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Cover photo: Diver watching a snapper Pagrus auratus *at Goat Island, within the Leigh Marine Reserve of New Zealand. Snappers have benefited from protection in the reserve and are now numerous.* Photo: Roger Grace.

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Editorial – lessons from marine protected areas around the world

GRAEME KELLEHER AND CHERI RECCHIA

THIS ISSUE of *PARKS* is meant to be different to the 'normal' issues in several ways. People interested in the sea are rarely able to monopolise an edition of any publication that is read by many people with diverse interests, not only those with primarily marine backgrounds. Such a rare opportunity occurs in this issue of *PARKS*. Our aim is to take maximum advantage of it.

This issue constitutes a kind of guideline which we hope will continue to be useful as a reference for some considerable time. It seeks to define the lessons learned in many MPAs with particular reference to two principal focal areas:
1. the application in practice of the IUCN/WCPA protected area categories to marine protected areas (MPAs): the suitability of those categories and the objectives on which they are based, the ease and difficulty of establishing and managing MPAs in each category and the benefits that can be derived from the various types; and
2. an evaluation of the contributions which the various categories of MPA can make to sustainable fishing, as well as to biological diversity.

In reading this issue, it is good to remember the definition of a marine protected area adopted by the IUCN. An MPA 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 or other effective means to protect part or all of the enclosed environment."** This definition is deliberately wide, because it was recognised that any level or type of protection is likely to contribute to IUCN's primary objectives.

The primary goal of IUCN's marine programme adopted in various General Assemblies 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."**

The papers in this issue have deliberately been drawn from different biogeographic and sociopolitical areas, to illustrate the different circumstances which prevail and the approaches that have been shown to be successful generally, as well as the difficulties that are commonly faced. We recommend that anyone wishing to gain as much as possible from this issue should read all the papers – they all contain elements of experience which are likely to be met in establishing an MPA in any biogeographic or socioeconomic area, regardless of the Category of Protected Area that best fits.

There are lessons that appear to be universal.

- Almost all MPAs contribute to the maintenance or restitution of both biological diversity and abundance, both of which are relevant to sustainable fisheries.

- It is not feasible in today's marine environment to divorce the questions of resource use and conservation, because marine natural resources and their living space are all sought now by many different users for many different purposes.
- The tendency in some areas to oppose the recognition of fishery reserves as MPAs seems to be counterproductive, inhibiting cooperation between fishers and environmentalists in creating and managing MPAs.
- There has been a long history in almost all areas of the world of conflict and lack of cooperation between environmental and fisheries management agencies. This lack of joint action inhibits progress in establishing MPAs and managing them wherever it is manifest. Individual MPAs and systems plans should be designed to serve both sustainable use and environmental protection objectives, and relevant agencies should work together in planning and management.
- Local people must be deeply involved from the earliest possible stage in any MPA that is to succeed. This involvement should extend to them receiving clearly identifiable benefits from the MPA.
- Socioeconomic considerations usually determine the success or failure of MPAs. In addition to biophysical factors, these considerations should be addressed from the outset in identifying sites for MPAs, and in selecting and managing them.
- It is better to have an MPA which is not ideal in an ecological sense but which meets the primary objective than to strive vainly to create the 'perfect MPA'.
- It is usually a mistake to postpone action on the establishment of an MPA because biophysical information is incomplete. There will usually be sufficient information to indicate whether the MPA is justified ecologically and to set reasonable boundaries.
- Design and management of MPAs must be both top-down and bottom-up.
- An MPA must have clearly defined objectives against which its performance is regularly checked, and a monitoring programme to assess management effectiveness. Management should be adaptive, meaning that it is periodically reviewed and revised as dictated by the results of monitoring.
- There is a global debate about the relevant merits of small, highly protected MPAs and large, multiple use MPAs. Much of this dispute arises from the misconception that it must be one or the other. In fact, nearly all large, multiple use MPAs encapsulate highly protected zones, which can function in the same way as individual highly protected MPAs. Conversely, a small, highly protected MPA in a larger area subject to integrated management can be as effective as a large, multiple use MPA.
- Because of the highly connected nature of the sea, which efficiently transmits substances and forcing factors, an MPA will rarely succeed unless it is embedded in, or is so large that it constitutes, an integrated ecosystem management regime.

There are other lessons which, although not explicitly referred to in the case studies, can be drawn from the experience with these and other MPAs. For example, MPAs are still often viewed as measures of last resort, used only to protect critically endangered stocks or species or to protect especially beautiful or appealing areas. While these are certainly valid objectives for MPAs, their fundamental role as a common-sense and flexible tool for providing holistic protection to marine species, habitats and ecological processes needs broader recognition. Because of the often slow recovery times of damaged ecosystems and the difficulty of excluding well-established human uses from an area, it is in principle a mistake to demand proof of serious habitat degradation or stock collapse before establishing an MPA or restricting destructive human activities within it.

Our conclusion regarding the applicability of the protected area categories to the sea is that there will be an almost infinite range of objectives for MPAs which will preclude any categorisation scheme from perfectly fitting every MPA. Nothing we have seen suggests that this 'problem' is more inherent or apparent in MPAs than in terrestrial PAs. The categories are judged to be generally applicable and are useful in emphasising the **objectives** of the MPA as the principal factor in deciding on a category, and in providing a framework in which the degree of attainment of these objectives can be used as the main measure of the success of an MPA. However, we do recommend an elaboration of the classification scheme, to indicate different types of zones occurring within MPAs in parentheses, following the principal classification. Thus, the Great Barrier Reef Marine Park should be classified as VI(Ia,Ib,II,III,IV), to indicate both the appropriate categorisation of the entire area as well as the various zones within. Finally, we believe the category scheme to be fully compatible with fisheries reserves.

We are very grateful for the contributions made by the authors, who are without exception very busy people. The papers in this edition represent a valuable range of experiences which can guide all of us in our future endeavours to protect the world's oceans, from which all life originated and to which almost all the products of life eventually return. We believe this is a good time to be working on MPAs – global attention on, and support for, MPAs is higher than it has ever been and is growing rapidly (for example, see the article on financing of MPAs by the Global Environment Facility). While the task ahead remains substantial, the prospects have in many ways never been brighter. Thus we hope that readers will find this special issue of *PARKS* not only informative, but encouraging, as we did.

Application of IUCN/WCPA protected area categories

In applying the six categories defined in *Guidelines for Protected Area Management Categories* (IUCN 1994), it is important to recognise that the principal criteria should be the objectives of the particular protected area and their relevance to the objectives of each category as set out in the *Guidelines*. Space does not permit us to repeat the objectives here, but as an initial indication we set out below the formal definition of each category. It should be recognised that, on both land and sea, some protected areas will not fit exactly into any category and that sometimes one or more categories nest within others. [*Source: IUCN. 1994*. Guidelines for Protected Area Management Categories. *CNPPA with the assistance of WCMC. IUCN, Gland, Switzerland, and Cambridge, UK. x + 261 pp*.]

CATEGORY I: Strict Nature Reserve/Wilderness Area: protected area managed mainly for science or wilderness protection

CATEGORY Ia: Strict Nature Reserve: protected area managed mainly for science – definition: Area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring.

CATEGORY Ib: Wilderness Area: protected area managed mainly for wilderness protection – definition: Large area of unmodified or slightly modified land, and/or sea, retaining its natural character and influence, without permanent or significant habitation, protected and managed so as to preserve its natural condition.

CATEGORY II National Park: protected area managed mainly for ecosystem protection and recreation

Definition: Natural area of land and/or sea, designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.

CATEGORY III: Natural Monument: protected area managed mainly for conservation of specific natural features

Definition: Area containing one, or more, specific natural or natural/cultural features which is of outstanding or unique value because of its inherent rarity, representative or aesthetic qualities or cultural significance.

CATEGORY IV: Habitat/Species Management Area: protected area managed mainly for conservation through management intervention

Definition: Area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats and/or to meet the requirements of specific species.

CATEGORY V: Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation

Definition: Area of land, with coast and sea as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, ecological and/or cultural value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area.

CATEGORY VI: Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems

Definition: Area containing predominantly unmodified natural systems, managed to ensure long term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs.

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Leigh Marine Reserve, New Zealand

KATHERINE WALLS

New Zealand has a coastline of more than 15,000 km and an Exclusive Economic Zone of 4.8 million km², extending between latitudes 26°S and 56°S. The combination of physical conditions and geographic isolation has contributed to a rich diversity of marine flora and fauna, including many endemic species. Fourteen marine reserves have been established since enabling legislation was passed in 1971. Further proposals await final approval.

The Leigh Marine Reserve, gazetted in 1975, is New Zealand's first marine reserve. Its history, from proposal to popular marine reserve, together with the lessons learned in planning and management, are outlined in this case study. The contribution of the reserve to protecting biological diversity and benefiting the community is considered. Finally, the IUCN categorisation is assessed.

NEW ZEALAND has a coastline of more than 15,000 km and an Exclusive Economic Zone (EEZ) of 4.8 million km² extending between latitudes 26°S and 56°S. The coast is varied, comprising rocky shores, cliffs, harbours, sheltered and exposed beaches, fiords and bays. The combination of physical conditions, latitudinal extent and geographic isolation has contributed to a rich and varied marine flora and fauna, including many endemic species.

The legislation implemented to establish marine reserves is the Marine Reserves Act 1971. Marine reserves are areas of the foreshore, sea and seabed within the Territorial Sea (12 nautical miles from shore) which are established for scientific study of marine life in its natural habitat and protected from harvesting. There is no comparable legislation to protect marine areas further offshore.

Fourteen marine reserves have been established as of May 1998, 12 during the 1990s. A further six proposals await final approval and other proposals are at various stages of development. All generally fit the IUCN Protected Area Category Ia (Strict Nature Reserve), as protected areas managed mainly for science, although there are departures from some of the management objectives, as discussed below.

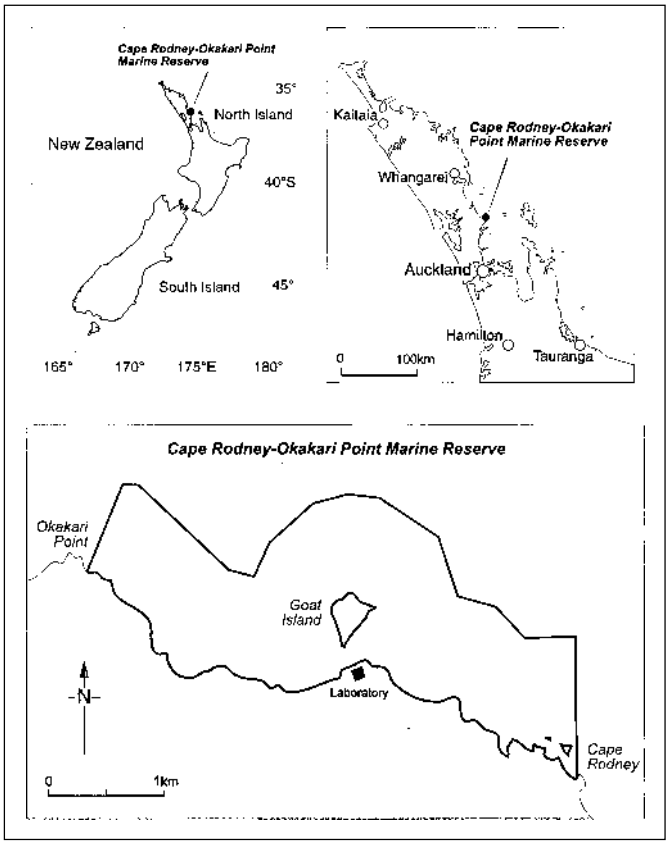
The Department of Conservation is responsible for marine reserves and aims to establish a national network of marine reserves which incorporates a full set of complementary sites representing a range of marine communities.

The Cape Rodney-Okakari Point Marine Reserve, located near the township of Leigh (northern New Zealand) and referred to as the "Leigh Marine Reserve", has been selected as a case study. It was New Zealand's first marine reserve and was gazetted in 1975. The lessons learned from this reserve have been used to assist with establishing further reserves.

History of Leigh Marine Reserve

The history of the Leigh Marine Reserve involved a small group of people who used both vision and tenacity to overcome the odds and ensure that an important area of the marine environment received protection (Ballantine 1991).

The University of Auckland established a marine laboratory on the coast near the township of Leigh in the early 1960s. The coast is predominantly rocky with a bay,



Location of Cape Rodney-Okakari Point Marine Reserve (= Leigh Marine Reserve) and the university marine laboratory.

beach and small island, all exposed to the north and east. It is typical of the outer Hauraki Gulf. During the late 1950s, the area had become popular with spearfishers who travelled from Auckland, New Zealand's largest city some 100 km to the south. In 1965, the committee managing the laboratory became concerned at the level of harvesting on the shores and shallow subtidal habitats, and the effect this might have on scientific research. The committee considered that a reserve would protect the research programmes and requested that the [former] Marine Department protect the area.

Unfortunately, no suitable legislation existed at that time and the Department did not consider it timely to create legislation to protect marine areas. In response, the laboratory's scientists went to considerable effort to advocate for empowering legislation to protect marine areas and for a reserve at Leigh. They held courses for divers and consulted with local commercial fishers and landowners during 1965 and 1966. They also went to schools and clubs and held public meetings to obtain public support for marine reserves legislation. The New Zealand Underwater Association supported the reserve proposal because many of the divers had witnessed the rapid and severe decline of marine life in the area since the late 1950s. The New Zealand Marine Sciences Society also supported the proposal. The Marine Reserves Act was eventually passed in 1971.

The new legislation provided the vehicle for a marine reserve at Leigh and the university laboratory committee submitted a proposal to the Marine Department within a year. However, the proposal was referred back for further consultation and this was duly carried out with support slowly but steadily increasing. There was already increased awareness of the proposal among the public because of the earlier consultation for marine reserves legislation. The proposal was resubmitted in 1973, publicly notified and submissions invited. Records show that a small number of objections and submissions of support were received. In reply to the objections the university wrote:

"It is to be noted: (i) that many of them are based on misconceptions of either the Act, or of the University's powers and intentions; (ii) that most objectors assume that the natural resources of the area will remain undiminished in the face of continued uncontrolled exploitation, when in fact a rapidly spreading decline in these resources is clearly observable; (iii) that although a large body of the public now realises the positive public benefits that would arise from a reserve, virtually all the objectors still assume that the reserve will 'restrict' public enjoyment."

It was not until 1975 that a gazette notice was published declaring the area a marine reserve. A further two years passed before a management committee was formed and the reserve officially opened in 1977.

Bill Ballantine, who worked with the other scientists to propose the reserve, sees the passage of the proposal through to a gazetted marine reserve as a sequence of bureaucratic delays and political agendas which eventually worked in favour of the reserve being established. He recently said of the Leigh Marine Reserve: "The process that led to New Zealand's first marine reserve did not start with a clear plan or final aim, but developed through a series of fortunate accidents to produce the final result" (Ballantine pers. comm. 1998).

The Leigh Marine Reserve paved the way for 13 others and more are expected. Later, I will identify some of the lessons learned from this first reserve.

The years following reserve establishment

Initially, public interest in the new marine reserve was low, with the main activity being research. The location of the marine laboratory in relation to the reserve was ideal, being approximately 100 m from the most accessible part of the reserve.

However, numbers of visitors to the reserve began to increase and a 1984 survey estimated that 14,000 people visited the reserve over the summer. Throughout the 1980s, numbers soared as tales of rocklobster *Jasus edwardsii*, snapper *Pagrus auratus* and red moki *Cheilodactylus spectabilis* in large numbers and easily visible to divers and snorkellers began to spread. Dive clubs and dive schools began to focus their training on the reserve. Many came just to picnic and swim.

Numbers of visitors continue to increase in the 1990s. A 1993/1994 survey estimated over 100,000 visitors in that year. Several local businesses opened to capture the potential market. SCUBA filling stations, snorkel equipment hire, cafes, a marine education centre, a camping ground and a glass-bottom boat operation have become established over the past few years.

During 1985/1986 commercial rocklobster fishers began setting pots on the seaward reserve boundary. Anecdotal reports told of very high initial catches with pots full of large males and several clinging to the outside of the pots (Kelly *et al.* 1997). They followed tagged reserve rocklobsters and concluded that the reserve enhanced the local fishery. The fishery continues to target the reserve boundaries and takes a significant number of rocklobsters.

The marine life has responded dramatically to protection. Cole *et al.* (1990) studied reef fish and large invertebrates in the reserve between 1976 and 1988. The abundance of red moki had increased, there was a striking increase in rocklobster numbers and an obvious trend in increased snapper size. MacDiarmid and Breen (1993) investigated rocklobster populations in the reserve and compared these to populations in similar, but fished, habitats. They found that both the density and mean size of rocklobsters in the reserve increased substantially in the first few years after the reserve was established.

A socioeconomic study of the reserve showed that residents of the nearby township believed the community would be worse off economically if the reserve did not exist (Cocklin and Flood 1992). Cash injected into the local economy by visitors to the reserve was mainly from the purchase of food and beverages.

The Department of Conservation was established in 1987 and assumed management responsibility for the reserve. It has addressed a wide range of issues resulting from

the popularity of the reserve with the public. Car-parks, toilets and information signs have been upgraded. Law enforcement is an ongoing requirement because, although the majority of the public respects the reserve's no-take rule, a minority poach the abundant rocklobsters and fish. The local commercial fishers have assisted with enforcement by providing information to the Department on illegal activities.

Notwithstanding the fact that the reserve was established to assist research on marine life unimpacted by harvesting, the original purpose has been overtaken by the immense popularity of the area among the public. The only access point to the reserve can become very busy as snorkellers and divers flock to observe the abundant fishes and rocklobsters close to shore during weekends and public holidays. The behaviour of some fish, snapper and blue cod *Parapercis colias* in particular, has become modified in this area because fish feeding is popular. However, the feeding occurs only at this one location which is less than 5% of the area of the reserve and scientific research is carried out away from this intensively used site.

The Department has completed a management plan for the reserve which addresses issues such as biological and visitor monitoring, research, cooperation with the laboratory, public awareness, education and *tangata whenua* (indigenous people) history and cultural values. Plan preparation involved a public participation process.

Lessons learned

The lessons learned from the Leigh Marine Reserve are integral to the successful establishment of other marine reserves and include the following.

Consultation

Consultation with the local community, stakeholders, interest groups and the public well in advance of a formal proposal being made is vital to the successful establishment of a marine reserve. Early consultation enables misunderstandings or misconceptions about the reserve to be cleared and a sense of community involvement in the process fostered. However, the Leigh Marine Reserve experience and subsequent marine reserves show that complete agreement is unlikely to be achieved when there are so many interests involved. The degree of support or opposition to a particular proposal is most important and this is assessed later in the process by the Minister of Conservation.

Changing attitudes

Interestingly, it would appear that after a reserve has been gazetted, support increases quickly. It is now difficult to find anybody who objects to the Leigh Marine Reserve, yet 17 objections were received on the application in 1973. Changing attitudes among objectors have also been observed for other reserves (e.g. Craw and Cocklin 1997)

Role of tangata whenua *(indigenous Maori people)*

Recognition of the role of *tangata whenua* has resulted in a significant change to consultation style since the Leigh Marine Reserve was established. In the early 1970s the local *iwi* (tribe) was not specifically consulted over the reserve proposal, although prominent leaders and other individuals who were Maori supported the reserve. New Zealand is now far more aware of its obligations to indigenous people under the principles of the Treaty of Waitangi, and local *iwi* are specifically consulted on particular reserve proposals at the early stages of proposal development.

Public support

The delay in opening the Leigh Marine Reserve may have contributed to a poor awareness of and appreciation for the reserve, initially. The Department of Conservation considers it important that reserves are formally opened as soon as possible after gazettal. This raises awareness of the reserve early on and assists with enforcement. Most reserves established since 1990 have been formally opened and *tangata whenua*, community leaders, the public and government officials are involved.

The Leigh Marine Reserve was proposed by the University of Auckland. The marine reserves legislation enables non-government groups to make formal proposals, as well as the Department of Conservation. This provision has increased the level of public participation in the marine reserve process with seven proposals made by non-government groups. Once a marine reserve is established, a committee can be formed comprising individuals and representatives of local *iwi*, the community, scientists and stakeholders. Non-departmental individuals may also assist with law enforcement as honorary rangers.

Research

Creese and Jeffs (1993) summarised the research conducted in the Leigh Marine Reserve between 1975 and 1991. They found that the reserve provided significant opportunities for scientific research. The close proximity of the laboratory to the reserve facilitated research on ecological interactions, particularly for commercially exploited species. The research has benefited from being in an experimental 'control' situation.

The results of research in the Leigh Marine Reserve, in particular the work on rocklobster and reef fishes, are used to promote the establishment of reserves elsewhere. Because of the scientific focus of the legislation, research is encouraged in all marine reserves.

Reserve boundaries and size

The Leigh Marine Reserve is 518 ha in area and extends 800 m from shore. New Zealand's marine reserves vary in size from the very large Kermadec Islands (748,000 ha) to Fiordland's Te Awaatu Channel (93 ha). Most reserves are in the range of 500–800 ha. Research by Kelly *et al*. (1997) suggests the rocklobster population of Leigh Marine Reserve shows distorted size and sex ratios through the impact of the local fishery. Large males move beyond the reserve to feed on bivalves in deeper waters and some are captured in rocklobster pots before returning to their dens in the reserve. Research is now focusing on the issue of critical size of marine reserves to ensure that new reserves are of sufficient size that the biodiversity of the area receives adequate protection. Needless to say, it is usually social and political decisions which ultimately determine the size of a particular reserve.

Management

The Leigh Marine Reserve is a no-take reserve, as with the other reserves in New Zealand. Although the no-take policy results in many reserves being relatively small to ensure the community is not adversely affected, the long-term goal of a network of complementary marine reserves will assist with protection of biological diversity. The no-take rule is simple to enforce because nobody may take marine life unless by permit, the latter being for the purposes of research.

Adequate public facilities, law enforcement and education need to be provided in marine reserves. Such management is most appropriately coordinated by an agency such as the Department of Conservation. However, it is important that the community continues to be involved in the reserve through participation in committees, management and planning.

Application of IUCN protected area management category: Category Ia

The Leigh Marine Reserve was established primarily for scientific purposes (as stated in the Marine Reserves Act 1971). However, the right of New Zealanders to access the coastal marine area was preserved in the Act. Although regulations exist to close areas in marine reserves from the public, these regulations have never been exercised and access for viewing marine life is essentially unrestricted. This is a departure from one of the objectives of Category Ia which provides for limiting public access. The Leigh Marine Reserve is probably intermediate between Categories Ia and II.

Initially, research was the main activity in the Leigh Marine Reserve. This has now changed to include a variety of no-take visitor activities. Would the public have supported the Leigh Marine Reserve if they had not been allowed to participate in the success of protection? Through my experience with the other marine reserves in New Zealand, I believe the public would not have supported them if access had been prohibited. For the Leigh Marine Reserve it is a matter of balancing both research and public activities through acknowledging and providing for each group's needs. Ultimately, it is the research subjects themselves (i.e. the marine life) which have benefited from protection.

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A network of small, community-owned village fish reserves in Samoa

MICHAEL KING AND UETA FAASILI

Under a community-based fisheries extension programme in Samoa, 44 coastal villages have developed their own Village Fisheries Management Plans. Each plan sets out the resource management and conservation undertakings of the community, and the servicing and technical support required from the government Fisheries Division. Community undertakings range from enforcing laws banning destructive fishing methods to protecting critical habitats such as mangrove areas. An unexpectedly large number of villages (38) chose to establish small Village Fish Reserves in part of their traditional fishing areas. Although by social necessity many of the community-owned reserves are small, their large number, often with small separating distances, forms a network of fish refuges. Such a network may maximise linking of larval sources and suitable settlement areas and provide the means by which adjacent fishing areas are eventually replenished with marine species through reproduction and migration. As the Fish Reserves are being managed by communities which have a direct interest in their continuation and success, prospects for continuing compliance and commitment appear high. Results confirm our belief that the responsible management of marine resources will be achieved only when fishing communities themselves accept it as their responsibility.

IN MANY countries in the tropics, inshore catches of fish and shellfish are in decline. In the Pacific Island of Samoa, catches of seafood from lagoons and inshore reefs have been decreasing for over ten years (Horsman and Mulipola 1995). Reasons for this decline include over-exploitation, the use of destructive fishing methods (including explosives, chemicals and traditional plant-derived poisons) and environmental disturbances.

Despite concerns over declining fish stocks, government actions and national laws to protect fish stocks are rarely successful. This is due to many factors, including poor enforcement regimes and particularly the lack of community involvement. Fishing communities are often repositories of valuable traditional knowledge concerning fish stocks, and have a high level of awareness of the marine environment (Johannes 1982). In addition, many subsistence fishers in tropical regions live in discrete communities that have some degree of control, either legal or traditional, of adjacent waters. Together, these factors provide an ideal basis on which communities can be encouraged and motivated to manage their own marine resources.

The extension project

The community-based fisheries extension project began in 1995. After staff training, a culturally acceptable extension process was developed which recognised the village *fono* (council) as the prime instigator of change, while still allowing ample opportunities for the wider community to participate (Figure 1; see also King and Faasili in press). Full field operations began in 1996.

Following an indication of interest, a village *fono* meeting was arranged to provide the community with information to allow either acceptance or refusal of the

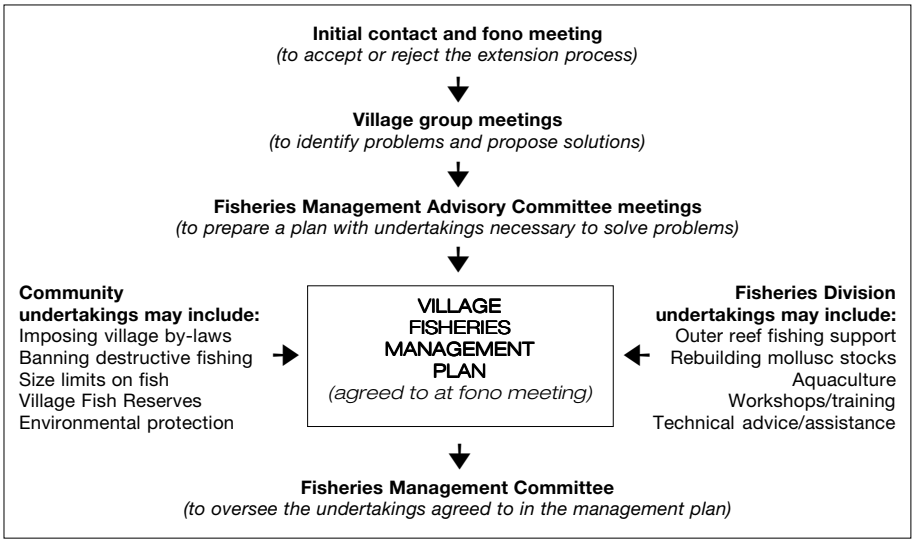

Figure 1. *The community-based fisheries extension process in Samoan villages.*

extension programme. If the *fono* accepted, it was then asked to arrange for meetings of several village groups, including women and untitled men (*aumaga*).

Over a series of meetings, each group held separate meetings to discuss their marine environment and fish stocks, decide on key problems, determine causes, propose solutions, and plan remedial actions. Problem/solution trees were recorded on a portable whiteboard by a trained facilitator. Finally, a village Fisheries Management Advisory Committee was formed, with three people nominated from each group, to prepare a draft Village Fisheries Management Plan (assisted by Extension Officers) for discussion and approval by the village *fono.* One third of all village group meetings were for women only, and approximately one third of members of the management committees were women. The proportions for untitled village men were similar.

Each Village Fisheries Management Plan listed the resource management and conservation undertakings of the community, and the servicing and technical support required from the Fisheries Division. If the plan was accepted, the *fono* then appointed a Fisheries Management Committee to oversee the working of the plan.

Results of the extension project

Within almost two years of full operation, fisheries extension staff attempted to introduce the extension programme in 65 villages. The extension process was rejected by nine villages and discontinued in a further four villages when extension staff noted a lack of community commitment (King and Faasili in press). Forty-four of the remaining villages have produced Village Fisheries Management Plans so far. The time taken from initial contact to approval of the plan by each village community averaged 13.4 weeks.

In their plans, communities included undertakings to support and enforce government laws banning the use of chemicals and explosives to kill fish. Traditional destructive fishing methods such as the use of plant-derived fish poisons (*ava niukini*) and smashing of coral to catch sheltering fish (*fa'amo'a* and *tuiga*) were also banned. Most villages made their own rules to enforce national laws banning the

capture of fish less than a minimum size, and some set their own (larger) minimum size limits. Some villages placed controls on the use of nets and the use of underwater torches for spearfishing at night. Community conservation measures included collecting crown-of-thorns starfish *Acanthaster planci* (L.) and banning the removal of beach sand and dumping of rubbish in lagoon waters. An unexpectedly large number of villages (38) chose to establish their own small Village Fish Reserves, closed to all fishing, in part of their traditional fishing area. The size of reserves ranged from 5,000 to 175,000 m^2.

Fisheries Division actions to support community undertakings included the provision of assistance with the farming of tilapia *Oreochromis niloticus* in freshwater (in 16% of villages), in facilitating the purchase of medium-sized boats to allow community members to fish outside the lagoons (39%), and the restocking of giant clams *Tridacna derasa* in Village Fish Reserves (82%).

Giant clams have been heavily depleted in Samoa and ongoing attempts to breed from native species *(Tridacna squamosa* and *T. maxima*) have been hampered by the difficulty of finding sufficient numbers of large animals in the wild. Large numbers of a related species (*T. derasa*) were imported from American Samoa to fill the vacant ecological niche (for a photosynthesising filter-feeder). After a quarantine period, these were placed in village reserves to be monitored and cared for by communities. These translocations were regarded as low risk, involving hatchery-raised clams from an adjacent island, which is geographically, if not politically, the same country [(1)].

A quantitative assessment of villages with Fisheries Management Plans in place for over six months revealed that all but eight were still actively pursuing undertakings and enforcing conservation rules included in their plans. Villages received low scores for various reasons including holding few village Fisheries Management Committee meetings, not enforcing village rules, failing to care for restocked clams and poorly maintaining their reserve signs and markers.

Discussion

Community-owned Fish Reserves may be discussed in terms of expected benefits to both villages and government. The community expectation is that, by banning fishing in part of its traditional fishing area, fish catches in adjacent areas will eventually improve. Although government authorities may share this expectation, there are additional public benefits relating to management, compliance, and sustainability and conservation of biodiversity.

As the Samoan Village Fish Reserves are being managed by communities with a direct interest in their success, compliance with bans on fishing is high and there are not the enforcement costs associated with national reserves. Most villages with reserves have actively enforced their own rules, and applied often severe penalties, including traditional fines of pigs or canned goods, for infringements. Some villages have made their village rules into fisheries by-laws in order that these can be applied to people from other villages (Faasili 1997). Community enthusiasm and commitment suggests that the prospects for continuity of the reserves are high.

[(1)]: Editors' note: *T. derasa* was introduced to American Samoa in the mid-1980s. A major source of larvae is the Micronesian Mariculture Demonstration Centre in Palau. (Source: Wells, S.M. 1997. *Giant clams: status, trade and mariculture, and the role of CITES in management*. IUCN, Gland, Switzerland, and Cambridge, UK.) *T. derasa*, along with all other tridacnid species, is listed on Appendix II of CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora).

The fisheries management benefits of marine protected areas are usually stated in terms of providing refuges in which invertebrate and fish stocks can grow and reproduce without interference. There is evidence that fish biomass increases, rapidly for some species, in areas where fishing is excluded (e.g. Roberts 1995), and some evidence that this increase will result in higher catches in adjacent fishing areas (Roberts and Polunin 1991, Alcala and Russ 1990). Fish larvae, previously thought of as passive drifters, may be able to detect the presence of, and swim towards, reefs several kilometres away (Wolanski *et al.* 1997). This suggests that refuge-derived larvae may actively move to, and repopulate, nearby reefs. Alternatively, if larvae settle in the same area in which they were spawned, juvenile or adult fish may eventually move out of refuges in response to increased crowding and competition. Tagging studies in South Africa suggest that excess stocks of fish in reserves move to adjacent exploited areas (Attwood and Bennett 1994).

Ideally, a reserve should be located in such a position, and be of sufficient size, to encourage a significant increase in the numbers of sedentary species (including corals) and fish stocks, thus also contributing to conserving biodiversity. However, in the case of village-ownership there are often constraints on both position and size.

In Samoa, when a village had proposed a reserve in an unsuitable position (e.g. an area of bare sand or coral rubble), additional scientific information was provided to encourage the community to select a more appropriate site. Some villages initially elected to have very large reserves and a few wanted to ban fishing in their entire lagoon area. In such cases, extension staff were obliged to curb over-enthusiasm, and ask the community to balance the perceived fish production advantages of a large reserve against the sociological disadvantages of banning fishing in a large proportion of the village's fishing area. In the latter case, although young men would still be able to go fishing beyond the reef, women (who traditionally collect echinoderms and molluscs in subtidal areas) and the elderly would be particularly disadvantaged in losing access to shallow-water fishing areas. A large reserve may also force people to fish in the waters of neighbouring villages, thereby increasing the potential for inter-village conflict.

Participants at a village meeting in Samoa. Community meetings such as this have resulted in many villages establishing their own community-owned fish reserves. Photo: Samoa Fisheries Extension and Training Project.

In terms of total fisheries production (and conservation of biodiversity), a small reserve is unlikely to be as effective as a large one. Larger reserves are more likely to provide suitable breeding areas for small inshore pelagic fish such as mullets and scads, but studies in South Africa (Buxton 1996) suggest that even small reserves are beneficial for non-migratory species. Indeed, it could be argued that, for non-migratory species, the combined larval production from many small reserves is likely to be greater than that from a smaller number of large ones.

However, as the interconnections between larval sources and settlement areas are poorly understood, this remains a hypothesis which is not easy to test.

There is currently a proposal to subsume several existing small, single-village Village Fish Reserves within two larger MPAs which would be managed by districts rather than single villages (Kelleher pers. comm. 1998). If these larger MPAs contain some no-fishing areas, as is proposed, it is possible that two large reserves connected via a broken chain of smaller Village Fish Reserves may confer the dual benefits of linking larval sources with settlement areas and providing larger breeding areas for inshore migratory species.

In addition to the availability of people-motivating skills, the success or otherwise of community-based fisheries management depends on the availability of professional technical support for the communities involved. Scientific input is required to assist communities with alternative sources of seafood and to advise on and monitor community actions.

Whether community-based or not, most fisheries conservation measures, including the prevention of destructive fishing and the imposition of fish size limits, will cause a short-term decrease in catches. The same is so for Village Fish Reserves because they reduce the area available for fishing. As most subsistence fishers require seafood for their families on a daily basis, it is unreasonable to expect fishing communities to adopt conservation measures which will initially reduce present catches of seafood even further without offering alternatives. Accordingly, the Samoan extension programme included the promotion and development of alternative sources of seafood to those resulting from the present heavy and destructive exploitation of near-shore reefs and lagoons. These alternatives included the introduction of medium-sized, low-cost boats (to divert fishing pressure to areas immediately beyond the reefs), the promotion of village-level aquaculture and the restocking of depleted species of molluscs in village areas. It is doubtful that community-based fisheries management would continue on a sustainable basis without such ongoing support.

Scientific input is also required to advise on, and monitor the effects of, village actions. For the community-owned Village Fish Reserves, this included providing advice on the placement of reserves, monitoring biological changes within the reserves, and collecting data on fish catches in adjacent areas. An additional benefit of fisheries staff working closely with communities is that the collection of scientific data on subsistence fisheries is greatly facilitated by community involvement. A large amount of information, and even estimates of sustainable yield by area, may be gained from such extensive surveys on subsistence fisheries. Where data are collected from different areas with similar ecological characteristics it may be possible to apply a surplus yield model (over area rather than time) to estimate not only the average sustainable catch, but also indicate villages where resources are presently under pressure (King 1995).

The Samoan model appears applicable to other countries in which fishing communities have either traditional, defacto or legal control over their adjacent waters. In countries where this is not the case, it may be necessary to grant such rights (Territorial Use Rights in Fisheries, or TURFs) as proposed in the Philippines (Agbayani and Siar 1994) to facilitate community management and the establishment of Village Fish Reserves. Indeed, results in Samoa have confirmed our belief that, regardless of legislation or enforcement, the responsible management of marine resources will be achieved only when fishing communities themselves see it as their

responsibility. If community actions include the declaration of even small Fish Reserves, this is likely to contribute to fisheries and biodiversity conservation.

Finally, it should be noted that the small, community-owned, Village Fish Reserves in Samoa are not easy to classify under existing IUCN categories for MPAs. Category IV (Habitat/Species Management Area) appears to provide the best fit, although the category guidelines refer to national rather than community ownership. Given the increasing trend towards community-based management, the popularity of reserves as a fisheries conservation tool and the necessarily small size of village MPAs, there may be a need for another IUCN category for "networks of small, highly protected, community-owned MPAs".

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The Ngerukewid Islands of Palau: 40 years of managing a marine protected area

NOAH T. IDECHONG AND TOM GRAHAM

With its 40-year history as a strict nature conservation area, the Ngerukewid Islands Wildlife Preserve in the Rock Islands of the Republic of Palau is one of the longest-standing protected areas in the Pacific Islands region. Management of the Preserve has been relatively lax throughout most of its history, but enforcement has improved over the last ten years, and the pristine nature of the Preserve appears to have remained largely intact, with disturbances mostly limited to moderate levels of poaching of fishes, marine invertebrates, birds, coconut crabs, and hawksbill sea turtles.

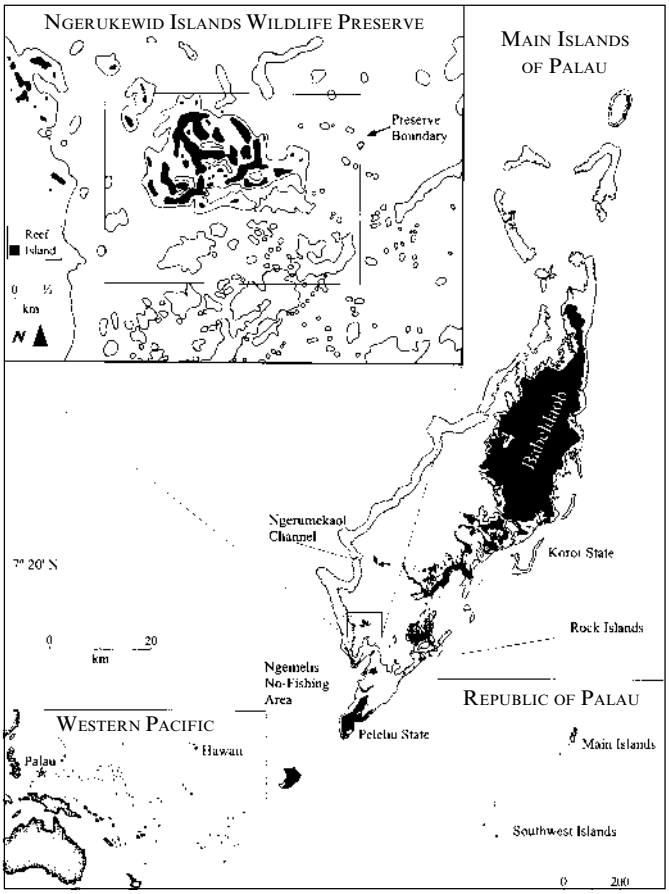
The ecosystems of the Ngerukewid Preserve are representative of the limestone island and lagoon ecosystems of the larger Rock Islands area. Given the exceptional marine biodiversity of Palau and the reasonable success in minimising disturbances and harvest activities in the Preserve, the Preserve has likely made important contributions to both the preservation of biodiversity and the conservation of fisheries resources important for local use. Perhaps just as important as these direct conservation benefits, the Ngerukewid Preserve has yielded indirect benefits, mostly stemming from the government's renewed interest in the Preserve ten years ago. A belated resource survey of the Preserve and subsequent public awareness campaign resulted in a growth in public pride of Palau's environment and spurred a number of initiatives to protect other areas of importance. These recent initiatives have recognised the importance of baseline resource surveys, public awareness building, and long-term monitoring – lessons learned from the Ngerukewid Preserve more than 30 years after its creation.

THE NGERUKEWID Islands of the Republic of Palau are a cluster of steep limestone islands within a complex of similar islands called the Rock Islands. The Rock Islands are spread through a lagoon of about 500 km^2 bounded by a barrier reef system. With its position near the global centre of marine biodiversity and its great variety of marine habitats, Palau and its Rock Islands boast exceptional levels of marine biodiversity. The natural beauty of the Rock Islands – both above and below water – is world-renowned and attracts divers and marine enthusiasts from all over the world.

The Ngerukewid Islands Wildlife Preserve was created in 1956 while Palau was part of the Trust Territory of the Pacific Islands (TTPI), administered since World War II by the United States [(1)]. The Preserve is rectangular in shape and covers 12 km^2, about 1 km^2 of which is the land area of the Ngerukewid Islands. About one-third of the marine area of the Preserve is shallow coral reef; the remainder is sediment-dominated lagoon bottom.

The enabling legislation for the Preserve, not modified since 1956, is brief, declaring a single objective: "the Preserve is henceforth to be retained in its present primitive condition where the natural plant and animal life shall be permitted to develop undisturbed" (24 Palau National Code 3001). The law prohibits the taking and disturbance of any terrestrial or marine life in the Preserve, but does not prohibit entry. The law's objective of preserving the area's wild state was echoed in a management

[(1)] Palau's constitutional government started in 1981 but Palau retained its Trust Territory status until 1994, when it became independent through a "Compact of Free Association" with the United States.



Ngerukewid Islands Wildlife Preserve.

plan for the Preserve drafted in 1989. That plan also emphasised "the importance of protecting the Ngerukewid Islands as a representative example of Palau's natural heritage, in particular that of the Rock Islands" (Thomas *et al.* 1989: 17). In applying the protected area categories of IUCN, the latter objective makes Category III, Natural Monument, a good fit, and the *IUCN Directory of Protected Areas in Oceania* lists Ngerukewid as such (IUCN 1991). The primary objective of the Preserve, however – preserving the area's wild state – fulfils the main criterion for Category I, Strict Nature Reserve/ Wilderness Area.

In 1981, the newly established constitutional government of the Republic of Palau inherited most of the TTPI laws that applied to Palau, including the Ngerukewid Preserve law. It took several years, however, for the new government to organise the institutions necessary to manage the Preserve, and it was not until 1988 that the government undertook a systematic investigation of the value of the Preserve and the best way to manage it. A survey of the marine and terrestrial flora and fauna of the Preserve – the first comprehensive survey ever – was completed in 1988 (Birkeland and Manner 1989) and a management plan was prepared in 1989 (Thomas *et al.* 1989). The management plan was never formally adopted, but its prescription for improved enforcement and public education were both acted on in the ensuing years.

Effects of protection

Effects on human use

The Rock Islands have not been regularly inhabited since well before European contact 200 years ago. Today, the biggest group of users of the Rock Islands is tourists, which visit Palau and the Rock Islands at a rate of about 60,000 per year. They come primarily to dive the barrier reef surrounding Palau's Rock Islands, an activity not available on the shallow reef platform of the Ngerukewid Islands. The most important uses of the Rock Islands by Palauans are boating, camping, and harvesting reef fish, giant clams (Family Tridacnidae), sea turtles *Chelonia mydas* and *Eretmochelys imbricata*, coconut crabs *Birgus latro*, birds, and fruit bats *Pteropus* spp. [(2)]. Ngerukewid

[(2)] Of Palau's 18,000 residents, about 12,000 live in the urban centre of Koror, with relatively easy access to the Rock Islands.

is closed to these activities, but they are available in the neighbouring islands, reefs, and lagoon, and the Ngerukewid Preserve covers only about 2% of the Rock Islands. In short, the Preserve has not required any great sacrifices of any user groups.

The protected status of the Preserve may have resulted in relatively high local abundance of some desired species, but it is not clear to what extent this abundance has motivated poachers to visit the Preserve. The 1989 draft management plan found that "there is evidence that many people visit to poach turtles, take turtle and megapode *Megapodius laperouse* eggs, hunt coconut crabs, take clams and catch fish, sometimes using illegal methods (dynamite and chemicals) for the latter" (Thomas *et al*. 1989: 16). Since the time of that writing, surveillance in the Preserve has intensified significantly, and, incidentally, fishing with dynamite and chlorine bleach has virtually ceased throughout Palau.

Effects on biodiversity

The 1988 resource survey of the Ngerukewid Preserve identified three major marine habitat types: 1) the interior of the shallow reef platform shared by the main Ngerukewid islands, 2) the outer reef flat and slope of the main reef platform, and 3) the patch reefs outside the Ngerukewid platform but within the Preserve.

The survey indicated that the Preserve contained 200 to 300 fish species (Birkeland and Manner 1989), or 15%–20% of the approximately 1,400 species believed to be found in Palau's waters (Myers 1989). The diversity of fishes is limited by the small size of the Preserve and especially by the fact that the Preserve contains only a limited number of marine habitat types. It lacks, for example, the species-rich habitats characteristic of outer reef margins and slopes.

More than 400 species of hard coral from 78 genera have been reported in Palau, making it the most coral-diverse area in Micronesia and Polynesia (Maragos *et al*. 1994). The Ngerukewid survey revealed about 82 species of hard coral from 47 genera (Birkeland and Manner 1989). Again, coral diversity in the Preserve is limited by the lack of variety of habitat types. It was concluded that "the lagoonal coral communities in the Preserve are robust and pristine and constitute a good representation of a typical lagoonal reef of Palau" (Birkeland and Manner 1989: 108).

The pristine condition of the islands and the relative lack of introduced species such as rats, which inhabit most other Rock Islands, led Thomas *et al*. (1989: 26) to observe that "it is unusual to find island groups in the Pacific in such a condition [as Ngerukewid] where the impact of human habitation is not substantial and apparent."

Ngerukewid is largely representative of the habitats of the high limestone islands and surrounding reefs and lagoons of Palau's southern barrier reef system. But lacking a large variety of habitat types, especially those associated with the barrier reef, the Preserve is not particularly biologically diverse compared with the whole of Palau. Because of their protected status, however, and in spite of their low level of management, the Ngerukewid Islands are the least modified of the Rock Islands and have the greatest chance of maintaining their diversity.

Effects on fisheries

The diversity and abundance of fishes in the Preserve have been studied, but the importance of the Preserve in terms of the life histories of fishes has not been investigated. It is not known, for example, how important the area's habitats are as settlement and nursery areas or as spawning sites. Given the area's limited number

of habitat types, the Preserve probably does not provide any exceptional services in these regards. The habitat types of the Preserve are common within Palau's barrier reef. The effects of the Preserve in terms of fish resources and fisheries production are therefore probably limited to those associated with the reduction of mortality on one portion of much larger populations of fishes. The extent of those effects depends on, among other factors, the proportion of the total fish populations that are contained within and interact with the Preserve and the degree to which fishing mortality is reduced in the Preserve. Both are difficult to determine. Recognising that illegal fishing does take place to some degree in the Preserve, it was concluded during the 1988 resource survey that "it is likely that fishing pressure has had only moderate impact on stocks of fishes within the Preserve" (Birkeland and Manner 1989: 114).

The Ngerukewid Preserve is not the only Rock Islands area closed to fishing. The national government also enforces a seasonal fishing ban in Ngerumekaol channel, a narrow cut in the barrier reef not far from Ngerukewid where groupers and other reef fishes are known to aggregate to spawn. The local government of Koror prohibits fishing in the Ngemelis area, a 35-ha area of barrier reef containing Palau's most popular dive sites.

The contributions of the Preserve to fisheries production probably apply equally well to other desired marine species, including giant clams and coconut crabs. But for the endangered hawksbill sea turtle, Ngerukewid plays a special role. The Rock Islands contain Micronesia's most important nesting beaches for the hawksbill. Although the taking of turtles and turtle eggs from beaches is prohibited in Palau, poaching is common. Surveys of Rock Islands beaches have found a high degree of poaching in the Preserve, but have also suggested that the proportion of nests poached in the Preserve is less than outside the Preserve (Guilbeaux *et al.* 1994).

Ngerukewid Islands viewed from the north, with the barrier reef visible in the background. Photo: The Nature Conservancy.

Indirect conservation effects

The lack of environmental monitoring within and outside the Preserve since its creation 40 years ago makes it difficult to assess the direct effects of the Preserve on biodiversity and fisheries. But there have been indirect effects that have resulted in important, if not measurable, impacts on Palau's natural resources.

Following the 1988 resource survey of Ngerukewid, the government undertook an environmental education campaign. Centred around a video that highlighted the values of Ngerukewid, the campaign sparked a still-growing upwelling of public pride in Palau's

environment. The campaign also resulted in the virtually universal knowledge of the Preserve among Palauans and visitors (in fact, it is commonly mistakenly believed that the Preserve is completely off-limits to people, not just to fishing and hunting).

The Ngerukewid resource survey yielded exciting results: the area was found to be both representative of the larger Rock Islands ecosystem and in relatively pristine condition. These findings contributed to the growing sentiment among national leaders that Ngerukewid was worthy of the nominal protection it had long had on paper, and led to the development of an increasingly effective enforcement programme for the Preserve.

The 1988 resource survey also brought home the realisation that Ngerukewid was representative of only a small portion of Palau's diverse marine and terrestrial ecosystems. If Palau was to conserve effectively all those ecosystem types, it would have to pursue protection of additional areas. This realisation contributed to the enactment in 1991 of the Natural Heritage Reserves System Act, a legal framework for establishing a representative system of protected areas [3]. Meanwhile, the government began the groundwork necessary to identify and protect other areas of Palau. A rapid ecological assessment of Palau's marine and coastal areas, completed in 1992, identified areas worthy of more active management (Maragos *et al.* 1994), including the Rock Islands as a whole. Most of those recommendations were incorporated in Palau's National Master Development Plan, adopted in 1997.

The conservation efforts of the national government following the 1988 Ngerukewid survey, particularly the education campaign, led to a surge of local-level conservation initiatives. Especially following Palauan independence in 1994, communities took a renewed interest in controlling the use of their natural resources, and in just the last four years, six new local-level marine and terrestrial conservation areas have been established (see Graham *et al.* 1997). In contrast with the way the Ngerukewid Preserve was created in 1956, most of these local initiatives have staked their success on the importance of baseline resource surveys, community consultation and awareness-building, and long-term monitoring. In the Rock Islands, especially, local-level management capacity appears to be keeping pace with the rapidly increasing intensity of competing uses such as tourism, commercial fishing and recreation by locals. The state of Koror, which shares ownership of the Rock Islands with Peleliu State, administers a range of management tools, including user permit fees and zoning for different users and uses, supported by a well-funded enforcement programme. Having been implemented on a piece-meal and largely reactive basis, these management elements do not constitute a comprehensive or integrated management programme for the Rock Islands. But recognition of the need for an integrated approach is increasing, and there is no doubt that management of both Ngerukewid and the entire Rock Islands area is improving. With its long history and strict prohibitions, the Ngerukewid Preserve is serving as an historical and geographical core of a gradually emerging comprehensive management programme for the Rock Islands.

Conclusions

The Ngerukewid Islands clearly have great value in terms of natural heritage on the national, regional, and global levels. They are relatively undisturbed and are representative of the biota and natural systems of the Rock Islands, an area with no

[3] No areas have yet been designated under the system.

comparison anywhere else in the world. Just how much Ngerukewid's status during the last 40 years as a natural preserve has contributed to maintaining that value is less clear. The demands by Palau's resident and tourist populations for food, recreation, and fishing can easily be met without the direct contribution of Ngerukewid's resources. With some exceptions, such as hawksbill sea turtles and their eggs, the incentive to poach in the Preserve has been relatively small. The government has therefore been able to keep harvesting pressure and other disturbances in the Preserve to relatively low levels with only moderate enforcement effort.

The intensity of management of Ngerukewid has been low during its 40-year history. It was created with little planning and no baseline surveys of what was there. Its management objectives have been simple: keep harvest pressure and human disturbance to a minimum. Enforcement and public education efforts have been modest during most of the Preserve's history, but they accelerated after a 1988 resource survey revealed the exceptional value of the area and its resources. The net result to date is what appears to be the effective safeguarding of most of the natural elements of a 12 km^2 area of land and sea that is part of one of the most biologically diverse marine areas in the world.

Renewed interest in the Preserve ten years ago also spurred the government to pursue the establishment of conservation areas in other areas of Palau. Somewhat unexpectedly, most of the progress in that area has been made at the local rather than national level. In most of those local initiatives, baseline surveys, public awareness building, and long-term monitoring have been essential elements for success – lessons learned from the Ngerukewid Preserve more than 30 years after its creation.

Acknowledgments

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Breiðafjörður, West-Iceland: an Arctic marine protected area

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Iceland, an island nation bordering the Arctic circle, is economically and traditionally dependent on marine resources. Generally efforts to create marine protected areas are resisted by marine nations in the Arctic. Nevertheless, in 1995, by special legislation, Iceland established the Breiðafjörður Conservation Area, a marine bay in West Iceland. Management objectives are to conserve the many ecological and cultural features, accommodate sustainable use such as fisheries, tourism and algal extraction, and maintain traditional uses. Currently there are few conflicts and no perceptible over-exploitation although the regulatory regime, still under development, may mean imposing some restrictions, including for fisheries. Local communities have been directly involved since the outset and are represented on a multi-stakeholder Committee that oversees the project, assesses development proposals and makes recommendations to the Minister for the Environment. To date, impacts of designation seem positive. It has facilitated scientific study, raised awareness of the biological, geological and economic values of the area, heightened interest in the cultural heritage and is spurring development of the tourism industry, including whale-watching. One reason is that the area aims for a balance between the needs of the natural environment and the needs of Icelanders for sustainable, long-term economic security consistent with their traditional use and dependency on the marine environment.

ICELAND IS an island nation in the North Atlantic, between Scandinavia and Greenland. Politically, it is one of the Nordic countries [(1)] and more recently has joined the circumpolar Arctic Council [(2)]. Iceland's land area is 103,000 km^2 with a coastline over 6,000 km long that touches the Arctic Circle. Settled 1,100 years ago, it is a land of contrasts with over 200 volcanoes, extensive hot-springs and geysers alongside glaciers typical of its Arctic character. Less than 2% of Iceland can be cultivated, primarily for cold-resistant root crops, or used for grazing, and Icelanders have traditionally turned to the sea for subsistence, as have other Arctic societies.

Efforts to designate marine protected areas (MPAs) have generally been resisted as competing with fisheries and curtailing traditional ways of life. For example, the Arctic Council's programme for the Conservation of Arctic Flora and Fauna (CAFF) reported that in 1997, the number of protected areas in the circumpolar Arctic stood at 294, encompassing 2,201,001 km^2, or 14.9% of the Arctic territory, nearly half of which is accounted for by the ice cap of the Greenland National Park. However, only a handful were marine and according to the 1995 report *A Global Representative System of Marine Protected Areas* (Kelleher *et al.* 1995), the Arctic marine environment is one of the least represented of all ecosystems.

[(1)] *Finland, Sweden, Norway, Denmark, Iceland, Åland islands and Faeroes.*

[(2)] *A circumpolar alliance of Canada, Finland, Greenland/Denmark, Iceland, Norway, Sweden, Russia and USA to "provide a means for promoting cooperation, coordination and interaction among the Arctic States, with the involvement of the Arctic indigenous communities and other Arctic inhabitants on common Arctic issues, in particular issues of sustainable development and environmental protection in the Arctic".*

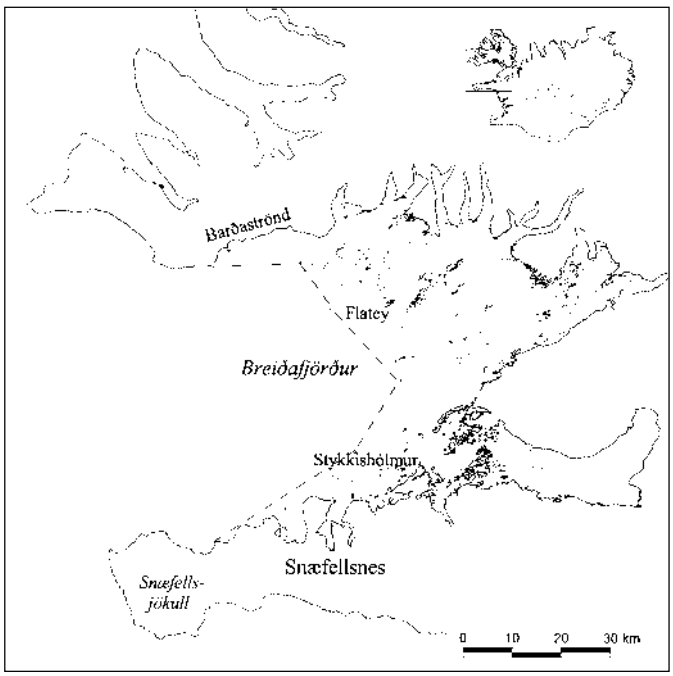
Iceland is heavily dependent on marine resources (over 70% of its export income is derived from fisheries). Nevertheless, in 1995 by special law 54/1995, Iceland successfully established its first MPA, the Breiðafjörður Conservation Area (a term preferred over 'protected area'). In doing so, it contributed both to its own protected area system of 80 areas totalling 12,165 km^2 (26 of which are over 10 km^2), and to the Circumpolar Protected Area Network (CPAN) developed by the eight countries of the Arctic Council.

Breiðafjörður is a multiple-use area preserving traditional use, and supporting some extraction activities and fisheries. Classified as IUCN Category IV, it also has elements of Ib and V. In parts, there is intervention to protect the common eider duck *Somateria mollissima* population, in others access is allowed only for science, and in others priorities are conserving cultural elements and allowing recreation and tourism. Consequently, the area provides for various uses while meeting conservation needs.

Local communities and industry have been involved in the process from the outset and prior to designation the Minister for the Environment visited local governments to introduce the idea of area protection, to get input and support and to initiate ongoing dialogue. Local communities continue to have an active role in the ongoing management and environmental assessment process. Talks were also held with the fisheries sector.

The Breiðafjörður Conservation Area

Breiðafjörður (65°20'N, 23°00'W) is a large shallow bay, about 50 km wide and 125 km long in West Iceland (see map). It is 2,874 km^2 and encircled by mountains, including glacier Snæfellsjökull, on the Snæfellsnes peninsula on the south side, and the Western Fjords peninsula to the north. The coast is a fairly narrow strip interspersed with farms and small urban areas.



The bay of Breiðafjörður, the darkened area showing the extent of the Breiðafjörður Conservation Area, West Iceland.

Management objectives and implementation

Consistent with the importance of the marine environment, an MPA in Iceland that does not accommodate some human use is not really a viable option. Consequently, the major management objectives are to:

- Conserve the biota, land/seascapes, geological formations and cultural heritage.
- Accommodate sustainable consumptive and non-consumptive natural resource use.
- Maintain traditional use.

The challenge is to determine acceptable uses and sustainability levels, based on best available knowledge, and implement them in cooperation with the different economic sectors in accordance with long-term conservation interests.

A management plan is being prepared to implement the management objectives and incorporate scientific research and monitoring, outdoor recreation, sustainable tourism, and environmental interpretation and education to minimise negative environmental impacts. Plan development has highlighted the requirement for a more solid scientific database, e.g. additional flora and fauna surveys, species distribution maps, vegetation and geological mapping. These data are needed to help determine acceptable levels of exploitation, including for fisheries, tourism and extraction.

The Breiðafjörður bay is characterised by extensive intertidal areas between the islands, creating quite a different land and seascape at low and high tides. A view from the island group of Skáleyjar. Photo: Ævar Petersen, 22 June 1987.

A committee oversees the project and includes representatives from local communities, the National Museum (responsible for cultural heritage in Iceland), and the Icelandic Institute of Natural History (responsible for general scientific research in zoology, botany and geology). The committee advises the Minister for the Environment on all environmental matters in the conservation area, and works with local authorities and the Nature Conservation Agency (responsible for protected areas in Iceland). The committee is responsible for preparing the management plan and for promoting research, education and interpretation in cooperation with other relevant authorities and is to be consulted on any development plans affecting the area. The Icelandic Institute of Natural History and local nature research institutes (primarily advisory to local authorities) can establish a local field station to facilitate environmental research and monitoring to ensure that the conservation of the region is based on solid scientific knowledge.

The regulatory regime for the site is under development and some restrictions are likely on, for example, access to nesting grounds, boat speed limits, and numbers of recreational boats at some locations. Some parts may also be closed to general traffic for scientific or conservation purposes.

Ecological and conservation values

The spectacular land and seascape consists of shallow seas, small fjords and bays and an inner part of extensive intertidal areas dotted with about 3,000 islands, islets and skerries. The area contains about half of Iceland's intertidal area and over one-third of its coastline. Tides of six metres, unique for Iceland, contribute to the diverse land and seascapes. Mean temperatures range from -3°C (February) to +10°C (July).

The bedrock, formed during rift volcanism in the late Tertiary, has a gentle south-east dip. The area consists mainly of a relatively regular pile of basaltic lavas with occasional extinct central volcanoes yielding a variety of geological formations. During the Quaternary Age, the lava pile was deeply eroded by glaciers leaving a diverse landscape with several geothermal sites, some visible only at low tide.

The area has diverse flora and fauna, substantial portions of the Icelandic populations of a number of bird and mammal species, and an intertidal zone high in biodiversity and productivity, with extensive algal 'forests' and other important habitats for invertebrates and fish, essential in the food chain.

The area supports 230 recorded species of vascular plants (about half Iceland's natural flora) and around 50 of its 70 regular breeding bird species including shag *Phalacrocorax aristotelis,* cormorant *P. carbo*, glaucous gull *Larus hyperboreus*, white-tailed eagle *Haliaeetus albicilla*, common eider *Somateria mollissima*, black guillemot *Cepphus grylle*, and grey phalarope *Phalaropus fulicarius.* The area is an internationally important staging site for the High-Arctic nesting brent goose *Branta bernicla* and knot *Calidris canutus.* Regional overviews of the invertebrate and fish fauna are not yet compiled.

The two Icelandic seal species, the common seal *Phoca vitulina* and grey seal *Halichoerus grypus*, have their main haul-outs on the islands and skerries. Several species of cetaceans are commonly found, including common porpoise *Phocoena phocoena*, white-beaked dolphin *Lagenorhynchus albirostris*, killer whale *Orcinus orca*, and minke whale *Balaenoptera acutorostrata*.

Information on cultural sites is limited, but, for some, conservation action is urgently needed to stem further deterioration.

Sustainable use

The islands have an unbroken history of human use. Nowadays, only two island groups are inhabited year-round, although there are many summer residences and the natural resources are still exploited. For example, eiderdown, collected from the nests, is an essential source of income for many farmers. Other major uses of the area are for fisheries, tourism and algal harvest.

An important conservation challenge is to assess the sustainability of fisheries. Breiðafjörður is the spawning ground for some of Iceland's most important economic fish species and its role in conserving and sustaining viable populations of these species is one of the area's primary functions. This will need detailed cooperative fisheries management plans. The area has important lumpsucker *Cyclopterus lumpus,* Iceland scallop *Chlamys islandica,* Atlantic cod *Gadus morhua* and pink shrimp *Pandulus borealis* fisheries. Green sea urchins *Strongylocentrotus droebachiensis* were exploited from 1993 to 1996, when the market collapsed. Recently, the common whelk *Buccinum undatum* is being exploited and the common mussel *Mytilus edulis* is targeted.

Grey seals Halichoerus grypus *are common inhabitants of the Breiðafjörður region. This young pup was born at the island group of Bjarneyjar. Pupping mainly occurs during the autumn and early winter periods.* Photo: Trausti Tryggvason, autumn 1984.

Cooperation with the fishing industry is fundamental to the success of these conservation efforts and throughout the designation process dialogue between conservation authorities and the fishing industry was good with low resistance to establishing the conservation area. However, to minimise negative impacts on the coastal and benthic biota, guidelines on fishing gear or other appliances, i.e. to prevent habitat damage, may be needed and could cause some tension.

Other consumptive uses include sealing, once an important source of food and income and still practised, puffin catch, and taking of young and

eggs of shag and eggs of cormorant, kittiwake *Rissa tridactyla*, fulmar *Fulmarus glacialis* and great black-backed gull *Larus marinus*.

Tourism is a growing industry and an incentive for establishing the Conservation Area. This sector, already benefiting from the designation, has considerable potential to generate local income and employment. For example, from 1993 to 1997 a tour operator conducted 1,700 sightseeing boat trips and the number of passengers increased from 8,859 to 10,097. Whale watching is being developed as a tourist attraction. Tourism has apparently had minimal impact on the natural and cultural environment, but it should be assessed and a multi-stakeholder tourism plan developed to minimise negative impacts while maximising benefits for the local communities. Ideally, it will embrace concepts such as *Agenda 21 for the Travel and Tourism Industry* [3], incorporating the *Principles* and *Codes of Conduct for Arctic Tourism*.

Algal extraction is widespread and about 10,000–12,000 tons of kelp *Ascophyllum nodosum* is extracted annually to produce about 3,000 tons of kelp meal, and 4,000 tons of tangle *Laminaria digitata* produces 400–500 tons of tangle meal. There is interest in increasing the tangle harvest four- or five-fold annually. Whether that level can be sustained without serious ecological damage, both directly from removing the tangle and indirectly by altering habitats for other inhabitants, needs to be determined.

Local, national and international importance

An effective protected area should contribute to local economies and to overall human and ecosystem welfare and to a secure and properly managed environment. Accordingly, the Breiðafjörður Conservation Area will be assessed for its local, national and international values and functions. It could be a candidate for Ramsar and World Heritage Site designation, both for its natural and cultural values. Locally and nationally, the area will be the subject of ongoing assessments of its contribution to the local communities and to Iceland's economy and conservation objectives.

Impacts and benefits of designation

To date, most impacts of the designation seem positive. There is good cooperation among the authorities, local communities and various industries. Scientific inquiry and data gathering has been facilitated and there is raised awareness of biological, geological and economic values of the area. Heightened interest in the area's cultural heritage and its artefacts is starting to be translated into preservation plans. It is spurring development of tourism and facilities on the area's biological and cultural resources.

Conclusions and lessons learned

The Breiðafjörður Conservation Area aims to reach a balance between the needs of the natural environment and the needs of Icelanders for sustainable, long-term economic security consistent with their traditional use and dependency on the marine environment. By allowing ecologically compatible uses and by setting a Committee mechanism in place to ensure that the uses stay sustainable, Iceland has taken a big step forward for marine protection. Furthermore, protection seems to be spurring the economy as people search for means to take advantage of the 'protected' designation for tourism development and to profile the region's cultural and natural heritage.

[3] Developed jointly by the World Travel and Tourism Council, World Tourism Organisation and Earth Council, 1997.

Specific lessons learned include:

- It is necessary to accommodate human use and get cooperation from local communities at the outset and to have local communities and various stakeholders and levels of government engaged in the ongoing management, e.g. through advisory committees, local nature centres etc.
- The status of protected area/conservation area should bring tangible, value-added results to communities, give them additional economic opportunities and be seen as a benefit, not a disincentive.
- Use should be allowed if, by prohibiting it, people are driven away that could otherwise add value to the area, and act as local 'custodians'.
- Protected area status should foster species conservation and sustainable use.
- Using special legislation can be advantageous because this can focus on specific regional issues.
- The need for good scientific data as the basis to assess sustainability of use and acceptable activities should be built in.

Although there is still a long way to go and the management plan is still in preparation, on the whole, designating Breiðafjörður as a Conservation Area is turning into an excellent model for other Arctic marine protection schemes.

Acknowledgments

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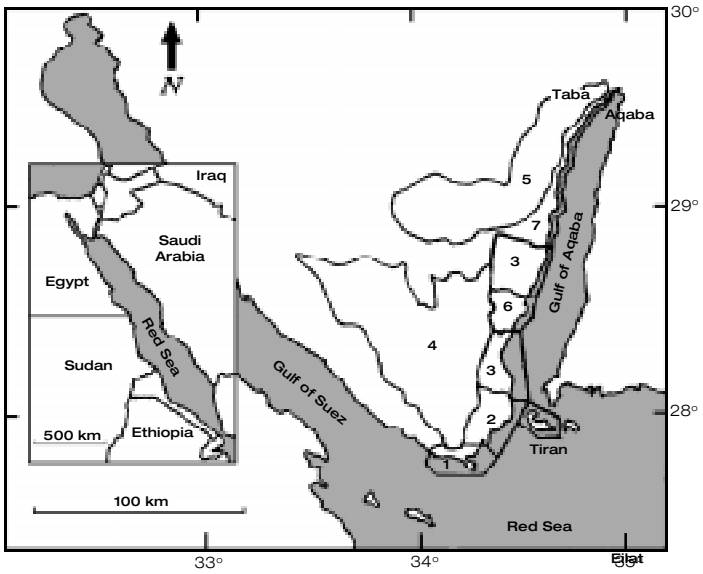
Protectorates management for conservation and development in the Arab Republic of Egypt

MICHAEL P. PEARSON AND AHMED IBRAHIM SHEHATA

Recognising the close linkage between coral reefs, reef-associated marine environments and its ambitious tourism development objectives for the Southern Sinai, the Government of the Arab Republic of Egypt established a network of marine and terrestrial protected areas to conserve critical natural resources and thereby support national economic development policies. The declaration of networked Protectorates on the Gulf of Aqaba has in effect established a large marine protected area (MPA), covering Egypt's Gulf of Aqaba littoral zone in its entirety. Government objectives supported by the Commission of the European Union are being realised, coral reefs and associated marine ecosystems on the Gulf of Aqaba are now fully protected, zero discharge policies are strictly enforced, coastal alterations are prohibited, artisanal fisheries are regulated and consensus on management issues with resident communities has been achieved. The Southern Sinai Protectorates Development Programme owes its success to strong legislation, unwavering Government support and the establishment of functional partnerships with the local community.

THE GULF of Aqaba Protectorates, declared periodically since 1983, have become established as a driving and regulatory force for all economic and tourism development activities in the Southern Sinai. Through a gradual process that has successfully educated key decision makers and line ministries within the Government of Egypt, the Egyptian Environmental Affairs Agency (EEAA) has managed to instil the concept of resource conservation, Protectorates management and intergenerational equity as key elements of national policy. This case study describes mechanisms that have permitted the government to adopt this visionary position, given the immediate economic and planning realities presented to any state with a population of over 60 million and clearly divergent priorities to accommodate their needs.

The Gulf of Aqaba Protectorates consist of a network of three distinct units linked by Protected Coastlines, thereby creating a large marine protected area (MPA) on the Gulf of Aqaba stretching from Taba (international border with Israel) to the Ras Mohammed at the southern extremity of the Sinai peninsula (approximately 260 km). The declaration



The Southern Sinai Protectorates Sector of the Egyptian Environmental Affairs Agency. Legend – 1: Ras Mohammed National Park. 2: Sharm el Sheikh Protected Coastline. 3: Nabq and Abu Galum Managed Resource Protected Areas. 4: St Katherine Protected Area. 5: Taba Natural Monument. 6: Dahab Protected Coastline. 7: Nuweiba-Taba Protected Coastline.

of the Ras Mohammed Marine Protected Area in 1983 marked the beginning of a process that was eventually to establish management over all coastal marine environments on the Gulf of Aqaba and serve as a model for Egypt's Protectorates policy for the 21st century. (The terms "protectorate" and "protected area" are used synonymously here to identify an area declared by Decree to be administered by Law 102 of 1983, also known as the Protectorates Law.)

The Ras Mohammed Marine Protected Area existed as a park 'on paper' until 1988, when the Government of Egypt entrusted its Egyptian Environmental Affairs Agency with the task of developing and managing this internationally significant coral reef resource in line with the Government's tourism development strategies. With Technical Assistance from the Commission of the European Union, a programme meeting the needs of the Government was implemented in 1989. Immediate actions included expansion of existing boundaries from 97 km^2 to 233 km^2 and designation as a National Park (IUCN Protected Area Category II). IUCN Category II management objectives, together with the prestige value of developing Egypt's first national park, were key elements leading to the selection of this Category. The Ras Mohammed National Park Development Project successfully implemented management measures that established Egypt's first National Park, regulated tourism development in adjacent areas, regulated artisanal fisheries, and initiated a process whereby stakeholders were provided partnership opportunities. The success of the Ras Mohammed Project lay in the conscious decision to identify and implement management objectives with only a rudimentary knowledge of the nature of the resources being managed, and to adjust management as parallel monitoring programmes identified immediate resource management and conservation needs.

The success of the Ras Mohammed project led to the declaration of two additional Protectorates on the Gulf of Aqaba in 1992. These areas, known respectively as the

Table 1. *The Southern Sinai Protectorates.*

name	national category	IUCN category	declaration date	land area (km^2)	sea area (km^2)	fishing restrictions [1]	length of coastline
Ras Mohammed	National Park	II	1983	133	327	A: 4 weeks/yr. on 7% shore; S: offshore	56
Tiran-Senafir	National Park	II	1983/1992	100	271	A: closed; S: closed	n.a.
Sharm-el Sheikh	Protected Coastline	–	1992	–	75	A: closed; S: offshore	15
Nabq	MRPA	VI and IB	1992	465	122	A: 60% closed; S: offshore	47
Abu Galum	MRPA	VI and IB	1992	337	121	A: open; S: offshore	25
Taba Coast	Protected Coastline	–	1996	–	735	A: open; S: offshore	147
St Katherine	Protectorate	VI and IB	1988–1996	4,250	–	–	–
Taba	Natural Monument	III and IB	1998	2,800	–	–	–
total				**8,085**	**1,651**		**290**

[1] **A** = artisanal Bedouin fisheries. **S** = sport fishing. **Offshore** = not closer than 500 m from reef crest.

Nabq and Abu Galum Managed Resource Protected Areas (IUCN Category VI), were linked by the Dahab Protected Coastline. Together these areas established the Ras Mohammed National Park Sector consisting of 1,951 km^2 of marine and terrestrial habitats and 43% of Egypt's littoral zone on the Gulf of Aqaba (Table 1).

Evaluation of EEAA management actions on the Gulf of Aqaba and strong support from investors and stakeholders prompted the government to establish the Southern Sinai Protectorates Management Sector (SSMS) through the addition of the remainder of Egypt's littoral zone on the Gulf of Aqaba to the Abu Galum Managed Resource Protected Area, the expansion of the St Katherine Protectorate and the Declaration of the Taba Natural Monument in March 1998. The Sector (Table 1) consists of 9,736 km^2 of linked marine and terrestrial Protectorates, all shorelines from the highest high water mark to the 500 m isobath on the Gulf of Aqaba and approximately 30 km of marine and terrestrial areas on the Gulf of Suez north of the Ras Mohammed Peninsula, and provides the EEAA with executive regulatory and management authority ensuring support of economic development activities in the Southern Sinai Governorate (Administrative "Province").

Management objectives

Management objectives favouring the development of the Southern Sinai Protectorates are directed to respond to, and mitigate, the consequences of rapid development of a tourism-based economy in the Southern Sinai.

The proximity of the Southern Sinai peninsula to the European tourism markets, and its wealth of marine and terrestrial natural resources, outstanding landscapes, a rich cultural heritage and coral reefs of international significance, have acted as a catalyst and promoted investment in the region. Since 1988 tourism capacity on the Gulf of Aqaba has expanded from 1,030 beds to over 15,000 beds. A development ceiling has been set at 160,000 beds and this number is expected to be reached by 2017. Expansion of bed capacity is obviously accompanied by expansion of tourism support infrastructures and tourism service operators. Resident populations are increasing through migration from heavily populated urban centres in Egypt and problems associated with frontier territories are now evident in the Southern Sinai. The task of the EEAA is to conserve natural resources, regulate massive development projects and establish partnerships with stakeholders and investors often unaware of the close linkages between resource conservation and the long-term value of their investment.

National Protectorates management objectives

Management measures and policies for the Gulf of Aqaba Protectorates Network have set the global objectives for the management of Protectorates in Egypt. These can be summarised as follows:

- To identify, conserve and manage Egypt's intergenerational equity.
- To support Egypt's economic development strategies paying particular attention to expansion of the tourism sector.
- To provide the Egyptian Environmental Affairs Agency with the Structure and capacity to implement Law 102 of 1983 (The Protectorates Law) and its accompanying Decrees, thereby strengthening the executive functions of the EEAA and providing it with a strong coordinating mechanism.
- To manage and administer Egypt's Natural Heritage.
- To permit the State to comply with ratified International Conventions.

- To protect natural assets as future options available to the state to diversify its economy.

Management objectives for the Southern Sinai Management Sector

Site-specific management objectives for the SSMS designed to respond to threats and achieve biodiversity conservation goals were identified as follows:

- To provide for the full protection, conservation and management of natural resources, biodiversity, landscapes, seascapes, cultural heritage, historical sites, ecosystems, habitats and natural processes essential to their preservation.
- To maintain the integrity of natural systems to protect and conserve their biodiversity.
- To provide for the protection of natural coastlines recognising that these are critical to the stability and health of coastal marine ecosystems.
- To manage desert ecosystems, landscapes and their biodiversity as areas of natural and economic significance.
- To provide for the full integration and protection of indigenous people residing in or adjacent to declared Protectorates.
- To provide the means to ensure that resource harvesting is sustainable and in harmony with the objectives of the Protectorates.
- To ensure that economic development activities are executed in accordance with the general objectives of the Protectorates and to encourage the establishment of compatible economic development activities.
- To provide opportunities for a full range of recreational activities ensuring that these are both socially acceptable and ecologically sustainable.
- To ensure that all actions likely to impact the Protectorates are subjected to proper evaluation according to the relevant legal instruments thereby mitigating resource degradation, loss of scenic beauty, loss of amenity value, loss of biodiversity, and reduced public access, while maintaining the value of the Protectorates and their contained hereditary resources.

To a greater or lesser extent the SSMS has achieved all of these objectives. Success has been due to a combination of strong legislation, unwavering support from the EEAA, and the establishment of functional partnerships with private sector investors.

Non-destructive reef access solutions have reduced damage to less than 10% of original damage figures. Photo: Conny Pearson.

Legislation

Law 102 of 1983, also known as the Protectorates Law, provides the EEAA with a strong legislative tool to administer Egypt's Protectorates. The Law consists of 11 articles and accompanying Decrees, providing for all management and administrative requirements. It provides the EEAA with a mechanism to regulate and coordinate the actions of all other administrative authorities when these are likely to endanger the value and integrity of natural resources in any

declared Protectorate. The Law specifically prohibits any action that may lead to the extermination or damage or alteration of any organism or system or formation considered as a habitat for the living terrestrial and marine resources of the Protectorate.

The Law also forbids any activities, actions or experiments in areas adjacent to protected areas which would affect their environment or processes without the express permission of the Nature Conservation Sector of the EEAA.

The Law stipulates that the EEAA must initiate monitoring activities essential to Protectorates management and that the purpose and objectives of establishing Protectorates should be clear to the public. The legislation permits the EEAA to set fees or other charges it deems adequate according to the level of service provided. Entrance fees are paid into the Environment Fund administered by the EEAA and are made available to the Nature Conservation Sector on the basis of agreed annual budgets.

Income generated by the Gulf of Aqaba Protectorates currently exceeds operating and recurrent costs making these the first fully self-financed Protectorates in Egypt.

Operations

Donor-assisted projects in Egypt normally operate on the principle of secondment whereby staff assigned to each project by the state are seconded from an existing civil service post for the duration of the activity. This procedure has inherent problems and often leads to failure once the donor withdraws its assistance. The EEAA, conscious of this problem, initiated procedures that permitted the recruitment and training of staff specific to the immediate needs of both the Protectorates Development Programmes and its Nature Conservation Sector. Since its inception in 1989, the Protectorates Programmes have recruited and trained professional and technical staff to ensure that administrative, managerial and operational structures remain after donor assistance has been concluded.

Protectorates staff implement all management, educational and enforcement measures required by the Law 102, and as such are responsible for the following activities:

- Identification of immediate and long-term management needs for each Protectorate.
- Preparation of access track and visitor management infrastructure.
- Preparation of reef access points designed to limit damage to coral reef areas.
- Public awareness and preparation of public awareness information materials.
- Development and maintenance of educational nature trails.
- Resource monitoring (there are 30 permanent reef monitoring stations).
- Marine and terrestrial patrols, enforcement of EEAA regulations.
- Installation and maintenance of vessel mooring points at all diving sites.
- Evaluation of Environmental Impact Assessments for all developments in areas adjacent to declared Protectorates.
- Continuous inspection of development sites to ensure compliance with existing regulations and as a mechanism to develop partnerships with investors and management groups, including provision of free consultancy services to developers and investors.
- Continuous assessment and management of commercial and artisanal fisheries.
- Provision of services to resident Bedouin communities.
- Care and maintenance of equipment essential to Protectorates operations.

The Nature Conservation Sector of the EEAA has adopted a recruitment policy favouring an internal advancement procedure whereby staff are trained and targeted

to assume specific management responsibilities. This internal promotion system is currently operational and staff recruited during the early years of programme implementation are now assuming senior management positions. It should be noted that Rangers in Egypt must be University graduates in any discipline and must have a second language.

Lessons learned and conclusion

Effective legislation and strong governmental support targeting the development of Protected Areas on the Gulf of Aqaba have been the driving force behind the successful implementation of these programmes in the Egypt. Technical assistance provided by the European Union has defined the Protectorates development programmes for the EEAA and facilitated their implementation. Key elements to their success can be defined as follows:

1. The expansion of the Protectorates network in the Southern Sinai could not have been achieved had the State not had the foresight to craft an effective legal instrument notable for its simplicity and strength. Though the Law does not define Categories, Egypt has adopted the IUCN guidelines as a management tool.
2. The Protectorates Law (102 of 1983) and its Decrees provide the EEAA with executive authority over Egypt's Protectorates. The Decrees provide staff with enforcement authority, and provide the Nature Conservation Sector with full administrative authority.
3. Staff recruited to the Protectorates were selected and trained to fill specific posts within the Nature Conservation Sector of the EEAA. Seconded staff from other Governmental Authorities were not considered. This decision ensures that the Protectorates programmes will continue after donor assistance to the EEAA has been concluded.
4. Training programmes were selected to provide hands-on experience from qualified experts contracted by donor assisted projects. Additional training was provided externally through the Great Barrier Reef Marine Park Authority, and through Universities providing post-graduate training to selected staff. External placement training programmes were useful and have permitted staff to select appropriate management solutions to specific problems in Egypt.

Artisanal fisheries are regulated through a consultative process. Photo: Axel Folley.

5. Successful implementation of Protectorates programmes in areas targeted for intensive tourism development can only succeed if stakeholders are fully integrated into the Protectorates Management process. In the Southern Sinai, the EEAA has succeeded in developing functional partnerships with investors and local Bedouin communities through the provision of services and through continuous dialogue with all stakeholders.
6. Biodiversity conservation programmes which involve the declaration of new Protected Areas must have political

support at the highest level from the outset if they are to achieve any measure of success.

7. Protectorates legislation has provided the Nature Conservation Sector of the EEAA with the means to rigidly apply regulatory measures. The success of the Aqaba Protectorates programmes is due to the fact that these powers were used sparingly in favour of a more conciliatory educational process.

8. The Protectorates programmes have become fully sustainable through the collection of entrance fees. The Gulf of Aqaba Protectorates can now function without subsidy from central government funding.

9. A flexible approach to management has been maintained, permitting the Protectorates to respond to opportunities and problems as they arise. Such flexibility is particularly important to Protectorates development activities which must involve multiple partners each with differing objectives. Management to objectives has been effective and has replaced a less flexible Management Plan.

10. The establishment of a climate of openness and transparency has been a key feature in the success of the Egyptian Protectorates development programme.

11. Involvement of local communities on their terms has resulted in the effective management of artisanal fisheries. Closed fishing zones, designated and enforced by Bedouin fishermen, have effectively increased catches and income.

12. The integrity of coral reefs and associated marine ecosystems in the Gulf of Aqaba has been maintained despite rapid coastal development of adjacent areas. The Nature Conservation Sector has managed to enforce a zero discharge policy, regulate development of setback areas and maintained public access. In so doing, the EEAA has increased the value of the destination and is supporting the resource-based tourism in the Southern Sinai.

13. The Gulf of Aqaba Protectorates have become a benchmark for Protectorates development in the region and are now a focus of attention from other concerned riparian States.

The multi-category network of Protectorates on the Gulf of Aqaba has proven itself to be an effective vehicle for coherent and consistent management of a coastal zone on the basis of protected area legislation. The IUCN Protected Area Categories have proven to be effective tools in the establishment of the Gulf of Aqaba large MPA. The EEAA has demonstrated that an equilibrium between economic development targets and resource conservation objectives can be achieved.

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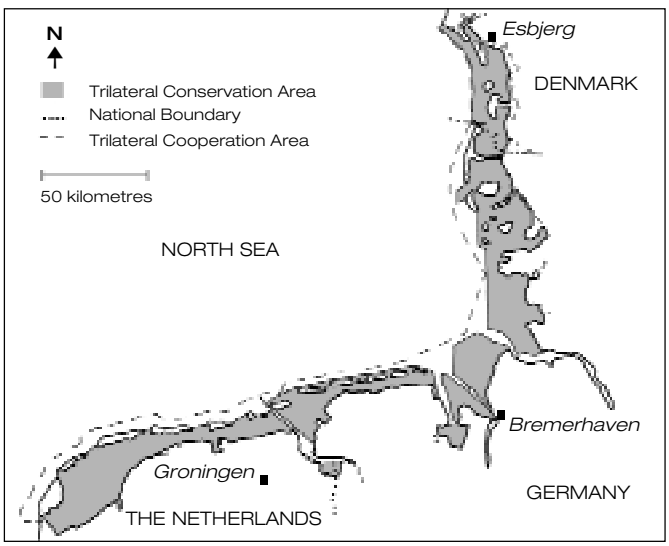
The Wadden Sea: an international perspective on managing marine resources

JENS ENEMARK, HOLGER WESEMÜLLER AND ANNETTE GERDIKEN

The Wadden Sea is one of the world's most important tidal wetlands both for species and habitats and for its high recreational value. Situated next to densely populated and industrialised areas, the Wadden Sea is endangered by human activities such as coastal engineering, eutrophication, pollution, gas and oil exploitation, tourism and fisheries. Protection measures have become necessary to maintain the ecological balance of the area. During the last two decades, the protection of the Wadden Sea has been supported by the national designation of nature reserves and national parks from Esbjerg in Denmark, along the German North Sea coast to Den Helder in the Netherlands. In 1978 the governments of the three coastal countries agreed to cooperate, to achieve a comprehensive marine protected area in the Wadden Sea. Within this framework environmental non-governmental organisations are playing an important role.

THE WADDEN SEA is a shallow sea extending along the North Sea coasts of the Netherlands, Germany and Denmark. Its habitats include tidal channels, sands, mud flats, salt marshes, beaches, dunes, river mouths and a transition zone to the North Sea – the offshore zone. The area denominated as the shared Dutch, German and Danish Wadden Sea Area covers 13,500 km^2.

The Wadden Sea ecosystem is very dynamic, with regular tidal cycles and more unpredictable fluctuations, such as storm tides. It provides a multitude of transitional zones between land, sea and freshwater environments, resulting in an exceptional species richness. This includes 2,000 species of spiders, insects and other invertebrates in the salt marshes and 1,800 in the marine and brackish areas. On the tidal flats, in contrast, only a few species of flora and fauna have adapted to the extreme environment. These, however, can be found in exceptionally high numbers and show a high biological productivity. Every year an average of 10 to 12 million birds pass through this area on migration from the breeding grounds in Siberia, Iceland, Greenland and north-east Canada to their wintering grounds in Europe and Africa (following the East Atlantic Flyway).



The Wadden Sea extends along the North Sea coasts of the Netherlands, Germany and Denmark.

The Wadden Sea as a marine protected area

Some 25 years ago, as awareness grew of the outstanding national and international ecological importance of the Wadden Sea, it became evident that traditional small-scale terrestrial and species conservation was inadequate to preserve

the ecosystem as a whole. Technical advances in coastal engineering, rapid increases in tourism in the area, harbour and industrial developments and pollution from adjacent areas have endangered the balance of traditional sustainable use of the area (WWF 1991).

As a result, the Netherlands, Germany and Denmark started initiatives to establish protected areas, national parks and nature and wildlife reserves in the late 1970s and 1980s. This resulted in the protection of the Wadden Sea through a series of national initiatives, with the establishment of the Wildlife and Nature Reserve in the Danish part in 1979–1982, the Wadden Sea Memorandum and Nature Reserve in the Dutch part in 1980–1981, and the three National Parks in the German part from 1985. The Wadden Sea is now covered by an almost unbroken stretch of nature reserves and national parks. They could in principle also be denominated as marine protected areas, since the areas covered are to a very large extent marine areas. However, such designations do not exist as legal categories in any of the respective conservation laws of the three countries. The area under legal conservation, the so-called Conservation Area, covers almost 9,000 km^2, more than two-thirds of the total Wadden Sea area.

Talks between the three governments were initiated with the aim of achieving a comprehensive protected area in the Wadden Sea. This resulted in the First Trilateral Governmental Conference on the Protection of the Wadden Sea in 1978. At the Third Conference in Copenhagen in 1982, the three governments formalised cooperation by adopting the "Joint Declaration on the Protection of the Wadden Sea". The Common Wadden Sea Secretariat was established in 1987 to extend and strengthen cooperation, following a decision at the Fourth Governmental Conference in 1985.

Trilateral cooperation provides the overall framework for national conservation and management of the Wadden Sea. The recently adopted Wadden Sea Plan entails political agreements with regard to common policy and management of the Wadden Sea Area. The trilateral plan is based upon a number of shared principles. The Guiding Principle is "to achieve, as far as possible, a natural and sustainable ecosystem in which natural processes proceed in an undisturbed way". In addition, seven Management Principles have been adopted which are fundamental to protection and management within the Wadden Sea Area, e.g. the Precautionary Principle and the Principle of Careful Decision-making.

Policy and management is directed towards the full range of habitat types for a natural and dynamic Wadden Sea. Each habitat needs a certain quality (natural dynamics, absence of disturbance, absence of pollution) which can be provided through conservation management. The quality of the habitats are maintained or improved by working towards agreed targets. Targets for water quality and sediment are valid for all habitats. Supplementary targets for birds and marine mammals have been adopted, as well as targets for landscape and cultural aspects. For each target category common trilateral policy and management measures are stipulated.

Scientists and environmental NGOs such as WWF were instrumental in providing the necessary factual information, enabling final political decisions to be reached on the establishment of a comprehensive protection scheme. International dialogue between scientists and NGOs constituted another cooperative element, resulting in increased commitment from participating organisations and helping to strengthen cooperation between the three countries (Wesemüller 1991).

The protection of the Wadden Sea is based on an ecosystem approach. Therefore legal protection has established three comprehensive national nature reserves and

national parks for the Wadden Sea in its entirety. Before the establishment of the current regime it became clear that it was insufficient to protect only those areas with the highest ecological values, because of the complexity of the ecological interdependencies and uses of the area. All these issues had to be addressed and managed within a comprehensive scheme. Those protected areas which existed prior to the comprehensive protection schemes indicated above were absorbed by the nature reserves and national parks.

The international dimension of the Wadden Sea also demanded an overall approach. The Trilateral Conservation Area is a comprehensive protected marine area made up of the three national protection areas (nature reserves and national parks). Between the three countries a Wadden Sea Cooperation and Management Area – the so-called Wadden Sea Area – has been established. This is substantially larger than the Conservation Area, and enables all issues pertaining to the Wadden Sea to be addressed. The Wadden Sea Area extends to three nautical miles offshore, and covers the seawalls (including the estuaries) up to the brackish water-line, and ecologically related areas behind the seawalls.

An important tool in the protection and management of the Wadden Sea (Conservation) Area is a zoning system. Irrespective of differences between the national systems it is possible to define three zones. The highest protection zones do not generally permit human use, although in many cases some uses, e.g. fisheries, are allowed as they existed prior to the establishment of the protected area. Only in the Danish section of the Wadden Sea does an area exist – the so-called scientific reference area – which has been totally closed to use (with the exception of scientific research) during recent decades. The intermediate protection zone allows for use provided that it does not have a negative impact on the conservation objectives. The remaining small zone is open for use (especially tourism) with the exception of those activities specifically denominated. However, there is probably a need to consider a more comprehensive and effective system in the future, to allow for a more integrated management of the system.

Achievements and unsolved problems

Much has been achieved over the last 10–20 years of legal protection and international cooperation. Plans for large-scale activities and construction of embankments and harbour and industrial facilities, which would have further substantially damaged and reduced the area, have been abandoned. The input of nutrients and hazardous substances has been reduced for several substances, but is still critical for others. The zoning system in the Conservation Area has significantly reduced disturbance of seals and birds. Hunting has been phased out or significantly reduced in the whole area, also contributing to substantially decreased disturbance.

However, as indicated above many issues of concern remain, and new issues have recently emerged. The latest data show that riverine inputs of heavy metals, PCBs and HCHs have significantly declined in the period 1985–1995. This has resulted in decreased concentrations of these substances in the water and sediment, as well as in blue mussels *Mytilus edulis* and bird eggs in most parts of the Wadden Sea. However, surveys of other hazardous substances have found them in relatively high concentrations. The main concerns are Tri-butyltin (TBT) and pesticides. There is increasing evidence that certain pesticides hamper the grazing ability of zooplankton, and herbicides interfere with the photosynthesis of phytoplankton. TBT has very high

toxicity for several marine organisms, most notably dog whelk *Nucella lapillus* (WWF 1998).

Since 1994, a picture of the possible consequences of sea level rise has emerged. Although the Wadden Sea tidal system will be able to cope with a moderate sea level rise, the North Sea coasts of the barrier islands will steepen. If sufficient sediment is not delivered from the offshore zone, the Wadden Sea tidal flats may disappear, because today there is no possibility of regaining areas landwards.

The Wadden Sea provides vital feeding and breeding grounds for large numbers of birds. Photo: H.-U. Rösner/ WWF.

Other pressing issues include the reduced dynamics of most dune areas, and the lack of sufficiently protected beaches as breeding areas for grey seal, Kentish plover and little tern. Furthermore, the role of the offshore zone is essential in the sand balance of the Wadden Sea, and biologically important as a feeding area for birds and nursery area for fish. Only five estuaries remain in the Wadden Sea area, three of which have been modified considerably by diking and deepening (Bakker *et al*. 1997).

Besides the shrimp fishery the most important fishery activity in the Wadden Sea is the shellfish fishery for blue mussels and cockles *Cerastoderma edule*. The blue mussel fishery is a good example of the difficulties in managing a resource sustainably (WWF *et al*. 1997). Mussel fisheries in the Dutch and the German section of the Wadden Sea entail mussel cultivation on culture lots. Mussel seed is fished from wild banks and dispersed on designated culture lots where they grow to a marketable size. By removing seed mussels to maintain culture lots and marketable mussels from natural mussel beds, the structure and functioning of the natural system of the Wadden Sea is being disrupted.

In order to maintain a natural system and a sustainable mussel fishery it was agreed at the 1991 Ministers conference "to limit the negative ecological impact of mussel fishery on the Wadden Sea environment and to this end to close considerable parts of the Wadden Sea, including intertidal and subtidal areas" (Common Wadden Sea Secretariat 1992). This agreement was supplemented with further agreements in the Wadden Sea Plan, in particular limitation of the mussel fishery to subtidal areas in principle, no enlargement of the current area of mussel culture, and protection and enhancement of the growth of wild mussel beds and seagrass fields (Common Wadden Sea Secretariat 1998). The limitation of the mussel fisheries to the subtidal area in principle is of major importance since the intertidal mussel beds are especially vulnerable to fishery and natural developments and regenerate with difficulty. The agreements have been or are in the process of being implemented in national regulations and management.

Conservation and management does not stop with imposing a legal protection scheme. Proposals for new developments that would damage the area need to be countered, and there is the continuing challenge of maintaining and where possible enhancing the quality of the habitats. Broad societal support is indispensable to

pursue such objectives. Public awareness, education and communication is becoming increasingly important and environmental NGOs play a vital role in this respect.

Outlook

The establishment of the large Conservation Area was a vital step in protecting the Wadden Sea, as it legally endorsed the aim of achieving "as far as possible, a natural and sustainable ecosystem in which natural processes proceed in an undisturbed way". Some uses of the area remain, but have to be seen within that framework. The national park and nature reserve provisions have defined the direction of conservation and management. WWF has launched the Living Planet Campaign in which the Wadden Sea is included among the 200 most important global ecoregions. This underlines the international importance of the Wadden Sea and the necessity to maintain it as a transboundary ecological region.

The Wadden Sea Conservation Area (national parks and nature reserves) is not easy to classify under the IUCN Protected Area Management Category System. The protection scheme is still in development. Some areas, e.g. parts of the islands, can also be denominated as cultural landscapes. The Wadden Sea has been used throughout the centuries, and the current legal regime allows continued use of its resources provided the overall objective of maintaining and extending the ecological integrity is respected. The legal regimes therefore encompass complex systems of protection, from strictly preserved areas to areas where sustainable use is allowed, as indicated above. The Wadden Sea protection scheme, with its trilateral arrangements (Conservation Area-Wadden Sea Area) and national legal protection areas (nature reserves and national parks), is complex and will inevitably be difficult to fit into the classification. Categories II and V would match best, but other categories are involved as well, with elements of all categories.

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Fisheries in the Great Barrier Reef Marine Park – seeking the balance

JOHN TANZER

The 350,000 km² Great Barrier Reef Marine Park in Australia is a multiple-use protected area supporting a wide variety of human activities (IUCN Category VI). Commercial and recreational fisheries, the focus of this paper, are of critical importance economically, culturally and ecologically. Within the Park 16,398 km² are closed to fishing, and 88,679 km² are closed to bottom trawling; fishing in the remaining areas is regulated through permits and zoning. Studies of the ecological impacts of trawling and line-fishing are on-going, but identified concerns include bycatch, especially of vulnerable and threatened species, excess capacity in some fisheries, and the need for increased surveillance and enforcement.

Achieving the correct balance between conservation and sustainable fisheries will require continuing consultations among State and Commonwealth Park managers, scientists, industry, and other stakeholders. As the health of fish stocks and the Park in general are not only required under legislation but demanded by the general public, consultations must be fully participatory and transparent, and supported by the best available scientific information.

THE GREAT Barrier Reef Marine Park is one of the world's largest marine protected areas, encompassing a complex array of diverse ecosystems as well as social, economic and cultural activities. It covers an area of approximately 350,000 km² stretching more than 3,200 km along the Queensland coast of Australia. Because of its large size, diversity and uniqueness, the Marine Park is an internationally significant resource of world-recognised ecological and conservation values.

The Marine Park was established under the 1975 Great Barrier Reef Marine Park Act, in response to persistent public concern over the conservation of the Great Barrier Reef and the perceived threat from mining. The goal is to provide for the protection, wise use, understanding and enjoyment of the Great Barrier Reef in perpetuity through the care and development of the Marine Park. The Great Barrier Reef Marine Park Authority was established as the Commonwealth Statutory Body responsible for managing the Park.

The Marine Park is not a National Park but was established as a multiple-use park. It is closed to petroleum exploration and development, and spearfishing with scuba equipment, but supports a range of commercial activities, significantly contributing to local and national economies. Tourism, the most economically significant activity, generates an estimated A$1 billion annually and employs thousands of people.

Activities are managed in the Park by a permit and zoning system. With so many different kinds of human use occurring inside the Park, as well as on the adjacent coastal lands, effects on the reef relate to pollution (including nutrients, sediments, and contaminants such as pesticides and heavy metals), tourism development and recreation, and fishing.

Fishing in the Park is the focus of this paper, which examines the existing situation and proposes mechanisms for assisting managers and industry to seek a balance between sustainable use and protection of the Park's outstanding natural values.

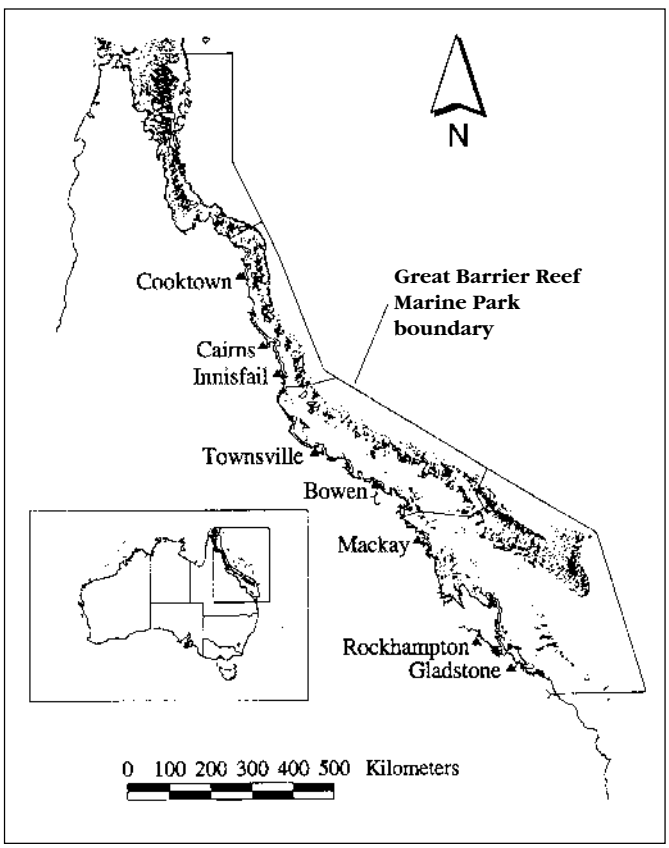
Fishing in the Marine Park

Within the Park 16,398 km^2 are closed to all types of fishing and 88,679 km^2 are closed to bottom trawling by statutory zoning plans. The other areas are zoned to permit and regulate human activities, including the various kinds of fishing that occur in the Park.

Fishing is, in economic terms, the second most important activity in the Park. However, the lifestyle and cultural value of fishing is perhaps even more significant, certainly from a political perspective and hence in terms of the challenges it presents for managers. Not surprisingly, the issue of allocation between competing groups clouds much of the public debate on fisheries sustainability.

Fishing in the Marine Park is conducted by four major user groups.

- **Commercial fishing** is estimated to earn approximately A$250 million annually. All commercial fisheries require permits, are limited-entry, and are subject to a variety of other restrictions and regulations, depending on the target species and gear type used.
- **Recreational fishing**, like commercial fishing, has been increasing steadily in the Park and adjacent waters as the coastal population has increased and as road development and other factors have made more of the area more readily accessible. Recreational fishers do not require permits, but are subject to bag limits, minimum and maximum size limits, and other restrictions. It is estimated that some 882,000 Queensland residents participate annually in recreational fishing, with half that number fishing regularly.



Great Barrier Reef Marine Park. Australia's Great Barrier Reef Marine Park includes complex reef zoning structures. (The Park is divided into four main sections for purposes of zoning.) Locations of major population centres on the Queensland coast adjacent to the Park are also shown.

- **Charter and guided fisheries**, consisting of both reef-going large charter vessels as well as smaller, guided operations that are more active inshore, provide a recreational experience for locals and visitors. Approximately 250 vessels operating in the Park engage mainly in this form of fishing, ranging in size from small runabouts to substantial vessels carrying up to 40 fishers.
- Finally, **traditional fishing** by indigenous peoples also occurs in the area, but is, by comparison, limited. It generally occurs close to communities and so is localised, tends to be intermingled with hunting, and is low-intensity. Thus, from an ecological perspective, it is not a significant management issue in terms of its impact on the natural values of the Park.

Major fisheries

The ecological impacts of fishing are largely determined by the type of gear used and by total effort. There are four main categories of gear used by the various fishing sectors.

Trawl fishery

Otter trawling [1] is the major activity in this fishery although a small amount of beam trawling also occurs. Like all commercial fisheries in the Park, this is a limited entry fishery. The number of operators has been capped and a maximum hull size imposed. Despite these restrictions, changes in technology and the knowledge base have seen a steady increase in real effort applied. Approximately 630 trawlers operate in the Park. This is the most important fishery economically, catching about 10,000 tonnes of product worth around A$150 to A$200 million annually to fishers.

It is a mixed-species fishery targeting prawns and scallops. There are inadequate stock assessment data to draw conclusions about the status of the stocks. However both the king prawn fishery and the scallop fishery are regarded as having excess effort, in both economic and ecological terms.

Bycatch includes a range of other species, some of which is marketed, but much is discarded. Bycatch is a major impact of trawl fishing, because of its effect on biodiversity and endangered and vulnerable species. As a significant step in reducing bycatch, the Authority intends that Bycatch Reduction Devices, including Turtle Excluder Devices, be mandatory by the start of the year 2000 season.

Another major impact of trawling is on bottom communities. For five years, the Authority, in association with research agencies, has conducted a detailed scientific study of the effects of trawling on various habitats within the Park. It is evident that ecological effects are determined by the intensity and frequency of trawling, and more closed areas in the Park are needed, as are closer surveillance and enforcement of fishing regulations.

Reef line fishery

The reef line fishery, which is commercial, recreational (including charter fishing) and traditional, targets demersal and pelagic species which generally have high per-unit value. Commercial fishing occurs both for the fillet and live trade. Recently, the live fish trade into Asia has developed following rapidly escalating demand and a decline in alternative sources of supply. There are approximately 250 principal licensed operators in the reef line fishery, and a further 1,563 licence holders with more limited licensing arrangements. Recent studies have estimated that 24,300 privately registered vessels fish the Park region annually for a total catch between 3,500 and 4,300 tonnes.

A major five-year study on the effects of line fishing is being conducted in the Park; a tentative conclusion is that populations of coral trout have declined to about 30% of baseline levels on heavily fished reefs. The rising value of fish in the market provides an incentive for increasing fishing effort and for ignoring fishing restrictions. This will demand special effort in the coming years to control illegal fishing.

Inshore and estuarine fishery

There are approximately 1,300 authorisations for operators to set gill nets along the east coast of Queensland. Much of this occurs outside the Park.

The major issue associated with this fishery is bycatch of protected or endangered species such as turtles, dugongs and dolphins. Working with State fisheries agencies,

[1] Probably from the Scandinavian 'ooter', referring to boards used to keep the mouth of a trawl-net open.

A charter fishing boat from Townsville. Photo: Andrew Elliot/ © GBRMPA.

the Authority has recently established a series of dugong sanctuaries along the coast where netting has been either removed or limited.

Harvest fishery

The reef supports a number of harvest fisheries including the collection of aquarium fish, bêche de mer (sea cucumber), trochus, crayfish and coral. These are not major industries, but they are significant in some local areas and occur mostly within the Park. Management of these fisheries is constrained by a lack of catch monitoring and prevention of illegal take.

Management of fishing

Under an Offshore Constitutional Settlement, Australian fisheries are divided between State and Commonwealth jurisdictions. Most fisheries within the Park are designated as State fisheries for purposes of management. Underpinning this agreement, the Great Barrier Reef Marine Park Act can override the State legislation in terms of management if it is consistent with the objectives of the Commonwealth legislation.

The Authority seeks to take an auditing role, working cooperatively with State agencies and allowing them to undertake day-to-day management of the fisheries. However, the Authority is obliged to set policies which ensure its basic responsibilities are met and the ecological integrity of the Marine Park is not compromised by management failure, whether from fishing or any other activity.

Management plans

The Queensland Fisheries Management Authority (QFMA) has established a system of Management Advisory Committees (MACs) for all the major fisheries in Queensland. The MACs include representatives from all stakeholder groups, including recreational, commercial and traditional fishers, State and Authority Park managers, enforcement officers, research scientists and conservationists. The MACs' primary task is to provide expert advice to the QFMA for the development of statutory Management Plans.

The preparation of Management Plans has been under way for three years, based on known scientific information on stocks and the impacts of fishing as well as community and stakeholder consultation. Inevitably this entails compromise; however, the establishment of basic objectives, tied to those in the State legislation, should ensure there must be bottom line outcomes, including the assurance of ecological sustainability. The Authority aims to ensure that best-practice fisheries management is implemented in the Park and to achieve the objectives in its own legislation.

The Authority's major management intervention is through zoning plans, which regulate all activities throughout the Park. The Authority's concerns are to ensure the impacts of fishing are minimised in the Park as well as with overall stock sustainability. A key political question is the extent to which the Authority can achieve its objectives through cooperation and negotiation with Queensland agencies, rather than using its

legislative mandate in what are traditionally areas of specific fisheries agencies. Time is a critical element. How long should be allowed for development of management plans by fisheries agencies? How long is the community prepared to wait?

Nevertheless, zoning plans do prohibit fishing in significant areas of the Park, as described earlier. These provisions create highly protected areas (IUCN Categories I and II), which ensure that, if conventional fishing controls fail to protect species or stocks, there will always be areas that can act as breeding areas to replenish surrounding waters. Of course, these areas perform other vital functions as well which contribute to achieving the objectives of the Park.

Challenges for managers – lessons learned

What key issues and challenges face managers as they seek the balance between allowing reasonable use and maintaining ecological integrity in the Park?

- Identifying and meeting community expectations. High-order skills in the area of negotiation, political acumen, capacity to interpret legislation, policy development and the ability to negotiate outcomes are needed.
- Ensuring the public is well informed on the situation as it is known (e.g. transparency on issues such as status of stocks and impacts of fishing). Much anecdotal information circulates about the status of stocks or the impacts of fishing and how these may have changed over time. Managers must ensure factual information, or the lack of it, is communicated, because community perceptions are critical for attempting to create or change legislation.
- Stakeholder involvement and consultation is obviously critical. The challenge for managers is to develop and adjust processes which will allow access of stakeholders and involve the general community in the policy formulation process.
- Key information needs must be identified and clearly stated to ensure that scarce public funds are spent in the most effective way to gather required information. Greater emphasis is needed on collecting and presenting economic and social information relating to fisheries in the Park. On-going stock assessment and independent monitoring of changes in abundance and impact are critical.
- Managers must develop key performance indicators for fisheries and the ecosystems that protect them, and then be able to adjust management arrangements accordingly.
- The issue of excess effort will, I believe, require direct government intervention. Management needs to anticipate changes in latent effort and recognise interventions which will displace effort into other areas. Excess effort must be removed and it would seem responsible to offer compensation to displaced fishers. Clear policy guidelines should be developed between the Commonwealth and the State on how to deal with these matters and where responsibility lies for the cost.

The newly created Fisheries Critical Issue Group in the Authority will seek to develop strong policy positions on fisheries matters throughout the Marine Park. Underpinning this, however, will be maintenance of the relationship with specialist fisheries management agencies who will continue in the lead agency role in this regard.

The Authority must be able to report on what is happening with fisheries and, if necessary, intervene to ensure the ecological integrity of the Park is maintained. The Fisheries Critical Issue Group will establish an advisory committee made up of key stakeholders to assist in policy formulation and process. It will also identify the major information requirements for reporting adequately to Parliament and the public on

the state of the fisheries and the impact of fishing activities in the Park. These information needs and priorities will then be published to enable linkage of management needs with research. This will be a significant step in the right direction.

Application of the IUCN protected area categories

The Great Barrier Reef Marine Park fits the definition of Category VI (Managed Resource Protected Area). However, through its zoning plans it contains large areas (see above) that fit the definitions of Categories Ia (Strict Nature Reserve – represented by Scientific Research Zones); Ib (Wilderness Area – represented by Marine National Park Zones, among others); II (National Park – represented by Marine National Park Zones, among others); III (Natural Monument – represented by the whole Park); and IV (Habitat/Species Management Area – represented by the whole Park).

Conclusion

The Great Barrier Reef Marine Park was originally established to protect the area's ecological attributes while allowing for reasonable use. This move by the Commonwealth Government in cooperation with the Queensland Government was seen to be of national significance and a major step forward in marine conservation throughout the world. Community expectations, especially on the coastline adjacent to the Park, are that fishing is an allowable activity. However this support will almost certainly end if stocks become significantly depleted (including in key locations) or World Heritage values are being severely damaged or devalued.

There are two key questions for managers: what level of impact, given that some impact is inevitable, is acceptable to the public, and how can the right balance be assured? There is no clear answer; rather, solutions or policy adjustments will occur over time as public expectations and values change. Regular, factual reporting of the state of the fishery, the stocks, and the supporting ecosystems, and regular monitoring of the impacts of fishing, are also essential.

Managing for the correct 'balance' to protect the attributes that provide the recognised high value of the area requires good scientific information, as well as managers well equipped as negotiators and integrators. Institutional arrangements allowing for Ecologically Sustainable Development to be implemented are needed to underpin this.

Analysis of the results of an integrated monitoring programme in place for over eight years, indicates that the general ecological state of the park is good and that human use is increasing but is generally at sustainable levels. However, for the trawl fishery, a management framework needs to be implemented to deal with problems of excess capacity and the environmental impacts of trawling. Also, management of the growing reef line fishery requires careful monitoring and a precautionary approach. Presently the large size of the Park provides a considerable buffer; however, growing evidence of local-area depletion, especially inshore and close to major population centres, requires short- to medium-term response.

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Fisheries and marine protected areas

Lack of individual or collective ownership over the oceans, coastal seas, rivers, lakes and other natural aquatic ecosystems and their resources (e.g. fisheries resources) has long troubled human societies. Hardin (1968) named the tendency to overexploit fisheries and other such resources the 'tragedy of the commons'. However, recent thinking is that over-exploitation occurs not because of the ownership (common property or individual) but when access is open to all and unmanaged (Hardin 1998).

Meryl Williams' contribution examines how protected areas or parks, especially in marine ecosystems where ownership is difficult to define and exploitation difficult to manage, could contribute to fisheries conservation through restraining access to and managing exploitation of the resource. However, recognising that fishing may threaten the ecosystem, its biodiversity and its integrity, the reverse question of what place extractive activities such as fishing have in protected area schemes is also addressed. Following this, Robert Johannes discusses the need for marine protected areas to safeguard fish spawning sites.

Do fisheries and marine protected areas need each other?

MERYL J. WILLIAMS

Do fisheries need marine protected areas (MPAs), and do MPAs need fisheries? I do not believe that we can divorce these two questions, because the Earth's natural resources and their living space are all sought now by many different users for many different purposes. Once, such multiple uses did not interfere much with each other. Now, this is rarely the case and will be less and less so in the future. Therefore, these two questions are becoming more convergent over time. Indeed, Kelleher and Kenchington (1992) identified a trend in the approaches to marine resource management and conservation, starting with regulation and management of individual marine activities, followed by use of small protected areas to cover the most valuable sites, and finally the eventual development of large, integrated multiple-use MPAs.

Notwithstanding this trend, developments in fisheries management and marine conservation more generally have proceeded fairly independently in most parts of the world to date.

Do fisheries need marine protected areas?

There is consensus that fisheries need better management if they are to continue to make a major contribution to world food supplies, livelihoods of people, human health and the economy, and if aquatic biodiversity, the integrity of aquatic ecosystems and the ecological services they provide are to be maintained. Fisheries management is now a major conservation issue. Also, conservation is one of the biggest issues on the fisheries' agenda. Fisheries conservation concerns are complex and numerous; MPAs could contribute to addressing several of today's fisheries conservation issues but will not be relevant to them all (Table 1).

New paradigms and modes for fisheries management are being sought. The Code of Conduct for Responsible Fishing, including the precautionary approach (FAO

Table 1. *Conservation concerns and fisheries.*

- **environment**
  - quality of coastal ecosystems
  - biodiversity
  - pollutants in the marine foodweb
  - impact of aquaculture and stock enhancement on marine resources
  - impact of climate change
  - impact of species introductions
  - increasing frequency of pathological episodes e.g. red tides, cholera
  - impact of fishing on the habitat
- **resource sustainability**
  - safe levels of exploitation
  - species and ecosystem conservation including listing of endangered species
- **fishing practices**
  - fisheries bycatch
  - animal welfare protected species
- **social and economic impacts**
  - the welfare of people, especially indigenous people, relying on the resource;
  - the impacts of trade on resources
  - social, political and military conflict generated by competition for access to resources
- **human development and welfare impacts**
  - food security and access to adequate protein for basic nutritional needs.

1995), fisheries ecosystem management, community-based resource management, fisheries co-management and the use of ecolabelling and product certification are all being developed, advocated and/or studied as possible alternatives for application in different situations (e.g. Williams 1998). Rights-based management schemes, such as individual transferable quotas, are being used in some developed country fisheries and explored in others. Some researchers are advocating fundamental changes in the concept of space and time controls on fishing. For example, Walters (1998) proposed that closed areas and seasons would be the norm, and areas and times open to fishing should be extremely limited to ensure conservation of stocks. Such approaches are already being used for severely overfished stocks, but more as a last resort than as a precautionary conservation measure.

During the 1980s and early 1990s, closures of fishing grounds in time and space lost favour as stock conservation measures among fisheries managers, biologists and, especially, among fisheries economists, because they represented indirect fishing effort or 'input' controls rather than the more direct 'output' controls on catch represented by total allowable catches and other forms of general and individual quotas. Notwithstanding their lack of theoretical favour, however, season and spatial closures to protect breeding stocks and nursery grounds and/or to greatly reduce overall fishing effort are still important ways to control fishing. Catch quotas are not easy to implement and regulate, especially in complex multi-species fisheries with many possible landing sites and without significant monitoring and control capacity. Many developing countries lack such capacity.

Spatial and seasonal closures have therefore regained some favour as viable and easy-to-understand management measures. They have the following potential biological advantages for fisheries resources and marine ecosystems:

- The average size of fish increases inside the protected area.

- Fish abundance increases within the protected area.
- The production of eggs and larvae increases as a result of the above two features.
- *In situ* conservation of genetic diversity of the fished species is created. Within-species genetic diversity is typically diminished in heavily fished stocks.
- Adjacent areas benefit greatly from all of the above through edge and spillover effects, the extent of which depends on many biological and ecological features of the species, their habits and habitats, and the size and duration of the protected area. Because most marine species produce many eggs and larvae which are dispersed widely, spillover effects from protected areas can be quite pronounced in many marine ecosystems.
- Direct habitat protection, which itself is often an important element in resource productivity.
- Less physical and biological interference in the ecosystem than, say, artificial reefs, stock enhancement through reseeding, artificial nutrient fertilisation schemes or aquaculture.

Potential socioeconomic advantages are:

- A clear, simple and easy-to-understand conservation scheme.
- The potential to establish strong participation in the design, planning, establishment and maintenance of the protected areas from many different stakeholders, especially at the local level.
- Significantly lower cost than many alternative schemes for stock replenishment such as artificial reefs, reseeding and habitat enrichment schemes.
- Non-extractive uses of the protected area, such as tourism, science, preservation of cultural sites, are permitted simultaneously.

Munro (unpublished 1998) pointed out the problems with implementation of MPAs on coral reefs. "Many MPAs have been created and there are few exceptions to the following generalisations:

- They are poorly administered and protective measures are not enforced.
- Claims to customary fishing rights have reduced their effectiveness.
- Successful implementation has most often occurred where they have been proclaimed in areas where fisheries are not of great social or economic importance, e.g. in developed countries such as Australia and the USA.
- Sites have been chosen for their aesthetic and tourism values and not necessarily because they have any value or potential for reef fisheries management.
- Their sizes have been arbitrarily determined."

Thus, despite the potential benefits, protected areas are not a universal panacea for fisheries conservation problems. They do not address some fisheries conservation issues at all, such as climate change and introduced species, and the distribution of benefits may be very uneven. For example, where coastal spaces such as coral reefs are protected for tourism, poorer fishers and their families may well be excluded from pursuing their livelihoods without gaining the benefits of new economic activities. The governance processes and the balance of power among interest groups and individuals will determine the extent to which equity is achieved. Benefits may take at least three to five or even ten years to achieve for longer lived and valuable fished species. Who bears the costs of the benefits foregone in the meantime?

Further, how widely applicable is the protected area approach? For marine ecosystems that are more or less well defined spatially, such as coral reefs, protecting areas of manageable size appears to offer good potential for protection of fisheries

resources. In practice, much needs to be learned and adapted to improve the scientific and economic basis for siting such areas, determine their optimal size and configuration, and develop effective mechanisms for support of communities and other beneficiaries.

What of the prospects for using protected areas to protect other types of fisheries? ICLARM (1992) in setting its research priorities defined nine aquatic resource systems: upland water bodies; farm ponds and rice floodwaters; rivers and wetlands; lakes; inshore coastal areas and estuaries; coral reefs, coastal shelves; upwellings; and open oceans. Of all these systems, only coastal shelves and the open oceans seem to present difficulties in terms of defining areas for protection, due to their apparent lack of spatial structure. However, scientific research is uncovering a high degree of spatial structure in even these systems and their resources.

The three major types of open ocean and coastal shelf fisheries are: 1) surface and sub-surface fisheries for large pelagic and highly migratory fish species such as the scombrids (tunas, marlins, large mackerels), 2) demersal fisheries for fish, scampi and deepwater shrimps, and 3) mid-water fisheries for smaller pelagics such as squid, jack mackerels, migratory salmon and species such as Alaskan pollock. Ocean thermoclines, current systems, undersea structures such as seamounts, hydrothermal vents and even the tectonic plates of the Earth's crust largely determine the spatial and temporal distribution of the fisheries resources and hence the fisheries. If large provinces are to be designated, protected area regimes for fisheries may need temporal as well as spatial dimensions.

Because many of these fisheries have international dimensions, most are now subject to seasonal and spatial management. They are heading towards protected-area type management, but more for minimal rather than precautionary protection.

I would like, therefore, to challenge fisheries management to consider bold precautionary moves towards integrated area management as described by Kelleher and Kenchington (1992). This must go beyond the first tentative but highly innovative concepts of fisheries ecosystem management (Sissenwine 1998) and combine the ecosystem approaches with stronger protective measures on fish stocks. That is, the management approaches must squarely shift the 'burden of proof' to the fisheries sector to demonstrate that the fishing proposed will be sustainable. In throwing out this challenge, I do not ask for its wholesale application yet. I suggest some well-chosen situations where reasonably fast and predictable stock recoveries can be expected, in countries which can afford the experiment. For example, tropical shrimp fisheries could make excellent case studies because the target species are fast growing, highly fecund and have reasonably well documented life cycles (spatially and temporally) in the coastal zone. In addition, we have some good and simple examples from countries such as Australia of how simple closed season management can greatly increase the take and value of these fisheries.

Can fisheries and marine protected areas co-exist?

When the main focus is the conservation of the marine environment via protected areas, what role, if any, should fishing have in MPAs? In 1988, IUCN passed a resolution recommending creation of a global representative system of MPAs (Kelleher and Kenchington 1992). Kelleher and Kenchington (1992) recommended that MPAs be selected based on: biogeographic and ecological criteria; naturalness; economic, social and scientific importance; international or national significance; and

practicality and feasibility. This call for a global system recognises human uses and values in marine systems. Its baseline is to protect representative parts of the vast marine resource and biodiversity systems of the planet.

The MPA selection criteria recommended by Kelleher and Kenchington (1992) and the management objectives defined in the six IUCN Protected Area Management Categories (IUCN 1994) thus provide for resource management and extraction except in the most protected categories, especially category I. The needs of indigenous people are especially mentioned, even in category Ib.

Recreational fishers catching coral trout in the Great Barrier Reef Marine Park. Photo: Andrew Elliot/© GBRMPA.

Despite current realities, there is often antagonism between stakeholders who see any form of extraction as inimical to protection and those who see protected areas as threats to their livelihoods. Currently, most fisheries experts do not yet see fisheries conservation and biodiversity conservation as closely related. We need to change that thinking and regard fisheries conservation as one subset of biodiversity conservation. Indeed, as the Convention on Biological Diversity states, biodiversity is contained within biological resources and to conserve it we must conserve the resources.

The different value systems of stakeholders, economic and other, can collide. Finding a common currency and getting accurate estimates of the resource system components may partially reconcile or focus the differences of views. Biodiversity is hard to value, however, and even obvious economic sectors such as fisheries are also often undervalued, especially in developing countries where small-scale catches, income and employment may be drastically underestimated. For example, recent studies showed that the fish catches of the Mekong River Basin are at least 2.5 times the officially recorded figures.

The correct valuation of fisheries needs to stress that fisheries production depends intimately on the underlying biodiversity of the aquatic systems. Better estimates of the value of resource systems and biodiversity should help put a premium on their protection. Conservation interests should seek the best estimates of the fisheries values of marine systems because these add to the total value of the system, as well as indicating the magnitude of importance of fisheries in the system. Fisheries and MPAs thus may find that they not only have to co-exist, but that each may benefit greatly from the other's existence.

What are the challenges for managing fisheries within the framework of protected areas?

Reconciling the parties within the governance processes and obtaining a suitable power balance is the first and greatest challenge in integrating fisheries and protected areas to the benefit of fisheries conservation. Polarised and unresolved conflicts are most likely to lead to lack of respect for protection schemes and further damage to the environment and resources. One early point of reconciliation may need to be the categories of protected areas to be used. Category IV areas, Habitat or Species

Management Areas, seem highly suited to meet the needs of fisheries resource conservation. The IUCN Categories provide a wide spectrum of types of protection of relevance to fisheries uses, including protection of the resource base and the natural ecosystem. However, few fisheries management actions using protected areas would yet be formulated within the framework of the IUCN Categories, suggesting that fisheries management and environmental conservation have been proceeding on separate tracks. A convergence of approaches is now needed.

The second great challenge comes from managing the 'externalities' which can threaten even the most carefully negotiated protected area schemes. Aquatic protected areas are downstream of most of the impacts of land based and atmospheric processes and strongly physically connected through water currents. Protecting even large geographic areas does not make them immune from dangers originating off-site, such as global warming and pollution from the land. Therefore, every governance mechanism will have to be cognisant of the potential linkages and determine an advance or response mechanism for handling the external factors, including socioeconomic externalities such as trade. Paradoxically, the external crises and threats may unify competing actors in protected area governance.

The third challenge underlies the other two major challenges, that of obtaining the knowledge required. The oceans and their ecosystems are still the least understood systems on Earth. Knowledge is accumulating but much, much more is needed to adequately define systems of protected areas at regional scales. Ignorance or imperfect knowledge is not an excuse for inaction, but we need an efficient and relentless search for relevant knowledge to help conserve marine ecosystems, and 1998 has been declared the International Year of the Oceans to highlight this need.

The fourth challenge is to how to permit and manage extractive activities. This entails determining, in a precautionary manner, where and what form of fishing can proceed, in which protected areas or in which zones within integrated managed systems, and how to implement and enforce the management agreed. Here, knowledge is important, as well as the capacity to monitor management performance.

As more marine ecosystems become integrated managed systems, then resource management and conservation converge. But is the speed of convergence fast enough?

Conclusion

Fisheries resource conservation needs to make greater use of protected area practices. At the same time, the practice of marine conservation is headed towards more multiple-use and integrated management areas, acknowledging the role of activities such as fisheries among the uses. The convergence between how fisheries use protected areas and how fishing is practised in protected areas must occur through precautionary resource and ecosystem management principles. Given the state of many of the world's fisheries resources, both resource management and conservation now demand a fundamental shift in the burden of proof in favour of the environment, for the sake of future productivity and the well-being of the people who depend on the ocean's resources.

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Tropical marine reserves should encompass spawning aggregation sites

ROBERT E. JOHANNES

Many coral reef food fishes aggregate in large numbers at specific locations, seasons and moon phases in order to spawn. Such fishes include groupers, snappers, emperors, jacks, mullets, bonefish, rabbitfish and others. A variety of such species will often spawn at common sites.

These aggregations are prime targets for fishers, who often take large catches from them. In consequence, a number of them have been wiped out, along with the fisheries they supported. This is best documented for groupers but is by no means limited to them. In the western Atlantic, grouper aggregations with a history of heavy fishing pressure have disappeared in Puerto Rico, St Thomas, Florida, and the Dominican Republic, resulting in the collapse of the corresponding fisheries. In addition, marked declines in aggregation sizes have been noted in Belize, Bermuda and elsewhere in the region (e.g. Sadovy 1994).

Although statistics on grouper stocks in the Pacific are scant, grouper spawning aggregations are known to have been virtually eliminated by overfishing at certain locations within Palau, the Cook Islands, the Society Islands and the Tuamotus. Aggregations of two species, ocean coral trout *Plectropomus laevis* and common coral trout *P. leopardus*, have also disappeared at two or three locations on the Great Barrier Reef in recent years (Samoilys pers. comm. 1998, Squire pers. comm. 1998).

It is very likely that a great many other aggregations of groupers and other species have been eliminated without written record, because of the slowness with which marine biologists, especially in the Indo-Pacific, have recognised and acted upon the need to locate, characterise and protect them. The problem is almost certainly

accelerating, not only because of the fishing pressure of growing human populations, but also because of the ease with which fishermen can relocate aggregations today using global positioning systems, and the targeting of spawning aggregations by the billion-dollar and fast-expanding live reef food fish trade centred in China.

The most widely discussed marine conservation measure in shallow tropical waters is the marine reserve, in which no fishing is permitted. Proponents often assert that the most important function of marine reserves is to protect spawning stock biomass and ensure recruitment to fished areas by means of larval dispersal. Clearly, for that reason, the boundaries of such reserves should, wherever practical, encompass spawning aggregation sites. Moreover the presence of an important spawning aggregation site would in some cases be justification in itself for the establishment of a marine reserve. For example, the Palauan government declared the Ngerumekaol Marine Reserve to protect spawning aggregations of a number of species that support nationally significant commercial and subsistence fisheries. Similarly, no-fishing zones should be established over spawning aggregation sites in large, multiple-use marine protected areas.

There is little evidence in the literature, however, to indicate that spawning aggregation sites were given any consideration when the boundaries of most marine reserves were drawn. Badly needed, therefore, are:

1. Efforts to locate and characterise spawning aggregation sites. Spawning aggregations and associated sites are very poorly documented except for portions of the western Atlantic and certain Pacific Islands. The Great Barrier Reef is an example of an important reef area where very little has been recorded concerning the timing and location of such aggregations.

Fishers often know far more about the location and timing of spawning aggregations than researchers. Indeed more than 20 different researchers have acknowledged in their publications that it was fishers who enabled them to locate the spawning aggregations that they subsequently studied. For this reason the assistance of fishers should be sought when searching for and characterising these sites.

2. Protection of important spawning aggregation sites. Those who plan to establish or redefine a marine reserve or no-fishing zone in nearshore tropical waters should ensure that it is located, if possible, so as to protect important spawning aggregations. Other means of protection include closing spawning grounds or closing fishing for important species during the spawning season. Most of the few examples of such protection of nearshore tropical spawning aggregations are found in the western Atlantic (e.g. Sadovy 1994).

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Financing marine protected areas: the role of the GEF

JOHN L. HOUGH

The Global Environment Facility, or GEF as it is more commonly known, is the world's largest single source of funding for biodiversity conservation activities. It was established in 1991 to assist developing countries fulfil their obligations under the various environmental conventions agreed at Rio. As the interim financing mechanism for the Convention on Biological Diversity, the GEF is currently providing nearly US$100 million to marine conservation projects in more than 30 different countries. This paper summarises the key features and functioning of the GEF and provides a brief overview of the range of interventions relevant to marine protected areas (MPAs) in which the GEF is currently active.

Focal areas

The Global Environment Facility (GEF) is not a general environment fund. It only supports the Incremental Costs of activities designed to generate Global Environmental Benefits within its Focal Areas of Biological Diversity, Climate Change, International Waters and Ozone Depletion.

Incremental costs

GEF can provide additional funding intended to generate global environmental benefits. It finances activities over and above those a country would undertake in pursuing its own national interests. Essentially the GEF enables countries to 'go the extra mile for the global environment'. The GEF distinguishes between the Baseline scenario (without GEF funding), and the GEF Alternative (with GEF funding). The Baseline generates only national benefits while the Alternative generates both global and national benefits. The additional cost of generating global benefits is the Incremental Cost. GEF projects describe the whole "Alternative", including both the Baseline and Increment. Thus most GEF projects have significant co-financing from government, donor, private sector, non-governmental organisation (NGO), or other sources to cover Baseline costs. Note that in many cases the current 'baseline' is inadequate even to meet national interests. Thus co-financing from non-GEF resources is needed to cover the costs of bringing the existing baseline up to a sustainable level.

Global environmental benefits and global significance

Global Environmental Benefits accrue to the world as a whole rather than to any one nation state. For example, acting in the national interest a country might decide to allow the private sector to construct hotels and marinas adjacent to biologically rich coral reefs. To establish a protected area and locate commercial infrastructure elsewhere might be considerably more expensive. The GEF would pay the Incremental Costs of the more expensive option, provided the biodiversity was of global significance and that the country could not reasonably be expected to have undertaken these activities itself.

Theoretically few global benefits would accrue from conserving the last remaining coral reef in a country if there were extensive areas of similar reefs protected in

neighbouring countries. In this case the national environmental benefits might outweigh the global environmental benefits and GEF would not fund. However, if an argument for the global significance of this particular reef could be made, then GEF might fund. Examples of global significance include areas that: contain unique assemblages of ecosystems or species; are recognised biodiversity 'hotspots'; have a large number of endemic species; are critical breeding, feeding or migratory stopovers for endangered species; or are already designated World Heritage or Ramsar sites.

Eligible countries

Countries must be eligible either to borrow from the World Bank or receive grants from UNDP. Countries must also have ratified the appropriate convention, which for MPAs is the Convention on Biological Diversity.

Country driven

GEF projects must support national agendas and priorities rather than those of international organisations or agencies, though this does not preclude the latter from developing GEF projects. Further, GEF resources are to be spent entirely for the benefit of the recipient countries and not for the benefit of an international organisation of any kind. When a proposal is submitted all participating countries must formally indicate their endorsement with a written letter from their national GEF Operational Focal Point.

Additional criteria

Additional criteria for determining the eligibility of a proposal for GEF funding include the following.

Strategic and holistic approach

The project should fit within an overall strategic plan or framework (e.g. a National Environmental Action Plan or Biodiversity Strategy), so that its contribution to the broader context is clear. It should aim to address the root causes of the problems identified rather than simply treat symptoms. Thus, GEF projects should identify and attempt to resolve the whole of the problem identified, including fundamentals such as non-conducive tenure systems and perverse economic incentives, rather than simply strengthening enforcement systems or increasing awareness.

Sustainability

The project achievements must be able to be maintained after GEF financing is completed. GEF will not commit funds to supporting on-going operating costs, or to a project which is likely to have to return to the GEF for additional funding.

Operational programmes

In addition to addressing at least one of the GEF's Focal Areas, projects should fit within the GEF Operational Programmes. In Biological Diversity these are currently: Arid and Semi-arid Ecosystems; Coastal, Marine and Freshwater Ecosystems; Forest Ecosystems; and Mountain Ecosystems.

The majority of MPA projects fall within the Operational Programme on Coastal, Marine and Freshwater Ecosystems. Relevant emphases within this programme include: tropical island ecosystems; threat removal; incorporation of the protection

of coastal biological diversity into the mainstream of other sectoral and economic plans and activities; sustainable use of biodiversity; and strengthening institutional and staff capacities. Activities that the GEF can support include: most activities related to protected area establishment and management; assessment of impacts of natural and human disturbances; remedial actions in areas under threat; control of alien and invasive species; pilot analysis and assessment methods and systems; collaboration with indigenous and local communities to conserve and maintain their knowledge and practices; and targeted awareness-raising activities.

Operational Programmes in the International Waters Focal Area may also be relevant to MPA activities. Currently the GEF is financing a number of interventions involving the management of large marine ecosystems, integrated coastal zone management, and marine pollution.

How the GEF works

The GEF is governed by a Council which approves a 'work programme' of projects every three months. The Council is supported by a Secretariat, which oversees the work of the GEF and is thus the key player in deciding whether a project should be recommended to Council for funding. The GEF Secretariat does not develop or implement projects itself but relies on the three Implementing Agencies (UNDP, UNEP, and the World Bank) to assist countries to develop and implement GEF projects. The World Bank deals primarily with large investment-type projects where GEF grants are often associated with loans to cover Baseline costs. UNDP is responsible for capacity-building and technical-assistance projects and also runs the Small Grants programme. UNEP deals with raising awareness and developing new knowledge and guidance through a programme of targeted research and selected experimental projects.

A proponent with a project idea for GEF incremental financing should contact an Implementing Agency at a very early stage. Implementing Agencies maintain close contact and will pass projects on to each other if they feel that will better serve proponents. They also work together in supporting the development and implementation of some projects.

Types of GEF funding

GEF releases funding in a variety of different ways: Full Projects, Short-Term Projects, Medium-Size Projects, Enabling Activities and Small Grants.

Full Projects are activities in line with the GEF Operational Programmes and range in size from US$1 million upwards. The project development process includes a detailed review process. After approval of a project by the GEF Council, a legal contract (often called a Project Document) is developed between the Implementing Agency, the recipient government or governments, and, where a government is not going to implement the project itself, the organisation that will actually execute the project. This contract normally must be approved by review meetings in each country participating in the project, the agency headquarters, and the GEF CEO, before it can be signed by the governments and the GEF Implementing Agency. Once the contract is signed, funding is released. This process can be quite lengthy and a minimum of three months must be allowed between submission of a final project proposal agreed with the Implementing Agency and the first release of any funds. The time between submitting an initial idea and having an agreed project can obviously be considerably longer.

Short-Term Projects are also funded at levels of US$1 million and upwards but do not correspond to the Operational Programmes. Consequently they tend not to exceed a few million US$ and are frequently urgent or are described as 'opportunities that are too good to miss'. Their review process is similar to that for Full Projects except that the criteria on fit with an Operational Programme are waived.

Medium-Size Projects can be of two types: less than US$750,000; and between US$750,000 and US$1 million. Those greater than US$750,000 follow a pathway similar to the Full Projects, though the review process is more rapid. Those less than US$750,000 follow an even more expedited pathway: after review by the other Implementing Agencies and the GEF Secretariat, they can be approved directly by the CEO.

Enabling Activities are small (up to US$350,000) capacity-building projects carried out in accordance with very strict criteria developed by the GEF and CBD Secretariats, and follow the same pathway as the Medium-Size Projects of less than US$750,000.

Small Grants (up to US$50,000) are available to NGOs and Communities in selected countries (currently 40) where the GEF Small Grants programme operates. Each country has its own proposal and review process and inquiries should be made of the GEF Small Grants Coordinator in each country, who can normally be reached through the UNDP country office.

Preparatory funds

To facilitate the development of eligible project proposals, GEF can release Project Development Funds (PDF). These are of two types: PDF A and PDF B. A proponent can skip either or both of the PDF funding blocks if they are not needed for project preparation.

PDF Block A Funds are intended for preliminary consultations and scoping activities for Full Projects, and complete project preparation for Medium-Size Projects. They are not available for Enabling Activities or Small Grants (though some of the Small Grants programmes have their own in-country funds for preparatory activities). They have an upper limit of US$25,000, and are requested through an Implementing Agency which assists the proponent in proposal preparation.

PDF Block B Funds are intended for detailed participatory project preparation, including studies, workshops, and detailed planning work. They have an upper limit of US$350,000. Implementing Agencies assist proponents to prepare PDF Block B proposals.

In unusual cases where significant technical design work is needed, PDF Block C funds of up to US$750,000 may be released where a full project has already been approved but further detailed technical design is needed.

Examples of activities relevant to MPAs currently receiving GEF funding:

- survey and establishment of MPAs in Madagascar;
- MPA planning and management as part of a national protected areas systems plan in Paraguay;
- capacity-building for MPAs in the western Indian Ocean;
- coral reef rehabilitation and management in Belize and Indonesia;
- protecting marine ecosystems in the Red Sea;
- coastal zone management in Argentina and Ghana;

- pollution abatement in the Seychelles, Gulf of Guinea, the wider Caribbean, and the east Asian seas;
- ship-waste management and oil spill contingency planning and management in China, the Mediterranean, and the western Indian Ocean;
- determining priorities for marine biodiversity conservation and protected area development and management in more than 100 different countries through support to the preparation of national Biodiversity Strategies and Action Plans.

Getting more information

Any of the GEF Implementing Agencies – the local UNDP Country Office, their headquarters in New York, the World Bank headquarters in Washington DC, or UNEP headquarters in Nairobi – can supply copies of documentation and advise and assist in project development. GEF publications are also available through the World Wide Web from: www.gefweb.org.

Key Documents you should consult include:

- the GEF Operational Programmes (1997);
- the GEF Medium-Size Projects kit;
- examples of Incremental Cost Calculations;
- the latest GEF Quarterly Operational Report;
- sample project proposals;
- IUCN Guide to Developing Project Proposals for the Global Environment Facility (1997).

Dr John L. Hough, UNDP GEF African Regional Coordinator for Biodiversity and International Waters, One UN Plaza, New York, NY 10017, USA.

IUCN – The World Conservation Union

Founded in 1948, The World Conservation Union brings together States, government agencies and a diverse range of non-governmental organisations in a unique world partnership: over 800 members in all, spread across some 125 countries.

As a Union, IUCN seeks to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

IUCN, Rue Mauverney 28, CH-1196 Gland, Switzerland
Tel: ++ 41 22 999 0001, fax: ++ 41 22 999 0002,
internet email address: <mail@hq.iucn.org>

World Commission on Protected Areas (WCPA)

WCPA is the largest worldwide network of protected area managers and specialists. It comprises over 1,100 members in 150 countries. WCPA is one of the six voluntary Commissions of IUCN – The World Conservation Union, and is serviced by the Protected Areas Programme at the IUCN Headquarters in Gland, Switzerland. WCPA can be contacted at the IUCN address above.

The WCPA mission is to promote the establishment and effective management of a worldwide network of terrestrial and marine protected areas.

Résumés

La réserve marine de Leigh, Nouvelle-Zélande

KATHERINE WALLS

La Nouvelle-Zélande, qui comprend plus de 15 000 km de côtes, possède une zone économique exclusive de 4,8 millions de km² s'étendant entre 26° et 56° de latitude Sud. Les conditions physiques conjuguées à l'isolement géographique contribuent à la richesse et à la diversité de sa flore et de sa faune marines, qui comptent de nombreuses espèces endémiques. Quatorze réserves marines ont été établies depuis l'entrée en vigueur de la législation adoptée en 1971. D'autres projets attendent leur agrément définitif. La réserve marine de Leigh, annoncée officiellement en 1975, est la première réserve marine néo-zélandaise. Dans son étude de cas, l'auteur retrace l'historique de cette populaire réserve, de son projet à sa réalisation, et tire les leçons enseignées par sa planification et sa gestion. Elle étudie comment la réserve contribue à la protection de la diversité biologique et à la prospérité de la collectivité, et conclut par une évaluation du système de classification de l'IUCN.

Un réseau de petites réserves halieutiques détenues par les communautés villageoises à Samoa

MICHAEL KING ET UETA FAASILI

A Samoa, dans le cadre d'un programme d'expansion des pêcheries à base communautaire, 44 villages du littoral ont élaboré leurs propres plans de gestion des pêcheries villageoises. Chaque plan définit les engagements de la communauté en matière de gestion et de conservation, ainsi que l'aide et le soutien technique attendus des pouvoirs publics. Ces engagements vont de l'application des lois interdisant les méthodes de pêche abusives à la protection des habitats critiques tels que les zones de mangroves. Trente-huit villages (un nombre étonnament élevé) ont choisi d'établir de petites réserves halieutiques au sein de leurs zones de pêche traditionnelles. Si le contexte social fait que beaucoup de ces réserves détenues par les communautés sont nécessairement de dimensions modestes, leur nombre et leur proximité contribuent à créer tout un réseau de réserves halieutiques. Ce réseau permet d'optimiser le rattachement des sources de larves et des zones d'établissement appropriées, et de procurer les moyens par lesquels les zones de pêche adjacentes sont réapprovisionnées en espèces marines grâce à la reproduction et à la migration. Du fait que les réserves sont gérées par des collectivités ayant un intérêt direct à leur durée et à leur réussite, les perspectives de durabilité de ces engagements sont très favorables. Les résultats confirment la conviction des auteurs que la gestion responsable des ressources marines n'est possible que si les communautés de pêcheurs en acceptent la responsabilité.

Les îles Ngerukewid de Palau : 40 ans de gestion d'une zone marine protégée

NOAH T. IDECHONG ET TOM GRAHAM

Depuis 40 ans qu'elle a été déclarée stricte zone de réserve naturelle, l'aire de protection des espèces sauvages des îles Ngerukewid, dans l'archipel des Rock Islands de la République de Palau, est l'une des plus anciennes zones protégées de la région Pacifique. La gestion de cette réserve, qui laissait beaucoup à désirer, s'est améliorée au cours de la dernière décennie et son caractère vierge semble être demeuré en grande partie intact, en dehors de quelques perturbations limitées au braconnage modéré des poissons, des invertébrés marins, des oiseaux, des crabes des cocotiers et d'une espèce de tortue marine.

Les écosystèmes de l'aire protégée des Ngerukewid sont représentatifs de ceux des îles calcaires et des lagons de l'ensemble des Rock Islands. Grâce à l'exceptionnelle biodiversité marine de Palau et au relatif succès des efforts de minimisation des perturbations et de la pêche dans la réserve, cette dernière a probablement largement contribué tant à la protection de la biodiversité qu'à la conservation des ressources halieutiques dont sont tributaires les habitants. Parallèlement à ces avantages directs, la réserve des Ngerukewid a donné lieu à des avantages indirects, peut-être tout aussi importants, découlant pour la plupart d'un regain d'intérêt du gouvernement à son égard il y a une dizaine d'années. Sur le tard, une étude de ses ressources suivie d'une campagne de sensibilisation publique se sont traduites par une plus grande fierté nationale pour l'environnement des îles Palau et par le lancement d'initiatives destinées à protéger d'autres zones significatives. Ces initiatives récentes témoignent de l'importance des études de référence des ressources, de la sensibilisation du grand public et du suivi à long terme - toutes leçons enseignées par la réserve des Ngerukewid plus de 30 ans après sa création.

Breiðafjörður, Islande de l'ouest : une zone marine protégée en Arctique

ÆVAR PETERSEN, GUÐRÍÐUR ÞORVARÐARDÓTTIR, JEANNE PAGNAN ET SIGMUNDUR EINARSSON

L'Islande, située au niveau du cercle polaire arctique, est une île dépendant économiquement et par tradition de ses ressources marines. D'habitude, les nations maritimes de l'Arctique ne sont guère favorables à la création de zones marines protégées. L'Islande toutefois, adoptant en 1995 une législation spéciale, a établi la zone marine protégée de Breiðafjörður, une baie de sa côte ouest. Ses objectifs de

gestion sont d'en conserver les nombreuses caractéristiques écologiques et culturelles, d'en favoriser l'utilisation durable entre autres des pêcheries, du tourisme et de la récolte des algues, et d'en maintenir les utilisations traditionnelles. On n'enregistre guère d'opposition pour l'instant ni apparemment de surexploitation même si les dispositions règlementaires, dont l'élaboration est en cours, risquent d'entraîner des restrictions, y compris pour les pêcheries. Les collectivités locales, directement impliquées depuis le début, sont représentées au Comité multipartite qui supervise le projet, évalue les propositions de développement et formule des recommandations au Ministre de l'environnement. A ce jour, la création de la réserve apparaît positive. Elle a favorisé les études scientifiques, sensibilisé l'opinion aux valeurs biologique, géologique et économique de la zone et ranimé l'intérêt pour le patrimoine culturel. Elle contribue par ailleurs à développer le tourisme, et notamment l'observation des baleines. L'une des raisons de ce succès tient au fait que la région s'efforce d'atteindre l'équilibre entre les besoins de l'environnement naturel et ceux des Islandais qui aspirent à une sécurité économique durable à long terme sans pour autant s'éloigner de leur utilisation et de leur dépendance traditionnelle de l'environnement marin.

La gestion des protectorats en vue de leur conservation et de leur développement en Egypte

MICHAEL P. PEARSON ET AHMED IBRAHIM SHEHATA

Conscient du rapport étroit existant entre les récifs de coraux, les environnements coralliens marins et ses ambitieux objectifs de développement du tourisme dans le sud du Sinaï, le gouvernement de la République arabe d'Egypte a établi un réseau de zones marines et terrestres protégées en vue de conserver les ressources naturelles essentielles et de renforcer les politiques nationales de développement économique. L'instauration du réseau des protectorats du golfe d'Aqaba a donné lieu à l'établissement d'une vaste zone marine protégée, recouvrant la totalité de la zone littorale de ce golfe côté Egypte. Avec le soutien de la Commission de l'Union européenne, le gouvernement réalise ses objectifs : les récifs de coraux et les écosystèmes marins apparentés du golfe d'Aqaba sont aujourd'hui entièrement protégés, les politiques d'interdiction de décharges sont strictement appliquées, les altérations du littoral sont interdites, les pêcheries artisanales sont réglementées et les questions de gestion se règlent avec l'accord des collectivités locales. Le programme de développement des protectorats du sud du Sinaï doit son succès à une législation rigoureuse, à l'appui constant du gouvernement et à l'établissement de partenariats fonctionnels avec les populations locales.

Le Waddenzee : une perspective internationale de la gestion des ressources marines

JENS ENEMARK, HOLGER WESEMÜLLER ET ANNETTE GERDIKEN

Le Waddenzee, ou mer des Wadden, est considéré comme l'une des plus importantes zones humides à marées du monde. Outre son importance pour les espèces et les habitats, il présente une haute valeur touristique. Situé à proximité de régions à fortes densités de population et d'industrie, le Waddenzee est menacé par des activités anthropiques telles que génie côtier, eutrophisation, pollution, exploitation gazière et pétrolière, tourisme et pêcheries. Des mesures de protection s'imposent si l'on veut maintenir l'équilibre écologique de cette zone. Depuis une vingtaine d'années, la protection du Waddenzee est favorisée par la désignation au niveau national de réserves naturelles et de parcs nationaux répartis entre Esbjerg, au Danemark, la côte allemande de la mer du Nord et Le Helder, aux Pays-Bas. En 1978, les gouvernements des trois pays côtiers ont conclu un accord de coopération destiné à créer une zone marine protégée dans le Waddenzee. Dans ce contexte, les organisations écologiques non gouvernementales jouent un rôle de premier plan.

La pêche dans le parc marin de la Grande Barrière de corail - à la recherche d'un équilibre

JOHN TANZER

Le parc marin de la Grande Barrière de corail, avec ses 350 000 km^2, est une zone protégée à usages multiples qui pourvoit à des activités anthropiques très diverses (catégorie VI de l'IUCN). L'auteur se concentre sur la pêche commerciale et de loisir dont l'importance économique, culturelle et écologique est primordiale pour cette zone. Au sein du parc marin, 16 398 km^2 sont strictement interdits à la pêche et 88 679 km^2 sont interdits aux chaluts de fond ; ailleurs, la pêche est contrôlée en fonction des zones et sous réserve de permis. Des études sont en cours sur les conséquences écologiques de la pêche au chalut ou à la ligne mais on identifie déjà des facteurs préoccupants tels que la prise accessoire, notamment des espèces vulnérables et menacées, la capacité excessive de certaines pêcheries, et la nécessité d'accroître la surveillance et l'application des règlements.

Le point d'équilibre entre la conservation et des pêcheries durables ne pourra être atteint que si les consultations se poursuivent au niveau des gestionnaires d'Etat des parcs, des chercheurs, de l'industrie et d'autres parties prenantes. Etant donné que la vitalité des réserves halieutiques et du parc marin en général est non seulement requise par la législation mais aussi réclamée par le grand public, ces consultations doivent privilégier une participation et une transparence totales, et s'appuyer sur les données scientifiques les meilleures.

Les pêcheries et les zones marines protégées

Le fait que les océans, les mers, les cours d'eau, les lacs et autres écosystèmes aquatiques naturels ainsi que leurs ressources (halieutiques, par exemple) n'appartiennent ni aux particuliers ni aux collectivités est un vieux sujet de préoccupation de l'humanité. Hardin (1968) a qualifié la tendance à surexploiter les pêcheries et autres ressources du même type de « tragédie du patrimoine ». Cependant, on pense depuis peu que la surexploitation n'est pas tant le fait de la propriété (collective ou individuelle) mais de l'accès aux ressources ouvert à tous et non contrôlé (Hardin, 1998).

Meryl Williams étudie comment les zones ou les parcs protégés, notamment dans les écosystèmes marins dont la propriété est difficile à définir et l'exploitation malaisée à gérer, pourraient contribuer à la conservation des pêcheries grâce à la restriction de l'accès aux ressources et à la gestion de leur exploitation. Mais, si l'on admet que la pêche est susceptible de menacer les écosystèmes, leur biodiversité et leur intégrité, il faut alors s'interroger (ce que fait l'auteur) sur la place qu'occupent les activités d'exploitation telles que la pêche dans les projets de zones protégées. Robert Johannes, quant à lui, analyse la nécessité d'avoir des zones marines protégées en vue de sauvegarder les sites de frai.

Le rôle du GEF dans le financement des zones marines protégées

DR JOHN L. HOUGH

Le Fonds pour l'environnement mondial, ou GEF (Global Environment Facility), est la plus importante source mondiale de financement des activités de conservation de la biodiversité. Il a été créé en 1991 en vue d'aider les pays en développement à remplir leurs obligations dans le cadre des diverses conventions signées à Rio en faveur de l'environnement. En tant que mécanisme financier intermédiaire pour la Convention sur la diversité biologique, le FEM subventionne actuellement, pour un montant de près de 100 millions de dollars US, des projets de conservation marine dans plus d'une trentaine de pays. L'auteur fait le point sur les principales caractéristiques du FEM et sur son fonctionnement, puis étudie brièvement l'éventail des mesures d'intervention pertinentes pour les zones marines protégées auxquelles le FEM contribue actuellement.

Resumenes

La Reserva Marítima de Leigh, Nueva Zelandia

KATHERINE WALLS

Nueva Zelandia tiene una costa de más de 15.000 kilómetros y una zona económica exclusiva de 4.8 millones de kilómetros cuadrados, que se extiende de los 26° S a los 56° S grados de latitud. La combinación de las condiciones físicas y el aislamiento geográfico han contribuído a una diversidad rica de la fauna y de la flora marítima que incluye muchas especies endémicas. Desde que se pasó la ley en 1971, ha sido posible establecer catorce reservas marítimas. Otras propuestas están a la espera de la aprobación final. La Reserva Marítima de Leigh, creada en 1975, es la primera reserva de este tipo en Nueva Zelandia. Su historia, desde la propuesta hasta convertirse en esta reserva tan popular, junto con las lecciones aprendidas durante su planeamiento y control, están delineadas en este estudio. Se toma en consideración la contribución de la reserva en la protección de la diversidad biológica y el beneficio a la comunidad. Finalmente evalúa la aplicación de las categoriás de la UICN.

Una red de pequeñas reservas pesqueras propiedad de la comunidad, en Samoa

MICHAEL KING AND UETA FAASILI

En Samoa,44 poblaciones costeras han desarrollado sus propios planes para el control de sus pesquerías locales, bajo un programa de extensión de pesquerías basadas en la comunidad. Cada plan establece los recursos de control, las garantías de conservación de la comunidad y el soporte técnico y de servicios requeridos por la División Pesquera del gobierno. Las garantías de la comunidad se extienden desde hacer cumplir las leyes que prohiben los métodos pesqueros destructivos hasta la protección de medio ambientes tales como las áreas pantanosas. Un gran número inesperado de poblaciones (38) eligió el establecimiento de pequeñas reservas pesqueras en parte de sus áreas pesqueras tradicionales. Aún cuando debido a las necesidades sociales, muchas de las reservas que son propiedad de la comunidad son pequeñas, su gran cantidad, a menudo con distancias pequeñas que las separan, forman una red de refugio para los peces. Este tipo de red podría maximizar la unión de las fuentes larvales y las áreas de establecimiento adecuadas y proveer los medios por los cuales áreas pequeñas contiguas, con el tiempo, se llenarán con especies marinas a través de la reproducción y la migración. Como las reservas son administradas por las comunidades que tienen un interés directo en su continuación y suceso, las probabilidades de mantenimiento de las obligaciones y compromisos parecen altas. Los resultados

confirman nuestra creencia de que la administración sensata de los recursos marítimos puede obtenerse solamente cuando las comunidades pesqueras mismas la aceptan como su propia responsabilidad.

Las Islas Ngerukewid en Palau: 40 años de administración de un área marítima protegida

NOAH T. IDECHONG AND TOM GRAHAM

Con su historia de 40 años como un área de estricta conservación de la naturaleza, la Reserva de la Fauna de las islas de Ngerukewid en las islas Rock de la Republica de Palau, es una de las áreas protegidas más antiguas en la región de las islas del Pacífico. La administración de la reserva ha sido relativamente liberal a través de la mayor parte de su historia, pero su imposición ha mejorado en los ultimos años y la naturaleza pristina de la Reserva parece haber permanecido en su mayor parte intacta y con perturbaciones limitadas generalmente a niveles moderados de pesca furtiva de peces, invertebrados marinos, pájaros, cangrejos de cocos y tortugas de mar con pico de halcón. Los ecosistemas de la Reserva Ngerukewid son representativos de la isla de piedra caliza y de los ecosistemas de las lagunas del área de las islas de Rock más grandes.Dada la biodiversidad marítima excepcional de Palau y el suceso razonable en la reducción al mínimo de las perturbaciones y las actividades cosecheras en la Reserva, ésta ha hecho contribuciones importantes a la preservación de la biodiversidad y a la conservación de los recursos pesqueros importantes para el uso local. Tal vez, tan importante como los beneficios directos de la conservación es que la Reserva Ngerukewid ha producido beneficios indirectos, mayormente surgidos, hace diez años, del renovado interés del gobierno en la Reserva. Un tardío relevamiento de recursos de la Reserva y la subsecuente campaña de información pública resultó en un aumento del orgullo publico respecto al medio ambiente de Palau y provocó un número de iniciativas para proteger otras zonas de importancia. Estas recientes iniciativas han reconocido la importancia de los relevamientos básicos de los recursos, del montaje de campañas públicas y el monitoreo a largo término. Estas lecciones se han aprendido a través de la Reserva Ngerukewid más de 30 años después de su creación.

Breiðafjörður, Islandia Occidental: un área marítima protegida en el Artico

ÆVAR PETERSEN, GUÐRÍÐUR ÞORVARÐARDÓTTIR, JEANNE PAGNAN AND SIGMUNDUR EINARSSON

Islandia, una isla- nación al borde del círculo ártico, es económica y tradicionalmente dependiente de los recursos marinos. Generalmente, los esfuerzos para crear áreas protegidas marítimas son resistidos por las naciones marítimas del Artico. Sin embargo, en 1995, a través de una legislación especial, Islandia estableció el área de conservación Breiðafjörður, una bahía marina en Islandia Occidental. Los objetivos de la administración son: conservar los numerosos rasgos culturales y ecológicos, acomodar el mantenimiento del uso de pesquerías, turismo y la extracción de algas y mantener usos tradicionales. En este momento hay pocos conflictos y no se percibe una explotación exagerada aunque el régimen regulador, todavía bajo desarrollo, puede resultar en la imposición de algunas restricciones incluso en la actividad pesquera. Las comunidades locales han sido incluídas directamente desde los inicios y están representadas en un comité de multi- accionistas que controla el proyecto, analiza las propuestas de desarrollo y da recomendaciones al ministro del Medio Ambiente. Hasta la fecha, el impacto de la designación parece positivo. Ha facilitado el estudio científico, ha aumentado el conocimiento de los valores biológicos, geológicos y económicos del área, ha incrementado el interés en el patrimonio cultural y está alentando el desarrollo de la industria del turismo e incluso la observación de ballenas. Uno de los motivos es que el área aspira a un equilibrio entre las necesidades del entorno natural y las necesidades de los islandeses por una seguridad económica sostenible y de largo término consistente con sus usos tradicionales y la dependencia del medio ambiente marítimo.

Administración de los Protectorados para la conservación y desarrollo en la Republica Arabe de Egipto

MICHAEL P. PEARSON Y AHMED IBRAHIM SHEHATA

Reconociendo la existencia del estrecho vínculo entre los arrecifes de coral, los entornos marítimos asociados con los arrecifes y los ambiciosos objetivos de desarrollo del turismo para el Sinaí del sur, el gobierno de la República Arabe de Egipto estableció una red de áreas marítimas y terrestres protegidas con el fin de conservar los recursos naturales críticos y por lo tanto apoyar las normas económicas nacionales de desarrollo. La declaración de los Protectorados de la Red en el golfo de Aqaba ha establecido, en efecto, una zona marítima protegida de grandes proporciones (MPA), que cubre totalmente la zona litoral del golfo de Aqaba en Egipto. Los objetivos del gobierno, con el apoyo de la Comisión de la Unión Europea, han sido cumplidos: los arrecifes de coral y los ecosistemas marítimos asociados con el golfo de Aqaba están ahora totalmente protegidos, las normas de cero descargas se han impuesto estrictamente, las alteraciones de la costa están prohibidas, las pesquerías artesanales están reguladas y se ha logrado un acuerdo con las comunidades de residentes en los asuntos administrativos. El programa de desarrollo de los Protectorados del Sinaí del Sur debe su éxito a la fuerte legislación, el apoyo firme del gobierno y al establecimiento de una asociación funcional con la comunidad local.

El mar de Wadden:una perspectiva internacional en la administración de los recursos marítimos

JENS ENEMARK, HOLGER WESEMULLER Y ANNETTE GERDIKEN

El mar de Wadden está considerado uno de los terrenos húmedos de mareas más importantes del mundo. Además de su importancia por las especies y el medio ambiente, tiene un valor recreativo muy alto. Situado al lado de áreas industrializadas con densa población , el mar de Wadden está amenazado por actividades humanas tales como la ingeniería costera, las actividades eutropélicas, la polución, la explotación de gas y petróleo, el turismo y las pesquerías. Ha sido necesario el establecimiento de medidas de protección para preservar el balance ecológico del área. Durante las dos ultimas décadas, la protección del mar de Wadden ha sido apoyada por la designación de reservas naturales y los parques naturales desde Esbjerg en Dinamarca a lo largo del mar del Norte alemán hasta Den Helder en Holanda. En 1978 los gobiernos de los tres países costeros acordaron cooperar para obtener un área marítima protegida comprensiva en el mar de Wadden. Dentro de este marco ambiental, organizaciones no gubernamentales están jugando un papel muy importante.

Pesquerías en el Parque marítimo del arrecife de la Gran Barrera - buscando un equilibrio

JOHN TANZER

Los 350.000 kilómetros cuadrados del Parque marítimo del arrecife de la Gran Barrera es un área protegida de uso multiple que soporta una variedad de actividades humanas (IUCN-Categoría VI). Las pesquerías comerciales y recreativas, el foco de este artículo, son de crítica importancia económica, cultural y ecológica. Dentro del parque, 16.398 kilómetros cuadrados del mismo están cerrados a la pesca y 88.678 kilómetros cuadrados están cerrados a rastreadores de profundidad; la pesca en el resto del área está regulada a través de permisos y zonificaciones. Los estudios del impacto económico del rastreo y de la pesca con cordel continúan pero han identificado preocupaciones que incluyen : la pesca involuntaria paralela de especies especialmente vulnerables o amenazadas, el exceso de capacidad de algunas pesquerías y la necesidad de aumentar la vigilancia y la imposición de las normas. El logro del equilibrio correcto entre la conservavión y las pesquerías viables requerirá la continuación de las consultas entre el Estado y los administradores de parques, la Mancomunidad de Naciones Británicas, los científicos, la industria y otros accionistas. Como la salud de los surtidos de peces y el Parque en general no sólo es requerida bajo legislación sino exigida por el público en general, las consultas deben tener participación total, ser transparentes y estar apoyadas con la mejor información científica disponible.

Pesquerías y las áreas marítimas protegidas

La falta de propiedad individual o colectiva sobre los océanos, mares costeros, ríos, lagos y otros ecosistemas acuáticos naturales y sus recursos (por ejemplo recursos pesqueros) han preocupado a las sociedades humanas durante largo tiempo. Hardin (1968) denominó la tendencia a explotar las pesquerías y otros recursos similares excesivamente " la tragedia de los comunes". Sin embargo, el pensamiento más reciente es que la excesiva explotación ocurre no a causa de la propiedad (sea común o individual) sino cuando su acceso está abierto a todos y no es administrado (Hardin 1998). La contribución de Meryl Williams examina como las áreas protegidas o los parques, especialmente en ecosistemas marítimos donde la propiedad es difícil de definir y la explotación difícil de administrar, pueden contribuir a la conservación de pesquerías a través de una restricción del acceso y a la administración de la explotación de los recursos. Sin embargo, reconociendo que la pesca puede amenazar el ecosistema, su biodiversidad y su integridad, la cuestión opuesta de identificar que lugar tienen las actividades extractoras tales como la pesca en los esquemas de las áreas protegidas, también se contempla. A continuación, Robert Johannes discute la necesidad de proteger los sitios de desove a través de las áreas marítimas protegidas.

Financiando las áreas protegidas: El papel del GEF

DR JOHN L. HOUGH

La Facilidad Global del Medio Ambiente, o GEF como se la conoce comunmente, es la fuente individual más grande del mundo para el financiamiento de las actividades de conservación de la biodiversidad. Fue establecida en 1991 para ayudar a los países en proceso de desarrollo a cumplir con sus obligaciones bajo las diversas convenciones del medio ambiente acordadas en Río. Como mecanismo financiero interino para la Convención de la Diversidad Biológica, el GEF está corrientemente suministrando casi 100 millones de dólares norteamericanos para proyectos de conservación marítima en más de 30 países diferentes. Éste artículo resume las cuestiones clave y el funcionamiento del GEF y provee una vista breve de la serie de intervenciones relevantes en áreas marítimas protegidas (MPAs) en las cuales el GEF es activo en la actualidad.

Protected Areas Programme

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