highly desirable that the concept of public or user participation is established in legislation. This should be expressed in terms appropriate to social structure, conventions and government structure relevant to the area in question. The key requirement is that procedures are sufficiently detailed to ensure effective and appropriate public participation.

Accordingly, opportunities should be provided for the public to participate with the planning or management agency in the process of preparing management and zoning plans for MPAs including: the preparation of the statement of MPA purpose and objectives: the preparation of alternative plan concepts; the preparation of the final plan; and any proposed major changes to the plan.

Preliminary research and survey

International experience has shown that it is often a mistake to postpone, by legislation or otherwise, the establishment and management of MPAs until massive research and survey programmed have been completed. Often, sufficient information to make strategically sound decisions regarding the boundaries of MPAs and the degree of protection to be provided to zones or areas within them already exists. Postponement of such decisions often leads to increasing pressure on the areas under consideration and greater difficulty in making the eventual decision. Provision in legislation for periodic review of management and zoning plans allows their continual refinement as user demands change and research information becomes available.

Monitoring, research and review

The legislation should provide for surveillance of use in order to determine the extent to which users adhere to the provisions of management, for monitoring to determine the condition of the managed ecosystem and its resources and for research to assist in development, implementation and assessment of management. The legislation should provide for periodic review of management and zoning plans in order to incorporate desirable modifications indicated from the results of surveillance, monitoring and research. The processes of, and the degree of public participation in, plan review should be the same as for initial plan development.

Compensation

Consideration should be given, where local rights and practices are firmly established, to arrangements for specific benefit to local inhabitants in terms of employment in management or of compensation for lost rights, because experience has shown that the success of conservation management programmed depends critically on the support of local people.

Financial arrangements

Financial arrangements for management of marine areas should be identified in legislation according to local practice. Consideration should be given to establishing special funds whereby revenue arising from marine management can be applied directly back to the programme or to affected local people.

Regulations

Legislation must provide authority for adequate regulations in order that activities can be

controlled or as necessary prohibited. Three types of regulation may be considered:

regulations to enforce a plan;

interim regulations to provide protection to an area for which a plan is being developed; and

external regulation to control activities occurring outside a managed area which may adversely affect features, resources or activities within the area.

Enforcement and Penalties

To be effective, legislation must provide adequate enforcement powers and duties. These should include:

effective penalties for breach of regulations;

incentives for self-enforcement of rules and regulations by users;

adequate powers for professional field staff to take effective enforcement action, including pursuit, apprehension, identification, gathering of evidence, confiscation of equipment and evidence and laying charges in courts of law; and

provisions, where feasible, for local people to reinforce or provide enforcement. This is especially practicable when the local people can continue with their traditional uses of an MPA, even if limitations on that use have to be applied.

Education

To be effective, management should be supported by educational measures to ensure that those affected are aware of their rights and responsibilities under the management plan and that the community supports the goal of the legislation. Few countries could afford the cost of effective enforcement in the presence of a generally hostile public. Conversely, costs of enforcement can be very low where public support exists.

A well designed education and public involvement programme can generate political and public enthusiasm for the MPA and its goal and objectives. Establishment of the idea that it is the people's MPA will generate pride and commitment.

7. Guidelines for Planning Marine Protected Areas

7.1 Introduction

The purpose of this chapter and of the more detailed treatment in Appendices 4 and 5 is to provide guidelines which will assist those preparing zoning and management plans for MPAs. The principles exemplified in these guidelines will apply either to the preparation of a management plan for a uniform, unzoned Marine Protected Area or to the development of a zoning plan containing several categories of protection applying to different parts of a larger Marine Protected Area.

Effective planning and management are directed towards establishment and achievement of management objectives.

The process of establishing objectives will be a major factor in determining whether an area can be managed as a single entity, or whether a system of zoning should be used, providing for different ranges of activities governed by specific objectives, to occur in specified sub-areas or zones. In most situations, but particularly in multiple use planning, there are objectives which cannot be applied at the same time to the whole of a significant area of marine habitat. The overall objectives of a representative system of MPAs are described in the IUCN Policy Statement in Chapter 3.

In practice, most of the management decisions incorporated in most plans will be taken on the basis of incomplete knowledge and understanding. Usually, however, before a plan is developed there is some opportunity for research to collect information to support the planning process. The realistic aim of such management related investigations must be to reduce progressively the areas and degree of uncertainty on which decisions are based whilst being prepared to provide advice and develop plans within a schedule which maybe determined by political urgency.

In the early stages of planning and management, it is easy to be depressed or overwhelmed by the need for data and for resources and time to establish a sophisticated data collection program. However, if time is short and funds are limited, a competent, reasonable plan can be developed on the basis of very simple descriptions of the physical, biological and socio-economic characters of an area. More sophisticated data add to the confidence of the manager or planner, but they rarely justify a dramatic change in a plan. In the light of general understanding of marine ecosystems and the impact of human activity, the absence of site-specific information is rarely so severe as to justify postponing management in favour of more research.

For the three major areas of consideration, physical, biological and socio-economic, it is

important to define questions and consider the use to which the resulting information is to be put before commissioning or undertaking studies. Otherwise it is all too easy to spend time, money and human resources on studies which add to general understanding but contribute little to answering critical questions for planning and management.

Perhaps of even greater importance is the need to limit the amount and detail of information that is sought, presented and used in decision-making to that which is necessary for the particular level of decision. Not only can the search for great detail postpone necessary decisions, but excessive detail can hinder decision-making by obscuring the major factors.

The sequence or hierarchy of decision-making in establishing and managing an MPA is:

Stage 1. Legal establishment of boundaries

Stage *2.* Zoning

Stage *3.* Enactment of zoning regulations

Stage 4. Specific site planning

Stage *5.* Specific site regulation

Stage *6.* Day-to-day management

Stage 7. Review and revision of management

At each of these stages of decision-making, the following factors should be taken into account. However the level of detail in which these factors are presented and considered should increase from Stage 1 to Stage 7:

Geographic habitat classification

Physical and biological resources

Climate

Access

History

Current usage

Management issues and policies

Management resources

It is nearly always a mistake to postpone a decision at one of the early decision-making stages until all the information necessary for a later decision-making stage is obtained.

7.2 The Systems Approach to Planning Marine Protected Areas

This section is quoted from "Planning, Design, and Management of Marine Parks and Reserves" (Dobbin, 1976)

The most recent scientific method for organizing information is called "the systems approach." The mode of thought inherent in this system is one of synthesis. That is, in problem solving, it recognizes the importance of analysis of separate issues, but stresses a complete view of all the issues or "sy stems" that are involved. In other words, the systems approach is dedicated to putting things together through synthesis.

Ackoff (1974) says we are in fact beginning the'' Systems Age." The application of the systems approach to planning is not new. Peter (1976) points out that throughout history man "has organized his observations into systems." Unfortunately, most man-made systems for dealing with environmental problems have developed haphazardly.

In the field of marine conservation, it is unfortunate that the "whole view" or "holistic view" has been overlooked. For example, when parks and reserves have been established in the past, there has been a failure to consider how the surrounding region may affect the park, and vice versa. Similarly, people have not been considered as part of the natural system, except as park visitors.

Better resolution of marine conservation objectives can be realized through the correct application of systems planning. As a basis for the discussion to follow, the definitions below should be helpful.

Planning - a process dealing with a system of problems, as seen from an "holistic" or total perspective, with the purpose of determining rational solutions to those problems. An example of planning would be the development of a strategy to survey a region with the purpose of selecting sites as marine parks or the development of a zoning scheme.

Design a process derived from planning in which solutions are creatively tested and/or implemented. An example might be the architectural design of a regional park centre on a land-based site designed to organize visitor activities.

Management - a process to control and direct the devised solutions. Examples might be the implementation of surveillance and enforcement programs to monitor, regulate, or control use so as to support planning and design objectives.

Planning, design, and management processes are interactive and interdependent. The planning/ design/management process as presented here aims to address marine conservation issues through a synthesis of all relevant factors This application of the systems approach involves consideration of the presence and effects of industry, tourism, urbanization, and offshore uses, in addition to conservation objectives, and economic and political factors. The approach seeks to make national and regional efforts comparable and compatible.

Peter (1976) says:

> "Shall we have piecemeal systems based on random components that escalate us toward incompetence? Or shall we have a systems approach that utilizes our total knowledge . . . to integrate our social and humanistic goals with our technological achievements and ecological needs? If we choose the latter, man's greatest age of achievement lies ahead. "

While this paper focuses on systems planning for marine parks and reserves, it should be noted that the principles and methodologies discussed here can and should be applied to all types of coastal and ocean zone planning and management projects.

Interdisciplinary Project Team

In addition to the "wholeview" suggested, there are several other characteristics that are integral to the total process proposed here. One of the most important elements is an interdisciplinary project team to provide that "whole" perspective.

The sciences are broken into specialized disciplines. Nature is not organized that way, only our knowledge of it is. For the purposes of this discussion, the following distinctions will be helpful.

> In a multi-disciplinary approach, a problem is investigated by breaking it down into uni-disciplinary and uni-professional problems and solving those independently. The final solutions are the aggregate of those separate solutions. Multi-disciplinary planning is generally not very satisfactory.
>
> In an inter-disciplinary approach, a problem is not disassembled. It is treated as a whole by representation of different disciplines working the solution out together. This brings synthesis of knowledge in the sciences, technologies, and humanities. Integration of disciplines yields broader synthesis of methods and knowledge and usually results in more complete and workable solutions.

Christakis and Jessen (1973) demonstrate the advantages of the interdisciplinary approach: "Each discipline has erected its own barriers with which it attempts to maintain intellectual sovereignty (which is an intellectual cul-de-sac).... A general systems theory framework might help to penetrate these barriers."

The make-up and roles of the team members should be designed with as much care as possible. Who is on the team is entirely dependent on the nature of the problem. Marine scientists and ecologists, planners, social scientists, lawyers, engineers, economists, and architects would be obvious candidates.

Project Management

Whether the planning, design, and management process is undertaken by national government departments, international agencies, or regional authorities, the basic principles of project management apply. Project management is the orchestration of all of the skills necessary to define the problem and to devise and implement a solution that optimally meets the objectives.

Project Manager

Scott (1970) summarizes the desired characteristics of a project manager: "an habitual broad-perspective style of thinking; an orderly mind which can integrate a large number of factors into a harmonious whole; an ability to communicate lucidly and concisely; an ability to get things done quickly; an ability to resolve conflict; an ability to run a meeting effectively since meetings will be the principal communications and decision-making forum."

Guidelines for Project Management

The following project management guidelines are also derived from Scott (1970):

1. Participants function most rationally and effectively when they have abroad understanding of the total picture. A reasonable amount of time spent in group discussion of problems, progress, and activities is essential to achieve this broad understanding so that the group may operate as a team.

2. The number of key participants must be kept to a realistic minimum, and their quality to a maximum.

3. The participants should be selected carefully and rationally after a detailed preliminary analysis of the project, and the skills that are required.

4. The eventual user/operator/manager of the park system or sites should be a key member of the team.

5. The project manager's function is that of integrator, coordinator, communications center, tactician, consensus-maker.

6. The project should be organized in an organic/adaptive fashion. All aspects should he orchestrated so that decisions follow an orderly progress, And maximum flexibility is retained.

7. Master scheduling should concentrate on the broad aspects of key project elements rather than getting bogged down in detail.

8. Cost control should rely on advance development of remedial tactics to stay within budget.

Use of a Comprehensive Data Base

The process relies on a data base of all relevant information as a basis for all phases of planning and subsequent implementation and monitoring. Of the vast amount of information available (scattered throughout numerous government agencies, institutions, and private industries), the relevant parts must be assembled and consolidated into a useful database. From there, the data base must be synthesized and evaluated. For the organization of the data base and its manipulation in the planning process, the tools described next are applied as needed.

Planning, Design, and Management Tools

Another important element in the proposed planning process is the use of available planning tools. Some of the many tools and techniques available to marine park and reserve planners include: mapping by hand-drawn and computer methods; aircraft and satellite remote sensing and interpretation; cross-sections and sketches; underwater interpretation; photography and filming: underwater television cameras; sonar; and electronic display screens.

7.3 Principles Applying to MPAs

Marine protected areas should be developed with specific objectives for managing human uses. Whether the MPA is large and multiple use or small and highly protected, the desired levels of usage may be achieved through:

establishing area boundaries for specific activities, i.e. zoning;

enforcing closure during parts of the year critical to life histories of species or for longer periods;

setting size limits, maximum permitted catches, harvest limits;

prohibiting or limiting use of unacceptable equipment;

licensing or issue of permits to provide specific controls or to limit the number of participants in a form of use; or

limiting access by setting a carrying capacity which may not be exceeded.

Often, a combination of all of these techniques is appropriate.

There is also a need for control of activities outside MPA boundaries which may affect their long-term viability. A measure of control can reachieved by creation of contiguous marine and terrestrial protected areas where appropriate. Local government may have an important role in control of development and other activities in adjacent coastal areas, as a form of integrated coastal zone management.

Statutory provision for review of zoning or other protective arrangements within a specified time is seen as an important part of management. The period between reviews should be neither so short that lack of resources is a problem, nor so long that management is not responsive, 5-seven years is preferable. Review must have as its basis the monitoring of impacts, of patterns of use, of the effectiveness of implementation of the existing management arrangements and improved scientific understanding.

Governments or communities should provide adequate resources for planning and management when the decision leading to creation of an MPA is taken. It is particularly important that these resources provide for ongoing consultation with and education for those affected by the MPA as well as the more usual functions of surveillance and enforcement. If adequate resources are not provided it is likely that the objectives of the MPA will not be achieved - it will become another "paper park". The same failure will usually occur if those people who will be affected by the MPA are not involved meaningfully in its planning and management.

The traditional approach to management of marine living resources has been through fisheries legislation which contains provisions restricting human access to particular stocks of fish or invertebrates. These provisions typically specify equipment restrictions such as minimum net mesh in order to reduce the impact upon juvenile animals. They may also:

1. use licences or permits to restrict the numbers of people entitled to fish a particular stock;

2. declare closed seasons to protect stock at vulnerable stages of the life cycle; and/or

3. define areas as closed to fishing permanently or for a number of seasons.

Such provisions have tended to focus specifically on target species for fisheries and to consider the habitat of those species and the non-target co-inhabitants and competitors of such species only when the productivity of the target stock has given cause for concern.

In parallel with increases in efficiency of fishing there have been increased demands for the use of marine resources arising in part from increased leisure and in part from new technologies applicable to recreation and tourism. Thus, in many countries, SCUBA diving and high speed vessels have increased the range of leisure and tourist activities and the proportion of the marine environment accessible for such activities. Underwater film and television have removed some of the threat and mystery and promoted the fascination of the shallow water marine environment.

Through these developments demand for access to the resources of the marine environment and informed concern for its conservation have developed from a limited base of traditional users and marine science professionals to a more general public appreciation of issues. This has led to the growing appreciation of the need for more broadly based conservation legislation incorporating provision for MPAs.

7.4 Zoning and Management Plans

A zoning or management plan is the means by which the planners and managers define the purposes for which a protected area may be used. It may be a legal document but it must be capable of being understood by those whose actions it seeks to control. Planners and managers have a responsibility to encourage public sympathy for, co-operation with and understanding of the management objectives of such plans. A key to this lies in effective and culturally appropriate involvement or consultation of users in the process of plan development.

The format of a zoning or management plan will depend on its legislative basis and upon conventions and procedures of the government agencies responsible for and involved in plan development. Particularly the format will be determined by whether a zoning plan forms part of the overall management plan. An example of a format of a management plan is provided later in this document. The actual format selected may range from a small scale locally adopted municipal plan, such as those developed in the Philippines by Alcala and White (1984) to the nationally endorsed legal instruments required under Australia's Great Barrier Reef Marine Park Act.

Given the range of possible contexts from a comprehensive coastal and marine management scheme, through large scale multiple-use management to a single zone free standing Marine Protected Area, there is no single ideal model. Different schemes use the terms zoning plan and management plan interchangeably. The important concept is that there should ideally be integrated management of an entire ecosystem and that there should be site specific management appropriate to the various parts of the area in question. Where this involves the creation of more than one usage regime or zone there should be an overall co-ordinating strategic plan.

Whatever the plan format, it will be necessary during the course of development of plans and associated reports to consider available information and to determine the level at which it is appropriate to address issues indicated in the list below:

Executive Summary - covering the essential issues and necessary decisions. Many of the final decision makers will not have time to read and digest supporting detail;

Introduction - defining the purpose and scope of the plan and explaining the legislative basis and authority for plan development;

Statement of the goals and objectives for the planned area as a whole;

Definition of the area - a formal statement of the boundaries of the planned area and a geographic description of its setting and accessibility;

Description of the resources of the area. A summary of information directly relevant to decisions should be included in the report. Detail should be restricted to an appendix or separate document;

- Description of uses of the area. This should concentrate on present uses but should place these in the context of past types and levels of use in the absence of a plan. The description should include social and economic analyses of use.

  Description of the existing legal and management framework such as coastal fisheries, marine transportation and other relevant legal controls on present use of the area. Where they still exist or can be recalled, traditional practices of management, ownership or rights to the use of marine resources should be described:

  Analysis of constraints and opportunities for activities possible within the area;

  Statement of the principal threats to the conservation, management and maintenance of the area;

  Statement of policies, plans, actions, inter-agency agreements and responsibilities of individual agencies existing or necessary for conservation and management of the area, i.e. to meet the objectives of the MPA and to deal with threats and conflicts. This may usefully include a summary of consultative processes followed in plan development;

  Statement of the boundaries, objectives and conditions of use and entry for any component zones of the planned area;

  Provision for regulations required to achieve and implement boundaries and conditions of use and entry;

- An assessment of the arrangements including financial, human and physical resources required to establish the MPA and to manage it effectively. This should cover:

  staffing
  equipment and facilities
  training
  financial budget
  interpretation and education
  monitoring and research
  restoration
  surveillance
  enforcement
  evaluation and review of effectiveness.

It is likely that the zoning or management plan will have to be supplemented by separate reports and procedure manuals, which will be developed during the life of the plan. An example of the content of an MPA Management Plan is provided in Appendix 4. Another may be found in Salm and Clark (1984).

7.5 How To Make a Zoning Plan

The principal purpose for which an MPA is created is ideally a subset of the primary goal adopted by IUCN and the 4th World Wilderness Congress (see Policy Statement in this document). It maybe briefly stated as:

"To provide for the protection, restoration, wise use, understanding and enjoyment of the area in perpetuity."

Whether or not this ideal is met in a particular case, a zoning plan is applied as an instrument for the management of an MPA whenever there is to be more than one geographically determined category of allowable use. The principal objectives of a zoning plan are usually:

to ensure the conservation of the MPA in perpetuity;

- to provide protection for critical or representative habitats, ecosystems and ecological processes;

to separate conflicting human activities;

- to protect the natural and/or cultural qualities of the MPA while allowing a spectrum of reasonable human uses;

to reserve suitable areas for particular human uses, while minimizing the effects of those uses on the MPA; and

to preserve some areas of the MPA in their natural state undisturbed by humans except for the purposes of scientific research or education.

This section illustrates the policies and processes that experience in widely different geographical, biological, social and administrative environments suggests are likely to be suitable for application generally. Certainly, many of the steps outlined are necessary for the development of management plans of the type indicated in the example in Appendix 3.

It is not possible to propose a "turn-key" model which would be appropriate, unmodified, in any country or situation other than that for which it is designed. In Appendix 5 a particular model is explained so that those designing systems for other situations can identify the critical purposes for each step. This may help them to create a system appropriate to particular social or geographic systems.

As an example, the sections on public participation are clearly based within the context of high literacy and ready access to print and electronic methods of information distribution. Obviously, different techniques will be needed to address the same purposes in, for example, an island nation with a structured village social organisation, a strong oral tradition and little local access to print and electronic methods. The essential points are that the usage patterns,

expectations, attitudes and local knowledge of users should be determined in the planning stage and that planning should not be allowed to become the task of remote experts with no direct contact with or understanding of local issues.

7.5.1 The Planning Programme

Desirably, there are five stages in the development of a zoning plan for an MPA:

1. Initial Information Gathering and Preparation: the planning agency, perhaps with the assistance of consultants, assembles and reviews information on the nature and use of the area and develop materials for public participation, consideration by the public or appropriate representatives;

2. Public Participation or Consultation- Prior to the Preparation of a Plan: the agency seeks public comment on the accuracy and adequacy of review materials and suggestions for content of the proposed zoning plan;

3. Preparation of Draft Plan: Preparation of a draft zoning plan and materials explaining the plan for the public or appropriate representatives. Specific objectives are defined for each zone;

4. Public Participation or Consultation - Review of Draft Plan: the agency seeks comment on the published draft plan and explanatory materials; and

5. Plan Finalisation: The Government or agency adopts a revised plan, which takes account of comments and information received in response to the published draft plan.

These five steps and others are described in detail in Appendix 5.

7.6 Conclusion

This chapter has outlined the principles and procedures which have been shown to be successful in practice in developing zoning and management plans. They are based on recognition of the fact that a zoning or management plan is likely to be successful only if planning is carried out systematically using a holistic, interdisciplinary approach and if the plan is supported by the majority of the users and neighbors of an MPA. Such support will be best generated if those to be affected by a plan are involved intimately in its development and application. While the details of procedures should vary depending on the particular social and economic conditions prevailing, the principles illustrated in this chapter are believed to be generally applicable. The principles and procedures are set out in more detail in Appendices 4 and 5.

8. Biosphere Reserves in the Marine Environment

Most of this chapter is drawn from "A practical Guide to MAB". (UNESCO, 1987)

8.1 Introduction and Definition

This chapter on biosphere reserves is included in these guidelines because the biosphere reserve concept - in which human activity is specifically provided for within buffer and transition zones surrounding highly protected core areas - is a particular form of a large, multiple use, protected area that is especially suited to application in the marine environment.

The following definition applies to terrestrial and coastal areas. This chapter illustrates how the concept could be applied to the marine environment.

Biosphere reserves are protected areas of representative terrestrial and coastal environments which have been internationally recognized under the UNESCO MAB (Man and the Biosphere) Programme for their value in conservation and in providing the scientific knowledge, skills and human values to support sustainable development. Biosphere reserves are united to form a worldwide network which facilitates sharing of information relevant to the conservation and management of natural and managed ecosystems.

8.2 Biosphere Reserves and the MAB Programme

In the beginning of the MAB Programme, MAB Project Area 8 concerned the conservation of natural areas and of the genetic material that they contain. The rationale behind this theme was the need to counter the increasing loss of living species, the lack of knowledge of how to conserve them and the inadequacies of traditional approaches to nature protection. This project area was developed subsequently in 1974 by a Task Force which drew up a set of objectives and characteristics of special sites, called "biosphere reserves" to identify them with the rest of the MAB Programme. Inherent in the original formulation of the biosphere reserve concept was the idea that biosphere reserves serve as a locus, or logistic base, for national activities - which now include pilot projects and comparative studies - which contribute to the MAB Programme at the national and international levels. Also, there was the basic idea that the human factor in MAB should be present and benefit from biosphere reserves, particularly in that they generate the knowledge and skills required for rational, sustainable development.

Over the years, biosphere reserves and the international biosphere reserve network they constitute have gradually become a key element of the MAB Programme in general (as at mid 1987, there were 266 biosphere reserves in 70 countries, some have coastal or estuarine components but none is wholly marine).

8.3 The Action Plan for Biosphere Reserves

In 1983 the First International Biosphere Reserve Congress was jointly convened in Minsk, Byelorussia USSR by UNESCO and UNEP, and in co-operation with FAO and IUCN. This Congress laid the groundwork for the Action Plan for Biosphere Reserves which was adopted by the MAB-ICC at its eighth session in December 1984. The Action Plan was subsequently published *in Nature and Resources* Volume XX No. 4 (UNESCO, 1984) in Chinese, English, French, Spanish and Russian and widely distributed as offprints throughout the world. This Action Plan identifies a range of actions grouped under 9 objectives for consideration by governments and concerned international organizations in developing the multiple functions of biosphere reserves within the overall context of the MAB Programme. These actions concretely serve to implement the *World Conservation Strategy (IUCN/WWF/UNEP, 1980)* In summary, governments and international organizations (notably UNEP, FAO, UNESCO, IUCN) are invited to undertake activities which will improve and expand the international biosphere reserve network, to develop basic knowledge for conserving ecosystems and biological diversity and to make biosphere reserves more effective in linking conservation and development in fulfilling the broad objectives of MAB. One of the actions of the Action Plan foresaw the establishment of a Scientific Advisory Panel for Biosphere Reserves whose task, amongst others was to refine criteria for the selection and management of biosphere reserves. The sections that follow hereafter are based on the recommendations of the Scientific Advisory panel for Biosphere Reserves, as endorsed by the MAB Council.

8.4 Guidelines for Selection

The initial recommended criteria and guidelines for the choice and establishment of biosphere reserves were elaborated by a special Task Force in 1974 and presented in *MAB Report Series No. 2* (UNESCO, 1974). In reviewing these criteria, the Scientific Advisory Panel for Biosphere Reserves considered that there were three main concerns present in the biosphere reserve concept from the beginning, although at the time they were not clearly expressed nor articulated. These were:

(i) the need to reinforce the conservation of genetic resources and ecosystems and the maintenance of biological diversity (conservation concern);

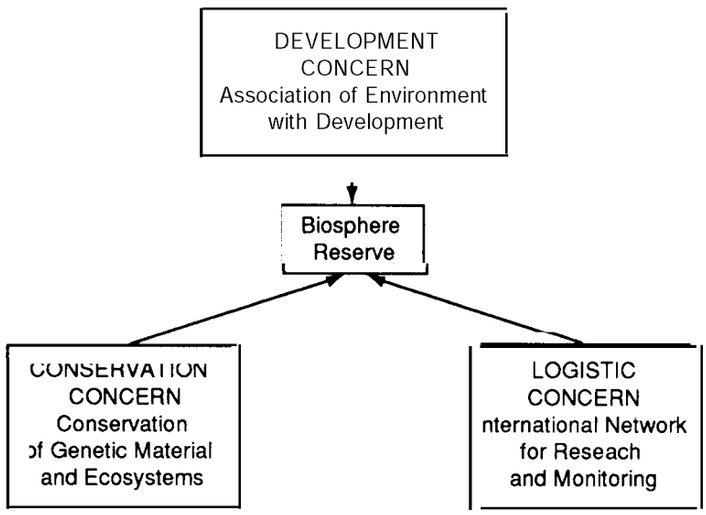
(ii) the need to setup a well-identified international network of areas directly related to MAB field research and monitoring activities, including the accompanying training and information exchange (logistic concern);

(iii) the need to associate concretely environmental protection and land resources development as a governing principle for research and education activities of the MAB programme (development concern);

These three concerns can follow from the triangular conceptual framework of Figure 1 below made by the interlinking of the conservation, logistic (research and monitoring of international significance) and development concerns. It is the combination - and harmonization - of these

three concerns which characterize the Biosphere Reserve. The application of these concerns is just as appropriate in the marine environment as it is in the terrestrial, although the balance of relative priority is likely to be difficult.

Figure 1.



1. Conservation concern:

Biosphere reserves should help to strengthen the conservation of biological diversity, genetic resources and ecosystems. The following factors are important:

(a) Value for conservation

A biosphere reserve must contain at least one sample of an ecosystem that is typical of a biogeographic unit, selected after criteria of diversity, naturalness and effectiveness as a conservation unit. The area concerned should be large enough to ensure the sustainability of viable populations of the species of the ecosystems. Such samples shall normally constitute the core area (or core areas) and should be effectively protected so that they are minimally disturbed. Human activities in the core area are limited to those which will not adversely affect the continuing natural evolution and functioning of the ecosystem.

(b) Coverage

There should be biosphere reserves in as many biogeographic regions and covering as many biological communities as possible in order that the global network of biosphere reserves can contribute to the conservation of terrestrial and coastal/marine biological diversity and provide models for sustainable and appropriate development. In terms of conservation, biosphere reserves alone are not intended to protect all biological diversity but complement other efforts.

2. Logistic concern (international research and monitoring network)

This "logistic" concern covers two ideas: that of providing an operational base and facilities for research and monitoring (as well as training and environmental education activities); and also that of contributing to an international network by communication information deriving from MAB research and monitoring. The following factors are important:

(a) Potential for scientific research and monitoring

The authorities responsible for biosphere reserves should have the potential for participating in interdisciplinary research programmed involving the natural and social sciences. Hence, biosphere reserves should have, or should plan to have, facilities for co-ordinated research such as for determining the requirements for conserving biological diversity, assessing the impacts of pollution on the structure and function of ecosystem, evaluating the effects of traditional and modern land use practices on ecosystem processes, and developing sustainable production systems for degraded areas. Some elements which can be used in evaluating the potential for scientific research and monitoring include:

- accumulation of scientific knowledge over long time periods;
- history of scientific research programmed and existence of ongoing projects;
- a balance of fundamental research and applied studies;
- emphasis on research to resolve specific land use or environmental problems;
- participation in international programmed on research and monitoring; and
- availability of research facilities and logistical support.

In some cases, proposed biosphere reserves may not have a history of research, nor have elaborated a research programme. It is particularly likely to be the case in marine areas. For these cases, the concerned MAB National Committee should certify that the administrative authorities responsible for the planning and management of the proposed biosphere reserve acknowledge their commitment to facilitate a programme of research and monitoring.

(b) Commitment to the MAB Programme and international co-operation.

Biosphere reserves should make a commitment to work within the international MAB framework for comparative studies of similar environmental problems in different parts of the world; for testing, standardising and transferring new methodologies; and for co-operating in the development of information management systems. In nominating and encouraging activities in biosphere reserves, MAB National Committees should acknowledge their commitment to pursue the objectives identified in the Action Plan for Biosphere Reserves.

3. **Development concern**

Biosphere reserves should associate environment and land and water resources development in their research, education and demonstration activities. The following factors are important:

(a) Local organizations and potential for participation of local people

Each biosphere reserve (or each administrative unit in biosphere reserves containing multiple sites) should have a managing authority which must acknowledge its responsibility in co-operating with local and regional institutions for planning and managing the biosphere reserve in order to benefit the people living in or around its boundaries. The managing authority should also indicate its willingness, as is possible and appropriate, to involve local people in the decision-making process pertaining to the management of the reserve and to its various activities.

(b) Value as a model for development

In terms of sustainable development, it is highly useful that a biosphere contains a representation of the substrate type, water depth and quality etc. occurring in a larger surrounding area so that the research taking place in the biosphere reserve will be relevant and can be applied in this larger region.

The biosphere reserve as a whole, including the core(s), buffer zone and transition area should be, or have the potential to be, a model of the harmonious relationship between man and nature, reflecting the use patterns and the cultural and ethnic characteristics of the biogeographic unit. It should be an example that effectively links conservation to development, in which the benefits of the biosphere reserve radiate into the surrounding area. The biosphere reserve should have the potential to play a significant role in solving the interrelated environmental, human use and socio-economic problems found elsewhere in the region or country.

(c) Potential for extension and demonstration

The work conducted in the biosphere reserve should, whenever possible, lead to practical results which could be used by the local population for resource development through extension and demonstration activities.

8.5 Conclusion

The objectives of the biosphere reserve scheme are clearly appropriate to marine environments. Nevertheless, the scale of many marine ecosystems, and the nature and scale of the processes of population recruitment and maintenance generate considerations and priorities which are not addressed by the guidelines developed for terrestrial biosphere reserves.

The issues of the role of biosphere reserves in the context of marine conservation and of the appropriateness to marine environments of biosphere reserve guidelines were addressed in 1988 by a workshop which drew upon Canadian and United States experience in developing a biosphere reserve proposal for Georges Bank in the North West Atlantic. The report of that workshop (Kenchington et al., inpress) is being published by IUCN. That workshop concluded concluded that the philosophy of the biosphere reserve is completely appropriate to the conservation of marine environments (Kenchington & Agardy, 1990). It identified a number of difficulties with literal translation of terrestrially derived guidelines to marine environments.

As an example, the terrestrially derived guidelines call for core areas, managed as strict nature reserves, which should be sufficiently large to be effective conservation units. The scale of the effective conservation unit for a marine ecosystem in which all or most species which are planktonic at some stage of their life-cycle, is likely to be very large, encompassing scales of hundreds of kilometres. However, because larvae and nutrients are transported freely in the sea and animals migrate in the marine environment generally in the absence of natural or man-made boundaries, conservation objectives can often be achieved with a series of relatively small core areas, complemented by sustainable-use management in the rest of the biosphere reserve. Zoning and management of the entire Reserve or MPA in a multiple-use regime may well achieve the conservation, logistic and development roles.

The concept of cluster biosphere reserves has been developed for terrestrial application. The concept refers to a combination of a number of contiguous or non-contiguous areas which together serve the various functions of a biosphere reserve. For the reasons given above, the concept is particularly applicable to the marine environment. Perhaps the best example of an MPA that meets all the criteria for a cluster biosphere reserve is the Great Barrier Reef Marine Park. This is administered by a single agency and consists of approximately 120 core areas linked by continuous buffer and transition zones covering an area of 350,000 square kilometers.

The 1988 workshop prepared, for future discussion, some draft guidelines for the development of a global network of marine biosphere reserves. These guidelines are based on the assumption that it will be possible, within the biosphere reserve programme to apply different criteria or develop different terminology to overcome the problems of attempting to apply the same criteria and terminology to marine and terrestrial environments.

The evolution of guidelines for marine biosphere reserves to support implementation of the policy framework provided in the Resolutions of the 4th World Wilderness Congress (Appendix 1) and the 17th General Assembly of the IUCN (Appendix 2) should provide the basis for a strong prograrnme of marine environment protection initiatives in the 1990's. This programme will complement actions taken by IUCN, other international bodies and nations to ensure that the marine environment is used and developed sustainably, in accordance with the principles of the World Conservation Strategy.

APPENDIX 1

RESOLUTION BY THE 4TH WORLD WILDERNESS CONGRESS, COLORADO, USA, SEPTEMBER 1987

OCEAN CONSERVATION

The Brundtland Commission's report highlights the serious threats which confront marine areas around the world. However, conservation efforts for the marine environment have lagged far behind those for the terrestrial environment, and an integrated approach to the management of the marine ecosystem is yet to be implemented. As a result, many marine areas now face serious problems, including:

Stress from pollution,
Degradation and depletion of resources, including species,
Conflicting uses of resources,
Damage and destruction of habitat

Even though by 1985 some 69 nations had designated 430 marine protected areas, lack of technical, human and financial resources limit the effective management of many of these protected areas. This seminar recognized that Marine Protected Areas represent but one component of a broader framework of integrated marine ecosystem management of renewable and non-renewable resources. Further, wilderness as a concept is applicable to the marine environment and represents one of the most highly protected categories of protected areas.

The 4th World Wilderness Congress **calls** upon national governments, international agencies and the non-governmental community to:

1. Implement integrated management strategies to achieve the objectives of the World Conservation Strategy and in so doing to consider local resource needs as well as national and international conservation and development responsibilities in the protection of the marine environment;

2. Involve local people, non-governmental organizations, related industries and other interested parties in the development of these strategies and in the implementation of various marine conservation programmed.

The 4th World Wilderness Congress **recommends** to FAO, IMO, IUCN, IWC, the North Sea Ministers' Conference, UNEP, UNESCO, other international organizations and all nations:

1. Adoption of the following primary goal:

   "To provide for the protection, restoration, wise use, understanding and enjoyment of the marine heritage of the world in perpetuity through the creation of a global, representative system of marine protected areas and through the management of human activities that use

or affect the marine environment in accordance with the principles of the World Conservation Strategy".

2. That as an integral component of marine conservation and management, each nation seek co-operative action between the public and all levels of government for development of a national system of marine protected areas. The term marine protected area is defined as: "Any area of intertidal or subtidal terrain, together with its overlying waters and associated flora, fauna, historical and cultural features, which has been reserved by legislation to protect part or all of the enclosed environment". Marine wilderness is defined as: "Marine areas where little or no evidence of human intrusion is present or permitted, so that natural processes will take place unaffected by human intervention".

3. That such a system should have the following objectives:

   (a) to protect and manage substantial examples of marine and estuarine systems to ensure their long-term viability and to maintain genetic diversity;

   (b) to protect depleted, threatened or endangered species and populations and in particular to preserve habitats considered critical for the survival of such species;

   (c) to protect and manage areas of significance to the life-cycles of economically important species;

   (d) to prevent outside activities from detrimentally affecting the Marine Protected Areas;

   (e) to provide for the continued welfare of people affected by the creation of marine protected areas; to preserve, protect, and manage natural aesthetic values of marine and estuarine areas, and historical and cultural sites for present and future generations;

   (f) to facilitate the interpretation of marine and estuarine systems for the purposes of conservation, education, and tourism;

   (g) to accommodate within appropriate management regimes a broad spectrum of human activities compatible with the primary goal in marine and estuarine settings; and

   (h) to provide for research and training, and for monitoring the environmental effects of human activities, including the direct and indirect effects of development and adjacent land-use practices.

4. That the development by a nation of such a system will be aided by:

   (a) agreement on a marine and estuarine classification system, including identified bio-geographic areas;

(b) review of existing protected areas, to establish the level of representation of classification categories within those areas; and will require:

(i) determination of existing and planned level of use of the marine and estuarine environment and the likely effects of those uses;

(ii) definiation of potential areas consistent with the objectives listed above and determination of priorities for establishment and management;

(iii) development and implementation of extensive community education programmed aimed at specific groups, to stimulate the necessary community support and awareness and to achieve substantial self-regulation; and

(iv) allocation of sufficient resources for the development and implementation of management plans, for regulatory statutory review processes, interpretation, education, training, volunteer programs, research, monitoring, surveillance and enforcement programmed.

APPENDIX 2

RESOLUTION BY 17TH GENERAL ASSEMBLY OF IUCN

17.38 PROTECTION OF THE COASTAL AND MARINE ENVIRONMENT

AWARE that the area of sea and seabed is more than two-and-a-half times as great as the total area of land masses of the world, that less than 1% of that marine area is currently within established protected areas and that protection of the marine environment lags far behind that of the terrestrial environment;

RECOGNIZING that the immense diversity of marine and estuarine animals, plants, and communities is a vital component of self-sustaining systems of local, regional, national and international significance and is an integral part of the natural and cultural heritage of the world;

CONCERNED that there are already areas which have become seriously degraded by the direct or indirect effects of human activities and that the rate of degradation is increasing rapidly;

RECOGNIZING that consideration must be given for the continued welfare of people who have customarily used marine areas;

BELIEVING that there are national and international responsibilities for the proper stewardship of the living and non-living resources of coastal and deeper ocean seas and the seabed to ensure their maintenance and appropriate use for the direct benefit and enjoyment of present and future generations;

BELIEVING that the development of such stewardship will require coordination and integrated management of a number of potentially competing uses at international, regional, national and local levels;

RECOGNIZING that a number of initiatives have been taken at international, regional and national levels for the establishment of marine protected areas and for managing the use of marine areas on a sustainable basis, including:

the Regional Seas Programme of the United Nations Environment Programme (UNEP);

the Man and the Biosphere Programme of the United Nations Educational, Scientific and Cultural Organization (UNESCO);

the Marine Science Programme of UNESCO;

the South Pacific Regional Environment Programme;

initiatives of the Food and Agriculture Organization of the United Nations (FAO), the International Maritime Organization (IMO), the International Whaling Commission (IWC) and other international organizations;

the proclamation of marine protected areas by 69 nations;

The General Assembly of IUCN, at its 17th Session in San Jose, Costa Rica, 1-10 February 1988:

1. **CALLS** upon national governments, international agencies and the non-governmental community to:

   a. Implement integrated management strategies to achieve the objectives of the World Conservation Strategy in the coastal and marine environment and in so doing to consider local resource needs as well as national and international conservation and development responsibilities in the protection of the marine environment;

   b. Involve local people, non-governmental organizations, related industries and other interested parties in the development of these strategies and in the implementation of various marine conservation programmed.

2. **DECIDES ITSELF** and further **RECOMMENDS** to FAO, IMO, IWC, the legal instrument bodies of the North Sea, UNEP, UNESCO, other international organizations and all nations, that:

   a. The following primary goal be adopted: "To provide for the protection, restoration, wise use, understanding and enjoyment of the marine heritage of the world in perpetuity through the creation of a global, representative system of marine protected areas and through the management in accordance with the principles of the World Conservation Strategy of human activities that use or affect the marine environment";

   b. As an integral component of marine conservation and management, each national government should seek cooperative action between the public and all levels of government for development of a national system of marine protected areas. The term "marine protected areas" is defined as: "Any area of intertidal or subtidal terrain, together with its overlying waters and associated flora, fauna, historical and cultural features. which has been reserved by legislation to protect part or all of the enclosed environment";

   c. Such a system should have the following objectives:

      to protect and manage substantial examples of marine and estuarine systems to ensure their long-term viability and to maintain genetic diversity;

to protect depleted, threatened, rare or endangered species and populations and, in particular to preserve habitats considered critical for the survival of such species;

to protect and manage areas of significance to the lifecycles of economically important species;

to prevent outside activities from detrimentally affecting the marine protected areas;

to provide for the continued welfare of people affected by the creation of marine protected areas; to preserve, protect, and manage historical and cultural sites and natural aesthetic values of marine and estuarine areas, for present and future generations;

to facilitate the interpretation of marine and estuarine systems for the purposes of conservation, education, and tourism;

to accommodate within appropriate management regimes a broad spectrum of human activities compatible with the primary goal in marine and estuanne settings;

to provide for research and training, and for monitoring the environmental effects of human activities, including the direct and indirect effects of development and adjacent land-use practices.

d. The development by a nation of such a system will be aided by agreement on a marine and estuarine classification system, including identified biogeographic areas; and by review of existing protected areas, to establish the level of representation of classification categories within those areas, which may require:

determination of existing and planned levels of use of the marine and estuarine environment and the likely effects of those uses;

delineation of potential areas consistent with the objectives listed above and determination of priorities for their establishment and management;

development and implementation of extensive community education programmed aimed at specific groups, to stimulate the necessary community support and awareness and to achieve substantial self-regulation;

allocation of sufficient resources for the development and implementation of management plans, for regulatory statutory review processes, interpretation, education, training, volunteer programmed, research, monitoring, surveillance and enforcement programmed.

APPENDIX 3

PLANNING FOR CANADA'S SYSTEM OF NATIONAL MARINE PARKS

Claude A. Mondor
Chief, Area Identification Section, National Parks Systems Branch
Department of the Environment, Ottawa, Ontario KIA OH3

I. INTRODUCTION

Canada's system of national parks marked its one hundredth birthday in 1985. From humble beginnings in 1885, when the first small portion of what is today Banff National Park was established, the system has grown to be one of the most renowned in the world, totalling 34 parks that in aggregate cover more than 180,000 square kilometres. Sixteen of these parks are coastal. Of those, only seven include a marine component, that is, the park's boundaries extend seaward to protect the sea bed and associated marine resources, and only three of these marine components are more than a few square kilometres in area. In short, for a country which boasts the world's longest coastline, Canada has until recently paid scant attention to the incorporation of significant marine areas within a comprehensive federal system of marine protection areas.

With the approval of the National Marine Parks Policy in 1986, Canada joined the growing list of coastal states that have committed themselves to protecting important examples of the country's marine environments. Historic progress occurred in 1987 with the establishment of Fathom Five National Marine Park in Georgian Bay at the north end of Lake Huron, and the signing of a federal-provincial agreement committing both levels of government to work towards the creation of a national marine park at South Moresby in the Queen Charlotte Islands of British Columbia. In June of 1990, Canada and the province of Quebec agreed to work along a course leading to the establishment of a third marine park, at the confluence of the Saguenay fiord and St. Lawrence River estuary. This park encompasses a portion of the habitat of the endangered stock of white whales which frequents this region.

This paper examines the approach that the Canadian Parks Service has adopted for planning its system of national marine parks. It begins with an outline of the basis of the system, and continues with a description of the sequence of events by which new national marine parks are established. This is followed by a more detailed exposé of the procedures used for identifying potential marine parks. The paper concludes with a discussion of some of the merits and shortcomings of the Canadian Parks Service approach to national marine parks system planning, and suggestions as to how it might be improved in the future.

II. BASIS OF THE NATIONAL MARINE PARKS SYSTEM

Canada's national marine parks system is based on the fundamental principle that it should protect a representative, outstanding and unique sampling of the country's Arctic, Atlantic and Pacific marine environments, and the Great Lakes (Canadian Parks Service, 1986).

The concept that a system of national marine parks or marine protected areas should represent the full range of variation in a country's marine environment is consistent with the efforts of the International Union for the Conservation of Nature (IUCN), which since the early 1970's has advocated the establishment of a global system of protected areas which is representative of the full range of biogeographic variation found on the planet (Dasmann, 1972; Udvardy, 1975). The Third World National Parks Congress in Bali in 1982 agreed that this approach should be used for designing a system of protected natural areas - both terrestrial and marine (McNeely and Miller, 1982). Achievement of this objective is seen as necessary to provide sample marine ecosystems in a natural state, maintain ecological diversity and environmental regulation, conserve marine genetic resources and provide education, research, and environmental monitoring.

To guide the development of a system of national marine parks representative of the full range of the biological and oceanographic variation found in Canada's marine environments, the Canadian Parks Service has pioneered the use of a broad-scale, hierarchical system of biogeographic units or "marine regions" (Mondor, 1985). Each marine region is relatively homogeneous in terms of climate, seabed geology, ocean currents, water mass characteristics (temperature and salinity), sea ice distribution, coastal landforms, marine plants, seabirds and marine mammals, or contains recurring patterns of these characteristics. The goal is to establish a national marine park within each marine region so that all marine parks together represent the whole.

The development of a biogeographic classification which is suitable for planning a system of marine protected areas is more difficult to develop than for their terrestrial counterparts. There are several reasons for this. First of all, marine ecosystems are not as well understood as their land counterparts. Also, their shifting nature over space-time makes them difficult to classify and map. As Dunbar (1951) notes: "*...It is simple, in the marine environment, to propose a criterion for the delimitation not only of the arctic from the subarctic, but also of the subarctic from the boreal or temperate. It is not always so simple to establish at any specific moment where the lines of delimitation lie. Furthermore, it should be remembered that the line of delimitation fluctuates, probably to some extent seasonally and certainly over the long-range time scale".* And ecosystem boundary shifts are more rapid at sea than on land: "*.. although all biogeographical zones change geographically with time, marine zones change more rapidly than zones on land, because the faunal response to changes in current patterns and temperatures is immediate, and in the case of planktonic forms the environment carries the biota with it, their boundaries may well shijt considerably over periods of a few years. "* Dunbar 1972).

Despite these difficulties, however, several researchers have taken up the scientifically challenging task of developing marine biogeographical classifications for conservation purposes. Paish's (1970) 'National Park Marine Natural Regions' was one of the first marine classification schemes developed especially for the long-term planning of a national network of marine protected areas, and was used by the Canadian Parks Service as a basis for selecting marine oriented national parks between 1970 and 1986 (see Figure 1). Hayden *et al.* (1982) reviewed the global coastal and marine environment schemes developed to date, and proposed a framework for use by the IUCN as a basis for ensuring adequate representation of global marine ecosystems in a wide range of protected marine and coastal areas. Although not

specifically developed for planning a system of marine protected areas, the broad zonation of Canada's northern marine waters by Dunbar (1972) warrants special mention because of its internally consistent application of physical oceanography criteria, and biological indicators where physical methods fail.

Use of Paish's marine framework for planning a system of marine protected areas, however, revealed a number of limitations which reduced its effectiveness for this purpose. Because only physical criteria were used in defining the regions, significant biological discontinuities often occurred within a region, thereby making the selection of a single representative park an extremely difficult, if not impossible, task. For example, the Western Arctic Marine Region lumped northern Ellesmere Island, which is characterized by permanent offshore pack ice, a wide coastal ice shelf and a high-relief rocky coastline, with the southern Beaufort Sea, an area of low coastal relief, sedimentary shorelines and open water during the summer months (Harper and Robillard, 1981; Mondor, 1982).

The development of the 1986 National Marine Parks Policy by the Canadian Parks Service provided the opportunity to correct some of the discrepancies noted in the early classification. This re-defined marine natural regions framework, which was initially developed by Woodward-Clyde Consultants and subsequently modified for the Atlantic coast (Yurick, 1984) and the eastern Arctic Ocean (Dunbar, 1988), is shown in Figure 2. A detailed description of the twenty-nine marine regions is provided by Mercier (1990). Rather than include a general overview of the key features of each marine region, this paper focuses instead on the innovative approach that was used to develop the framework itself.

The following operational conditions were imposed on re-defining the regional framework: (1) use existing information and the consensus of specialists from a wide range of marine disciplines; (2) incorporate an hierarchical structure whereby the largest or first-order regions coincide with those developed for the IUCN by Hayden *et al.* (1982), and the marine regions are subdivisions of these into smaller, more homogeneous units; (3) each marine region is to be relatively homogeneous based on physical oceanography and biological parameters; (4) give approximately equal weight to each of the framework parameters; (5) the total number of marine regions should lie somewhere between nine regions, which proved to be inadequate using the 1970 Paish classification, and thirty-nine regions, which is the total number of terrestrial natural regions delineated for planning the system of national parks; and, (6) the framework must incorporate the Great Lakes.

The new marine biogeographic classification scheme was derived based on the consensus arrived at through an extensive series of workshops with marine scientists familiar with Canada's oceans. A set of physical theme maps were drawn, showing oceanographic regions and coastal environments for each of Canada's four major marine environments the Arctic, Pacific, Atlantic and Great Lakes. These were then superimposed using manual overlay techniques to derive a single base map of physical regions. A similar set of biological theme maps, illustrating marine mammal, seabird, fish and indicator invertebrate distributions for each ocean environment, were produced and used to create a single base map of biological regions. The physical and biological base maps were subsequently combined based on extensive peer review and consensus building to derive the final twenty-nine marine regions

classification scheme.

In order to resolve potential conflicts between marine scientists during the workshops, some basic principles from decision analysis and bargaining theory were incorporated by the workshop facilitator. Alternative regional boundaries were compared because boundaries are easier to compare than indices, and the impact of moving boundaries can be readily appreciated by participants. Since the output of any expert judgement or debate is a set of boundaries in this case, rules were developed beforehand to exploit the structure of, or correlations between, alternative boundaries. For example, where two or more theme boundaries coincided they were adopted as a base case boundary (minimizes contested areas), and where two theme boundaries were near each other and generally parallel, abase case boundary was drawn midway between the two (the contested area is balanced between the two themes). The main principle the approach borrows from bargaining theory is that consensus is most easily achieved when a base case is put forward that is the result of a clear, well-understood and legitimate selection process.

III. STEPS IN CREATING NATIONAL MARINE PARKS

Section 1.0 of the National Marine Parks Policy (1986) outlines the general policies and procedures that guide the identification, selection and establishment of national marine parks. The normal sequence of events by which new national marine parks are created in Canada has been reviewed by Mondor (1988) and Yurick (1989). The five main steps in national marine park establishment include: (1) identifying representative marine areas; (2) selecting a potential marine park; (3) assessing marine park feasibility; (4) negotiating a new national marine park agreement; and, (5) establishing the new national marine park in legislation. It is important to note that deviations from the "standard" park establishment process frequently occur because each situation differs, and the process that is adopted must reflect the involvement of all parties which are directly affected.

STEP **1. Identifying Representative Marine Areas**

Studies are carried out to identify areas which provide outstanding representation of the oceanographic and biological features and processes characteristic of the marine region, and where human impact is minimal.

The first step in identifying representative marine areas is the preparation of a regional analysis study. This study systematically summarizes the region's biological and oceanographic features, as well as its cultural themes, and identifies candidate marine areas which encompass a high diversity of these key regional characteristics and which exhibit a high degree of naturalness. These areas are referred to as 'marine natural areas of national significance', in systems planning parlance. The regional analysis study concludes by listing the marine areas in terms of their representativeness and naturalness. The study is usually compiled by a consulting firm under contract, and is based on a review of the published literature and unpublished research information, and discussions with individuals familiar with the study region.

One of the principal techniques used for assessing the representativeness of marine areas is the

"geographic matrix", a term coined by Berry (1964) to describe a rectangular array or matrix wherein each natural feature or characteristic accounts for a row and each place for a column. If the rows represent the region's key oceanographic and biological characteristics and each column is a marine area identified by the consultant, and the presence-absence of each characteristic is noted in binary form (1 or O) for each area in the appropriate cells (i.e., the junction of row and column), a comparison of complete columns facilitates an understanding of how the marine areas differ from, or are similar to, the marine region and one another. The diversity of each marine area can be obtained by summing the appropriate column, and its representativeness calculated by dividing the number of themes present in the area by the total number of themes occurring within the region and multiplying the quotient by 100. An example of the geographic matrix that was constructed to compare the representativeness of the three marine areas identified in the North Labrador Sea Marine Region (LeDrew, Fudge and Associates, 1990) is shown in condensed form in Table 1.

The geographic matrix is one of the most useful and powerful techniques for assessing representativeness. It is relatively easy to construct and understand. If adequate information for the marine region is available, more sophisticated matrices can be formulated, taking into account the geographic extent of the features (common, uncommon or rare) and their regional significance (prime, some or little importance). Also, because the geographic matrix is ideally suited to computerization using widely available and inexpensive spreadsheet programs, it can be used by planners or researchers who do not have access to a geographic information system (GIS). The matrix approach is also invaluable to those with a GIS, as it can serve to identify which thematic maps should be digitized in order to identify the location of future protected areas, that is, those maps showing the distribution of unrepresented features.

The second part of the regional analysis study involves completion of a field reconnaissance of the candidate representative areas and preparation of afield trip report summarizing the findings of the consultant's report, field observations and concluding with recommendations concerning which area(s) the Canadian Parks Service should pursue for future marine park establishment. Often this work leads to follow-up research to clarify information uncertainties. For example, in assessing the three preliminary areas identified as representative of the Beaufort Sea Marine Region (Woodward-Clyde Consultants, 198 1), staff recognized that selecting the best area and recommending appropriate boundaries for it required a better understanding of regional ice distribution patterns and of the utilization of polynya and spring open ice lead systems by marine mammals and birds. This phase of the regional analysis study is completed by staff of the National Parks Systems Branch usually in cooperation with provincial or territorial officials and other interested federal agencies such as the Department of Fisheries and Oceans.

STEP 2. Selecting Potential Marine Park Areas

Once representative marine areas have been identified in a marine region, further studies and consultations are undertaken to select one of these areas as a potential national marine park.

In comparing possible areas at this stage, a wide range of factors is considered. The variables examined include: quality of regional representation, occurrence of exceptional natural features, presence of cultural heritage features, provincial or territorial government priorities,

Table 1. Application of the geographic matrix for assessing the oceanographic, biological and cultural diversity and representativeness of three marine areas in the North Labrador Shelf Region.

KEY REGIONAL THEMES	AREA 1	AREA 2	AREA 3
Bedrock Geology			
Lower Paleozoic	0	0	1
Mesozoic-Cenozoic	1	1	1
Physical Oceanography			
Labrador Current	1	1	1
Upwellings and mixing	1	1	1
Ice conditions (icebergs)	1	1	1
Coastal Habitats			
Bedrock shorelines	1	1	1
Fiords	1	0	0
Intertidal flats	0	1	1
Deltas (inlets and bays)	0	1	1
Marshes (fringe)	0	1	1
Estuaries	1	1	0
Invertebrates			
Iceland scallops	1	1	1
Pink shrimp	0	1	1
Finfish			
Atlantic cod	1	1	1
Arctic cod	1	1	1
Greenland cod	1	1	1
Atlantic salmon	0	1	1
Capelin	1	1	1
Avifauna			
Northern fulmar	1	1	1
Storm-petrels	0	0	1
Common eider	1	1	1
Murres	1	1	1
Razorbill	0	1	1
Atlantic puffin	0	1	1
Marine Mammals			
Fin whales	0	0	1
Humpback whales	0	0	1
Pilot whales	0	0	1
Ringed seal	1	0	1
Harp and hooded seals	1	1	1
Polar bear	1	1	0
Historical and Cultural Themes			
Prehistoric Inuit settlements	1	1	0
Moravian settlements	1	1	1
Whaling stations	0	0	1
Bio-oceanographic Diversity	20	25	29
Representativeness (%)	60.6	75.7	87.8

potential for marine interpretation and marine-based recreational activities, competing incompatible uses of the area's marine resources, actual and potential downstream threats to the marine environment, location of other protected marine or coastal areas, ownership of the seabed and coastal lands, the implications of aboriginal claims and treaties, and degree of national and local public support.

STEP 3. Assessing National Marine Park Feasibility

At this stage a national marine park proposal is prepared as the basis for a detailed feasibility assessment, including public consultations. The factors listed in Step 2 are now studied in greater detail, usually with the direct involvement of the provincial or territorial government and in consultation with representatives of local communities. Possible boundaries of the potential national marine park are drawn.

If this assessment shows that a marine park is feasible and there is strong public support for its establishment, the federal and provincial/territorial governments may decide to proceed with the negotiation of a park agreement. If a national marine park is not a feasible option, other representative marine areas within the region will be considered.

This step of the marine park establishment process will not be dealt with further except to highlight the following points. It has been the experience of the Canadian Parks Service that the successful creation of a national marine park requires four elements: comprehensive planning work prior to the initiation of public consultations; the support of the large majority of local residents and resource users who will be affected by the proposed marine park; strong political support at all levels of government; and, adequate funding to complete the process and provide for the park's subsequent planning and development. In Canada's national marine parks, as in marine protected areas of other nations, a necessary fifth element is the support of the other management agencies which will be involved in the cooperative management of the marine park area following its establishment.

STEP 4. Negotiating a New National Marine Park Agreement

For the federal legislation to apply, it is a constitutional requirement that all national marine park lands be federal property (Bankes, 1988). If jurisdiction of the seabed is within the provincial domain, a federal-provincial agreement is negotiated stipulating the terms and conditions under which the province transfers administration and control of the coastal lands, islands and seabed to the federal government for national marine park purposes. Where some of the lands are subject to a comprehensive land claim by aboriginal people, a new national marine park can be established as part of a negotiated claim settlement, or a national marine park 'reserve' can be created pending the resolution of the outstanding claim.

New park agreements cover many different topics depending on the circumstances. Some of the subjects included are final park boundaries, management of fisheries and marine transportation, cost-sharing for land acquisition, timing of the land transfer, conditions under which traditional harvesting of marine renewable resources can continue, cooperation in park planning and management, regional integration, economic benefits, and others.

STEP 5. Establishing a New National Marine Park in Legislation

Once the responsible parties have agreed to create a new marine park and the lands are under the administration and control of the federal government, the proposed new national marine park must be formally established by legislation of the Parliament of Canada so that the National Parks Act will apply. In the case of a national marine park reserve, the Act applies but the status of the area is subject to the final resolution of the aboriginal claim.

IV. CURRENT STATUS OF CANADA'S NATIONAL MARINE PARKS SYSTEM

Compared to the country's national parks network, the national marine parks program is in its infancy. As shown in Figure 2, only one of the twenty-nine marine regions is represented by a national marine park - Fathom Five in Georgian Bay. A second marine region, the West Vancouver Island Shelf along the Pacific Coast, is represented by the extensive marine components of Pacific Rim National Park Reserve. An internal review of the park's representativeness concluded that its marine components could serve as the core of a future national marine park, with appropriate boundary modifications to incorporate unrepresented themes, improve ecological integrity and increase opportunities for visitor use and understanding.

Two more marine regions will be represented when South Moresby/Gwaii Haanas National Park Reserve is established in 1993. In accordance with the 1988 federal-provincial agreement, an assessment of the area's underwater petroleum and mineral resources will be completed by June 30, 1992, and final marine park boundaries will be decided by December 31 of the same year. The St. Lawrence River Estuary will be the fifth marine region represented when the Saguenay Marine Park is created, pursuant to a federal-provincial agreement signed in June, 1990.

Table *2* shows the status of national marine park studies for each of the twenty-four unrepresented marine regions, and illustrates that planning for future national marine parks is still in the very early stages as well. In order to ensure that the Canadian Parks Service does not miss any unexpected opportunities to establish a new national marine park in an unrepresented region, a proposal to complete the selection of potential national marine parks for all unrepresented marine regions over the next five years (199 1-96) has been put forth for approval and funding.

V. CONCLUDING REMARKS

As noted in the introductory remarks, the biogeographical classification approach was adopted by the Canadian Parks Service for planning the country's system of national marine parks. Since this approach has been in use for almost 20 years, its strengths and weaknesses are well-known.

Some of the strengths of the biogeographical region approach for the design of a system of marine protected areas are that it:

The principal drawback to the use of 'marine regions' for planning a system of marine protected areas is the difficulty of identifying the 'ideal' marine area, that is, a single tract of ocean, seabed and coast which encompasses examples of the full range of natural ecosystems and processes

Table 2. Status of national marine parks systems planning for each of the 24 unrepresented marine regions in Canada In this chart, "Y" refers to "Yes" and "N" to "No".

MARINE REGION	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
Arctic Ocean					
1. Beaufort Sea	*Y*	Y	N	N	N
2. Viscount Melville Snd.	*Y*	Y	N	N	N
3. Northern Arctic	N	N	N	N	N
4 Queen Maud Gulf	N	N	N	N	N
5 Lancaster Sound	*Y*	Y	Y	Y	N
6. East Baffin Island Shelf	N	N	N	N	N
7. Foxe Basin	N	N	N	N	N
8. Davis-Hudson Straits	N	N	N	N	N
9. Hudson Bay	*Y*	Y	N	N	N
10. James Bay	N	N	N	N	N
Atlantic Ocean					
1. North Labrador Shelf	*Y*	Y	N	N	N
2. South Labrador Shelf	*Y*	N	N	N	N
3. Grand Banks	N	N	N	N	N
4. Laurentian Trough	N	N	N	N	N
5. Scotian Shelf	N	N	N	N	N
6. Bay of Fundy	*Y*	Y	Y	N	N
7. Magdalen Shallows	*Y*	Y	N	N	N
8. North Gulf Shelf	N	N	N	N	N
Pacific Ocean					
3. Queen Charlotte Sound	N	N	N	N	N
5. Strait of Georgia	*Y*	N	N	N	N
Great Lakes					
1. Lake Superior	N	N	N	N	N
3. Lake Huron	N	N	N	N	N
4. Lake Erie	N	N	N	N	N
5. Lake Ontario	N	N	N	N	N

Step 1.- Identifying representative marine areas
Step 2.- Selecting a potential marine park
Step 3.- Assessing marine park feasibility
Step 4.- Negotiating a new national marine park agreement
Step 5.- Establishing a new national marine park in legislation

that are characteristic of the region. In practice, however. only rarely will it be possible to represent a marine region by means of a single marine protected area because of the enormous diversity and complexity of marine ecosystems and processes within any region. Achieving the ideal is further compounded by the dynamic spatial and temporal nature of the marine regions themselves, as noted earlier. Consequently, in the great majority of regions, more than one protected marine area will often be required in order to achieve an adequate level of representation.

These practical considerations have led the author to conclude that countries interested in protecting the full diversity of their nation's bio-oceanographic diversity should consider adopting a system comprising of several types of marine protected areas. The main conservation priority within each marine region should be the establishment of a large, representative marine protected area selected to portray a continuum of as many marine habitats as possible. The second priority should be the creation of smaller marine reserves to augment these major representative marine protected areas in order to safeguard unrepresented marine habitats or regional variants thereof, as well as unique sites of special scientific interest (seabird nesting colonies, marine mammal calving areas, etc.), or underwater sites of outstanding beauty. And lastly, a series of smaller marine reserves may also be included in the system to specifically meet regional recreational, educational or research needs.

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APPENDIX 4

DETAIL OF CONTENT OF AN MPA MANAGEMENT PLAN

This example of the content of an MPA Management Plan is provided to assist those involved in the preparation of plans and submissions in government agencies and non-government organisations. It should be viewed as an ideal since it implies a planning situation where there is a high level of description and understanding of the area under investigation. The precise format adopted will depend upon the provisions of the legislation establishing the MPA and the government processes required for putting a management plan into effect.

The relationship between a management plan and a zoning plan is optional. In large, multiple use MPAs, the zoning plan maybe the primary document that defines the strategic framework for management. In such cases it will be supplemented by various subordinate tactical documents such as guidelines and day-to-day management plans.

The example that follows refers to the case where the management plan is the primary policy - setting document and the zoning plan is subordinate to it. In many cases the items 1 -4.1 may form a preliminary document which establishes the initial case for protection of the area in question.

All the information listed in the following example should be provided in one document or another.

TITLE PAGE

This includes:

The name of the area subject to the plan and its status;

The words - MANAGEMENT PLAN;

The name of the agency/agencies responsible for implementing the plan;

The date when the plan was prepared and the expected date for review;

EXECUTIVE SUMMARY PAGE

On this page are summarised:

the reasons why the plan was prepared;

the period of time for which it applies;

any special conditions which controlled its preparation including the legislative basis and

authority for plan development;

the principal provisions of the plan;

the estimated budget; and

acknowledgements.

CONTENTS PAGE

The headings of the body of the plan are listed here against the appropriate page numbers. It may be preferable to list only the main headings, but sub-headings are usually included.

BODY OF THE PLAN

1. Objectives for Management

   The goal and objectives for management are stated in this section. They will reflect the purpose(s) for which the area is protected and the use(s) which will be permitted.

2. Resource Description

   This section provides information on the following categories for the areas to be protected. Maps will be an important feature of this section.

   2.1 Name of Area and Location
   To include the geographic location (State district, etc.); latitudes and longitudes (preferably on a map); surface area (square kilometres, hectares or other units of area).

   2.2 Geographic and Habitat Classification
   The area should be categorised according to a habitat classification scheme to identify its geographic zone, substrate type(s) and major biological feature(s).

   2.3 Conservation Status
   This should indicate the area's degree of naturalness, aesthetic values, degree and nature of threats (if any), jurisdiction(s) and present ownership. The degree of habitat representativeness should also be indicated.

   2.4 Access and Regional Context
   The regional land and sea surroundings and access routes to the area are described, in addition to the character and use of contiguous areas, emphasizing their effectiveness as buffer zones.

   2.5 History and Development
   This section contains a summary account of direct and peripheral human

involvement in the area. This section may be divided into several sub-sections e.g.:

2.5.1 Archaeology
A summary description of the people who used the area before historical times, including any known areas of religious significance, species taken and if closed seasons or closed areas were ever used as management techniques. Archaeological information could also provide clues to species that were found in the area

2.5.2 Historical relics
This sub-section should identify submerged wrecks and any submerged structures.

2.5.3 Written and oral history

2.5.4 Recent developments
Give a brief history of fishing and other human use of the area and developments on the land which may have had a major influence on the area.

2.5.5 Current human use and development
In this section the current use of the area by subsistence, artisanal, commercial and recreational fishermen, tourists and others is discussed. It is most important to establish who the users are, where they conduct their activities, at what times of the year, and for how long, and the social and economic importance of their use. A user survey may be helpful. This information is just as important as biophysical data.

2.6 Physical features
In this section the non-living features of the area are described. Maps in addition to descriptions should be included.

2.6.1 Coastal landforms
Nearby land forms should be described together with islands and underwater formations.

2.6.2 Bathymetry
A map showing isobaths is needed. The depth of water can provide an important insight into the dynamics of the system. Major trenches, canyons and shallows should be described in as much detail as is available.

2.6.3 Tides
A description of the tidal regime and resultant currents and water movements associated with phases of the tidal cycle.

2.6.4 Salinity and turbidity
Measurements of salinity and turbidity in all seasons are desirable.

2.6.5 Geology

A description in geological terms about how the area was formed and how that process is continuing with the deposition of present day substrates and by erosion processes observable in the area.

2.6.6 Dominant currents

A description of physical oceanographic features of the area, wind-driven, tidal and residual currents, on a seasonal basis.

2.6.7 Freshwater inputs

Major river and estuarine areas should be noted.

2.7 Climate

2.7.1 Precipitation

Annual precipitation figures and a chart to indicate average precipitation on a monthly basis should be included.

2.7.2 Temperature

Monthly charts for both air and average sea temperatures (surface and at given depth). Impossible include a monthly chart of solar radiation received.

2.7.3 Winds

Monthly charts of rose diagrams plus a description of any unusual feature of the local winds.

2.8 Plant life

This section should contain at least a description of dominant marine plant life, and wherever possible a comprehensive summary of the plant community and related environmental factors such as the depth of occurrence, together with any botanical features that may have special scientific, recreational or other interest. Phytoplankton could be included if information is available. Plant species identified in the area should be listed in an appendix.

2.9 Marine fauna

As a minimum, a description of the dominant marine or estuarine fauna is required, with an account of their ecological relationships if known. Include sections on Mammals, Reptiles, Amphibians, Fish, Birds, Invertebrates and Zooplankton as appropriate. A separate appendix should list the species.

Note: Sections 2.8 and 2.9 could be amalgamated to one section entitled "Marine Wildlife". Wildlife would be defined as animals and plants that are indigenous to the nation, to its coastal sea, to its continental shelf or its overlying waters; migratory animals that periodically or occasionally visit its territory; and such other animals and plants, not being domesticated animals or cultivated plants, as are prescribed by legislation.

2.10 Miscellaneous

This can be a varied section that includes those matters which do not fit under any of the other descriptions of the plan. Each plan will be site specific and could therefore have features or problems which are not encountered in other plans.

3. Description of Management Issues

A summary of past, present and possible future threats and management conflicts should follow.

3.1 Historic and current conflicts

A brief statement of any historic or current conflicts between uses or user groups.

3.2 Pollution

Include point and non-point sources of external pollution within the area and in nearby areas, especially those upcurrent, e.g. runoff, sewage inputs, fish processing, industrial pollution and pollution from tourism and shipping.

3.3 Future demand

Estimate future demand for recreational and other uses, and if applicable, future pollution loading and proposed developments.

3.4 Potential conflicts

Potential conflicts specific to the area within and close to the boundary of the MPA should be described. Any potential conflicts due to more distant regional influences should also be identified. This should include review of sectoral development plans and propose projects for, or likely to influence, the area in question.

4. Management policies

In this section the management plan comes to grips with the threats and conflicts and prescribes solutions.

4.1 Objectives

The goal of protecting the area is briefly reiterated. The objectives of management are stated clearly. If the area is to be subdivided, sub-objectives should be stated for each zone or subdivision of the managed area.

4.2 Resource units

It could be useful to divide the area into resource units.

4.2.1 Natural

Each MPA will have unique characteristics and the resource units will be site specific. An area could be divided into resource units such as beaches, islands, deep water trenches, turtle or seal rookeries etc.

4.2.2 Development areas

Another category could be areas that are either developed orproposedto be developed.

4.2.3 Areas of impact

Areas showing marked impact from human activity could be identified.

4.3 Zoning

The resource units defined above may provide a basis for zoning, which should be kept as simple as practicable, consistent with avoiding unnecessary restriction on human activities. Zoning must be easy to understand both from the point of view of the manager and the managed. This section should explain why a particular area has been given a zone classification and what activities are permitted and prohibited within each zone.

Special habitats or wildlife areas such as a seagrass bed or a turtle rookery, may require additional management provisions such as seasonal closures or permanent restrictions to human access. Unusual prescriptions may be needed in the short term and these should be described in this section.

4.4 Management policies for resource units

In the draft management plan a list of management options can be presented in this section and a choice made between them in the final version of the plan.

5. Surveillance

This section should describe any programmed proposed to assess movement of people, vessels and aircraft within and through the area and the use made of the area.

6. Monitoring

This section should describe any biological, environmental and usage monitoring programmed proposed for the area, when these programmed will be completed and how they are to be used in reviewing the management plan. It may also identify other monitoring programmed to be initiated during the first stage of the plan and who could carry them out. Some of the results from monitoring may eventually be included in the appendices.

7. Education and Interpretation

This section should describe programmed and co-operative arrangements with educational institutions, public associations and community groups to promote protection, wise use, public understanding and enjoyment of the MPA.

8. Enforcement

This section should outline the arrangements which will need to be made to detect apparent

offences and to apprehend and prosecute offenders in order to achieve an acceptable level of adherence to MPA regulations. No nation could afford to manage primarily on the basis of enforcement in the face of general public hostility or to apprehend every breach of regulation. Education is therefore the primary management tool.

9. Maintenance and Administration

A section will be required to address the subjects of budget, staffing, etc.

9.1 Budget

Anticipated costs should be identified so that adequate funding may be arranged.

9.2 Staffing

The management plan should indicate staffing needs and identify major functions. Volunteers, consultants and head office staff involved in the planning process should also be identified, as this will provide a more accurate indication of staffing levels. Staffing deficiencies can be predicted and recommendations suggested. Section 9 should be updated and released as part of an annual report.

10. Information Sources

Information regarding the area will come from sources outside the manager's regular information base. These should be identified and listed wherever possible, and include those other government agencies, non-government organisations, individuals, consultants, overseas sources etc that were consulted.

A bibliography should be appended.

11. Appendices

Appendix 1: Boundary and Area Description

This should provide the legal description of the area including any outstanding legal tenure or matters of existing interest which might have become clear during the development of the management plan. In most federal systems of government, there are complex and sometimes unresolved questions of jurisdiction between levels of government especially in the intertidal environment. These problems should be highlighted and, if appropriate, solutions suggested. One solution is to have complementary legislative, planning and management provisions on each side of that jurisdictional boundary. Examples of this include adjacent Federal and State Marine Protected Areas at Florida Keys and the Californian Channel Islands in the United States of America and the Great Barrier Reef Marine Park and adjacent Queensland Marine Parks in Australia.

Appendix 2: Legislation

All legislation and regulations relating to the area and their interactions, should be noted and explained. Where feasible, the legislation that prevails

in the event of conflict between the provisions of different enactments should be identified. Implications for the protective status of the area should be identified.

Appendix 3: Plant Species

A comprehensive list of plant species should be attempted for the first management plan. As the process continues over the years, it is very likely that new plant species will be discovered in the area. Plant names should be listed in broad taxonomic groups, with botanical and common names where possible.

Appendix 4: Animal Species

Animal species should be listed in broad taxonomic groups: e.g. Mammals, Reptiles, Amphibians, Fish, Birds and Invertebrates and common names provided where possible.

Appendix 5: Special Features

This section could describe unusual or outstanding features of the area and could range from whale strandings, waterspouts, oil slicks to spiritual revelations and cultural beliefs.

Appendix 6: Past, Present and Proposed use

This section should attempt to provide more detail on uses, identify key user groups and assess the social and economic significance of areas.

Maps

The following are suggested as a minimum number of maps required.

Map 1 - Location
Map 2 - Land/water tenure and jurisdiction
Map 3 - Land topography and seabed bathymetry
Map 4 - Geology
Map 5/6 - Dominant plant and animal communities
Map 7/8 - Major uses
Map 9 - Major use conflicts and threatened resources
Map 10 - Zoning

Where practicable the use of overlay presentation is recommended in order to illustrate the associations between such factors as topography, biological communities and uses.

APPENDIX 5

DETAILED GUIDELINES FOR PREPARATION OF A ZONING PLAN

Much of the material in this appendix is drawn from "Managing Marine Environments (Kenchington, 1990)

I Initial Information Gathering and Preparation

The initial task of the planning team is to assemble and review available information on the resources and use of the area to be planned and, if the area is already under management, on the experience, effectiveness and performance of management. From this initial review specific investigations may be identified as necessary to provide important information within the available time frame for the current planning operation. A review document is then developed by the planning team.

The review document provides the basis for development of public participation materials. The form of these materials will depend upon the scale of the area and the most appropriate means of communicating with the user and decision-making community concerned. For a large scale planning operation in a community with a high level of literacy the most widely distributed information might be a descriptive brochure which describes the purpose of the programme and the process of plan development and invites interested readers to contact the planning agency for further information. The brochure should incorporate a map, a questionnaire and a paid mail-back panel in order to make it as easy as possible for a respondent to make a representation. The most substantial published document might be a jargon-free summary of about 50 pages (e.g. GBRMPA, 1985) which is provided to individuals and groups or sent to those who request further information after reading the brochure. This document should seek to draw out the issues which must be faced in developing the plan and a major part should consist of maps illustrating the distribution of resources and usage patterns.

Typical Resource and Activity Maps

These may be produced manually as transparent overlays or by computer Geographic Information System software.

MAP	1	Distribution of Fish and Benthic Communities
	2	Endangered, Rare or protected Species Distribution and Significant Sites (eg. Dugong, turtle, manatee, whales, seals).
	3	Significant Bird Breeding Colonies
	4	Mangrove and Seagrass Communities
	5	Trawling
	6	Pelagic Fishery (Mackerel, Game)

7 Demersal Fishery (Commercial, Recreational)

8 Netting (Gill and Drift, Bait)

9 Collecting (Coral, Shells, Aquarium Fish)

10 Spearfishing

11 Diving

12 Research - Study Reefs

13 Tourist Developments and Camping

14 Charter Vessels and Aircraft

15 Adjacent Land Use (eg. National Park, Trust Land, Industrial Use, Agriculture)

16 Navigation, Shipping and De fence Areas

17 Mariculture

18 Traditional Uses and Rights

Preparations for public participation require the development of a theme for the brochure and advertising materials and an advertising programme for the media (press, television and radio where appropriate) which will attract public attention yet be sufficiently different from previous planning programmed to avoid confusion or saturation.

A user friendly culturally appropriate approach is recommended with the aim of encouraging public involvement A cartoon based approach has proved successful in some cases.

The final element of preparation involves arrangements to publicise and distribute the brochure and other materials. Summaries and brochures should be mailed to a large number of groups and individuals on contact lists maintained by the planning agency. Other means of distribution may be through small promotional display panels with a supply of brochures. These can be set up on shop counters and in offices of organisations which have interests relating to the area being planned and are prepared to replenish the brochures in the display from a bundle provided. An important preliminary logistic task is the development of itineraries and agreements for deployment of the counter top displays and for contact with the press (and electronic media where appropriate) for publicity at the launch of the programme. Once the programme has been launched this task evolves into organisation of a schedule of meetings to accommodate requests by interested groups for meetings to discuss the planning programme with staff of the planning agency.

In countries where the social tradition is face-to-face contact with the community, with no history of distribution of information through written material or electronic media, the approach of user involvement should, of course, be adapted through use of socially appropriate techniques to convey explanatory information. These might include village drama, story-telling, tee shirts or church meetings.

2. **Public Participation or Consultation - Prior to Preparing a Plan**

The primary function of this phase is to alert users and those interested in the MPA, directly or through their representatives, that a zoning plan is to be prepared.It is used to seek comment and correction of maps and other information concerning distribution and use of resources and to solicit opinions on appropriate provisions to be included in the zoning plan. Where the planning programme involves review of an existing, implemented zoning plan this phase is used as an opportunity to test the results of research into user reaction to the existing plan.

In the cycle of development of initial zoning plans for an MPA this phase has the difficulty that, in the absence of specific zoning proposals, most respondents may have generally supportive views on the need for management but little, if any, specific information to add and few specific proposals. For this reason it is important to stress the information role of this phase of the programme and the importance of respondents commenting on the specific proposals in the subsequent public participation programme to review the draft plan.

3. Preparation of Draft Plan

The aim is to make a zoning plan as simple as practicable, consistent with providing the range of degrees of protection considered necessary and avoiding unnecessary restrictions on human activity. Specific objectives are defined for each proposed zone. For instance, the most highly protected zone might have the following objective: "To provide for the preservation of the area in its natural state, undisturbed by human activities." In contrast, the least restrictive zone might have the following objective: "To provide opportunities for reasonable general use, consistent with the conservation of the Marine Protected Area." There will be several other zones, each with its own objective or objectives, which will provide levels of protection between these two extremes.

The planning team should work to a series of guidelines, each expressed with the preamble "as far as practicable" which help to develop a contemporary interpretation of reasonable use and to ensure that multiple use objectives are properly considered. These guidelines, taken together, should include all the uses and objectives to be provided for in the zoning plan. They may often be in mutual conflict e.g. where one guideline provides that "as far as practicable an area should be provided close to a coastal town where recreational fishing is provided for" and another guideline provides that "as far as practicable an area should be provided close to a coastal town free from fishing". Resolution of these conflicts is best achieved through careful consideration of the political, social and ecological factors involved. The guidelines used in the development of zoning plans for the Great Barrier Reef Marine Park are listed in section 8 of this Appendix.

Despite the inherent and inevitable conflict between some of the guidelines, it is generally the

case that a majority of zone allocation decisions flow logically from the guidelines. There are a few "toss-up" allocations where one of several, apparently similar areas could logically be allocated to a restrictive zone. There are some sites, usually those near islands or most accessible from harbours or boat launching ramps where there are clear conflicts of use, the resolution of which will please one party but displease another. The planning team develops a draft plan and, if necessary, alternative options for specific problem sites. These should be considered carefully by the planning agency which adopts a plan for release for the second phase of public participation.

The agency should publish a report containing information, updated as necessary since the initial public participation programme, explaining the basis for zoning and presenting a brief summary of specific reasons for zoning of any areas allocated to zones more restrictive than "General Use". These documents are used to develop second phase public participation materials which allow the style and promotional design theme adopted for the initial phase. These might be a 50 page summary and a brochure containing a zoning map, a summary of zoning provisions, a list of questions concerning information of interest to the planning agency and a mail back panel for easy response.

4. **Public Participation or Consultation, Review of Draft Zoning Plan**

This programme can be conducted similarly to the initial phase. An information summary and a brochure can be widely distributed by mail using a mailing list expanded to include all those who responded in the initial public participation programme. Counter-top displays can be used to make the draft proposals widely available. Meetings are arranged in response to user requests. This phase is usually easier to conduct since users find it much easier to evaluate and react to specific proposals. Material and presentations emphasise that the proposal is not final but is a draft published for the specific purpose of inviting public comment. Respondents who wish to object are invited to specify their objections, to propose alternative solutions and to support their arguments with factual evidence where possible. Those who support all or specific parts of the plan are asked to say so in representations because in the absence of that information it is possible in revision to modify a plan to meet an objection by one user group and unwittingly overturn a solution regarded as good by another.

Public comments and suggestions are summarised as they are received. Usually there will be considerable repetition in these comments. Progress reports on the analysis are produced as required during the programme. The aim is to produce a detailed analysis within a few weeks of the last reasonable date for receipt of results of consultation.

5. **Plan Finalisation**

The planning team should meet after the report on the analysis of public comments has been completed to consider the issues raised in the public participation programme and to discuss and evaluate possible changes to the published draft plan.

Proposed major changes should be discussed with those user groups who will be affected by those changes. The importance of doing this cannot be over-emphasized.

The content of the final plan is determined by the planning agency and after the completion of precise cartography and written boundary definitions for all zones, checking by the agency's legal officers and final proofing of the plan and zoning maps the plan is submitted to the responsible Minister or senior decision-maker for government approval.

6. Management and Analysis of Public Participation

Clearly, the appropriate form of public participation or consultation will depend greatly on the social and political context. The description which follows contains a number of principles which may be adapted to a variety of forms of consultative process.

Considerable effort should be put into management of the public participation programmed in order to make them efficient and non-bureaucratic. In some communities there maybe a basic apathy and cynicism expressed in such terms as *"Why bother? You're only asking because the law says you have to. Nothing that I say will make any difference -in any case you probably won't even read it. "*

The first focus of effort should be to make public participation materials attractive and clearly expressed. The second should be to ensure that once the programme has started trained staff can always be contacted at times convenient to users in order to ensure that:

questions are answered immediately or, with explanation to the caller, referred to a named expert officer;

requests for the materials are filled promptly; and

requests for meetings with planning staff are logged and arrangements made for them to be fulfilled.

Feedback to the public is important in obtaining public support, which itself is vital because management resources for policing and enforcement are limited and the co-operation of a majority of users will be needed for management. When a written comment is received it is recorded and an acknowledgement sent as soon as possible. The names and addresses of the respondents is entered in a mailing list so that they can subsequently receive a letter and a copy of the materials developed as a result of the public participation programme. After the first phase respondents should receive a letter thanking them again for their participation and a copy of the 50 page information summary and brochure for the second phase. At the conclusion of the process all participants should receive a copy of the plan and second phase participants should receive a letter which briefly presents the planning agency's response to the issues they raised.

The form and style of written comments will vary. The majority is likely to use the mail-back brochure and respond to the questions upon it. A few may consist of detailed technical analyses and arguments which may cover many pages.

Reports should refer to individual written comments by index number so that it is possible for a planning team member to retrieve and read firsthand all comments about a particular location or activity.

Reports should be produced which cite the number and the points of origin of written comments received. These provide an important indication of the geographic extent of effective contact and involvement of the public participation process.

The results of the public participation programmed should be treated cautiously since the programrnes will not obtain statistically representative samples of the opinion of the public generally or of subsets of the public. The structure and the promotion of the public participation programmed should be designed specifically to obtain comment from interested parties.

Considerable effort should be expended during the programme to avoid participants or agency personnel coming to regard public comments as votes. This reflects the underlying position that a piece of information or an argument relating to achievement or interpretation of the objects of the MPA should be as carefully evaluated if it is made in one written comment as in hundreds.

Despite this, in an operation designed to develop consensus, some guidelines are needed to assess the breadth of opinion. These permit some cautious consideration of the claimed and apparent public support for a particular opinion expressed in a written comment. This should be done qualitatively in order to avoid quantitative rules which could rapidly be abused to create a quasi-voting system.

The system should be designed to ensure that each written comment is taken into account and that the competing views of the various interest groups can be seen in context.

7. **Zoning Plans as a Multiple Management Approach**

Zoning plans may use a combination of a real and other forms of controls. The provisions of the zoning plan should establish purposes for which zones may be used or entered.

A use or purpose of entry may be "of right" - that is any person may undertake that use orpurpose of entry subject to any condition specified in the plan.

A use or purpose of entry may be allowed only after prior notification of the management agency.

A use or purpose of entry maybe allowed only with a permit.

A use or purpose of entry not specified as of right, after notification, or by permit may be allowed by permit under the general category of a use "consistent with the objectives of the zone". Such a general category is needed to avoid the unintended prohibition of uses that were not thought of when the zoning plan was made.

8. Example of Guidelines Used to Make Zoning Decisions

These guidelines have been used in the preparation of zoning plans for several sections of the Great Barrier Reef Marine Park. Each section covers a large area, of the order o f70,000 sqkm. This scale can cause confusion because of the variety of ways in which the term MPA is understood in different parts of the world. Each section of the Great Barrier Reef Marine Park is in effect a large MPA, on a scale associated in a few parts of the world with coastal zone management. However, in the course of zoning, parts of each section become incorporated into highly protected, National Park or Strict Nature Reserve type zones which areas large as MPAs in many parts of the world. The remainder of each Section is zoned for a range of multiple use, including commercial fishing, mariculture and tourism. These guidelines maybe adapted for use wherever zoning of MPAs of any size is appropriate. However, in zoning a small MPA which is surrounded by areas managed for sustainable use, the need to provide for commercial and recreational activities may not exist. Experience has shown that when these guidelines are followed, conflict with users is minimized and the over-riding objective of conservation of the natural qualities of the MPAis achieved. The listing here is slightly modified to remove or adapt guidelines that are quite specific to the socio-political environment of the Great Barrier Reef.

General, Legislative and Management Requirements

1. The zoning plan should be as simple as practicable.

2. The plan should minimize the regulation of, and interference in, human activities, consistent with meeting the goal of providing for protection, restoration, wise use, understanding and enjoyment of the MPA in perpetuity.

3. As far as practicable, the plan should maximize consistency with existing zoning plans in the country's other MPAs in terms of zone types and provisions.

4. As far as practicable, the pattern of zones within the MPA should avoid sudden transitions from highly protected areas to areas of relatively little protection. The concept of buffering should be applied so that highly protected zones are generally adjacent to, or surrounded by, zones which provide for moderate protection.

5. As far as practicable, single zonings should surround areas with a discrete geographic description, e.g. an island or reef.

6. As far as practicable, zoning boundaries should be consistent and where possible should be described by geographical features (based on line of sight to aid identification in the field).

7. As far as practicable zoning plans should complement current regulations and management practices under State and Federal legislation.

Conservation of Significant Habitat

1. As far as practicable, areas of world, regional or local significance to threatened species (for example, dugong, whales, turtles, crocodiles) should be given appropriate protective zoning.
2. As far as practicable, where significant breeding or nursery sites can be identified, particularly for species subjected to harvesting, these should be provided with Marine National Park or Preservation zoning, or by appropriate Seasonal Closure or Replenishment Area designation; that is, given a high degree of protection on either a permanent or seasonal basis.

3. As far as practicable, representative samples of characteristic habitat types should be included in either Marine National Park or Preservation Zones.

4. As far as practicable, protective zoning should be applied to incorporate a wide range of habitat types within one unit (e.g. reef/shoal complexes).

5. Reefs and other areas adjacent to coastal settlements and/or popular departure points are often the focus of fishing and related activities. As far as practicable, a group of Replenishment Areas (areas closed for set periods to enable fish and other exploited resources to regenerate) should be declared within the same general area to ensure future fishing stocks.

National Parks, Reserves and Historic Shipwrecks

. As far as practicable, zoning of reefs and waters adjacent to existing National Parks, fisheries reserves and Historic Shipwrecks should complement the objectives of those reserves.

Commercial and Recreational Activities

1. As a general rule areas recognized and/or used for reasonable extractive activities (uses that involve taking any animal, plant or object away) should be given General Use zoning.

2. As a general rule areas of significance for non-extractive activities should be given Marine National Park zoning.

3. When a reef or reefs are zoned in a way which excludes a particular activity, provision should be made, in as many cases as possible, for access to alternative areas.

Traditional Hunting and Fishing

Where there is a continuing tradition of hunting or fishing by local inhabitants using appropriate methods for subsistence or cultural reasons, this should be addressed in the plan. Where target species are endangered or very scarce, it may be necessary to restrict or exclude such traditional use. Nevertheless, as far as practicable, provision should be

made for traditional hunting and fishing by indigenous people in protected areas.

Anchorages

Zoning of major anchorage sites should allow most of the activities associated with overnight or longer anchoring of vessels to continue. The zoning for anchorages should not result in the multiple zoning of a single island/reef unit simply because an anchorage is present. The plan should retain access for small boats to important all weather anchorages. Access to all zones during emergency conditions is always allowed. Ideally, in sensitive and potentially heavily used areas such as coral reefs, the need for anchoring should be removed by the provision of moorings and a requirement that these should be used.

Shipping

The plan must not impede the access of international, interstate or intra-state shipping to recognized or proposed shipping routes or to existing ports on the coast. Nor should it impede access to potential ports.

Defence Areas

. The plan must recognize defence requirements, particularly with regard to gazetted defence areas.

Scientific Research

provision should be made for the conduct of scientific research throughout the MPA. However, reefs should only be zoned exclusively for scientific research where existing and probable future research programmed indicate that they are likely to be used for that purpose on a frequent and regular basis. In general, proclamation of Reef Research Areas (small areas on or around a reef in which permitted research maybe conducted undisturbed) should meet the needs of the scientific community.

APPENDIX 6

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APPENDIX 7

ABBREVIATIONS AND ACRONYMS

ACIUCN: Australian Committee for IUCN

Brundtland Commission's Report: Report of the World Commission on Environment and Development: "Our Common Future".

CEP: (IUCN'S) Commission on Environmental Policy

CNPPA: (IUCN'S) Commission on National Parks and Protected Areas

COE: (IUCN'S) Commission on Ecology

FAO: Food and Agricultural Organization of the United Nations

IMO: International Maritime Organization

IUCN: International Union for the Conservation of Nature and Natural Resources (now the World Conservation Union)

IWC: International Whaling Commission

MAB: UNESCO's Man and the Biosphere Programme

MPA: Marine Protected Area (including estuarine protected areas).

UNEP: United Nations Environment Programme

UNESCO: United Nations Educational, Scientific and Cultural Organization

WCED: World Commission on Environment and Development

WWF: World Wildlife Fund (now World Wide Fund for Nature)