



**Protecting  
the Gulf  
of Aqaba**

A Regional  
Environmental  
Challenge

Environmental  
Law Institute

## Chapter 6

# Protecting Sensitive Aquatic Habitats in the Gulf of Aqaba

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The Gulf of Aqaba contains a variety of outstanding and unique sensitive aquatic habitats, including extensive rocky outcroppings, shallow coastal lagoons, mangrove thickets, and world-renowned coral reefs. Each of these habitats in turn supports a multitude of species.

While we tend to see these habitats as distinct, they are in fact intimately interconnected. The semi-enclosed character of the Gulf of Aqaba acts to further enhance the ecological interconnectedness of the aquatic systems within it. Consequently, it is absolutely vital in managing these marine areas that the interrelationships among and within them are not overlooked and their relationship with adjacent terrestrial environments is appreciated.

When marine protected areas (MPAs) were created in the past, the founders often failed to comprehend how the surrounding marine and terrestrial regions and human uses of those regions would affect the MPA, leading to their continued degradation. To protect these habitats, all human uses of the habitats and other nearby marine and terrestrial environments must be managed in a manner that fosters their protection.

Protection of sensitive aquatic habitats within the Gulf might be achieved either by establishing several relatively small MPAs in the Gulf within a broader management framework, or alternatively by establishing a large MPA (perhaps modelled upon the Australian Great Barrier Reef), encompassing the entire Gulf, or a large part of it, which would permit human activities compatible with protection. Irrespective of the approach taken, effective protection of sensitive aquatic habitats within the Gulf compels lasting cooperation within and among the four nations bordering the Gulf.

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This will require effort not only from governments and their agencies, but also from users of the marine environment, non-governmental organizations, and, above all, the public.

This chapter discusses some of the means by which sensitive aquatic habitats within the Gulf of Aqaba may be protected or their existing protection enhanced. It begins by describing briefly the Gulf of Aqaba's sensitive marine habitats and the threats facing them. The focus then shifts to an examination of legislative mechanisms that can be used to protect sensitive aquatic habitats. Next, the chapter examines means of selecting sites for designation as marine protected areas. Finally, it explores some of the planning and management tools commonly used to implement MPA laws and policies.

### I. Sensitive Aquatic Habitats in the Gulf of Aqaba and Threats to the Gulf's Marine Environment

The coastal fringe of the Gulf of Aqaba hosts a variety of diverse and spectacular sensitive aquatic habitats.<sup>1</sup> These include extensive rocky outcroppings; shallow coastal lagoons laid with seagrass; mangrove thickets; and coral reefs. Each of these habitats in turn supports a multitude of species and provides a buffer against coastal erosion. A number of endangered, threatened, or rare species inhabit the sensitive aquatic habitats within the Gulf.<sup>2</sup>

The Gulf of Aqaba is world renowned for its exquisite fringing coral reefs, which are considered "exceptionally high in their diversity of forms and species, and associated fauna."<sup>3</sup> Coral reefs are judged one of the most diverse and complex ecosystems within the biosphere, rivalling tropical rainforests,<sup>4</sup> and have been internationally recognized as deserving of protection.<sup>5</sup> It is commendable then, that the process of protecting these coral reefs and other sensitive aquatic habitats within the Gulf of Aqaba is already underway.

The coral reefs within the Saudi Arabian portion of the Gulf have recently been studied by the International Union for the Conservation of Nature (IUCN), and several areas have been recommended for protection: Humaydah Beach, Bay, and Island, and the inlet south of Humaydah Bay (Al Humaydah)<sup>6</sup>; Ras Suwahil, Bir Marshah, and Wadi al Hiqaf (including Ras Suwahil sa Kabir); Maqna North Beach; and the Tiran Islands.<sup>7</sup> The entire Egyptian Sinai coast within the Gulf of Aqaba is exceptional for its magnificent coral reefs: "There are several spots of breathtaking underwater living topography."<sup>8</sup> At least three areas on the Sinai coast have been recommended for protection: Dahab; Nabq and Ras Burkha.<sup>9</sup> Although Israel has only a very short coastline located in the far north of the Gulf, it has placed under protection the reef system eight kilometers south of the City of Eilat, known as the Eilat Coral Reserve.<sup>10</sup> While Jordan too has only

a short stretch of coast, there is a proposed national marine park in the central section of the Jordanian coastline.<sup>11</sup>

Protection of these coral reef ecosystems is crucial. In addition, it will be very important that the other sensitive ecosystems within the Gulf, and perhaps even the entire Gulf, be considered for protection. Some of the existing threats to these sensitive ecosystems come from tourism, urban and industrial pollution, and in particular pollution by oil.

Although increased tourism resulting from the creation of marine protected areas is often cited as a significant benefit, an uncontrolled increase in tourist numbers will intensify the stress on coral reefs and other sensitive areas within the Gulf—particularly through souvenir hunting, accumulation of solid and plastic waste, recreational overfishing, and increased sewage loadings.<sup>12</sup> Moreover, building tourist infrastructure, such as hotels, ports, marinas, and roads, can severely damage or destroy adjacent sensitive coastal zones (for example, mangroves and seagrass beds) and increase siltation in adjacent coral reefs.

The input of pollutants such as oil, phosphate, industrial, agricultural, and domestic wastes into the Gulf of Aqaba results primarily from the localized urban and industrial areas at the northern end of the Gulf (Eilat and Aqaba). These wastes can be toxic, persistent, and bioaccumulative within marine ecosystems, increasing turbidity of seawater and promoting eutrophication.<sup>13</sup> While a major catastrophe such as the wreck of an oil tanker would be devastating, “the smaller day-to-day spills in coastal waters produce chronic pollution that is much larger in total volume and probably more severe in biological consequences.”<sup>14</sup> The semi-enclosed character of the Gulf of Aqaba and the restricted water exchange through the Strait of Tiran reduce natural dispersion and assimilation of these pollutants.<sup>15</sup> Contamination may also be expected through discharges from oil tankers and other maritime commercial traffic, as well as from small recreational pleasure craft whose anchoring on coral reefs also causes extensive abrasive damage to these habitats.

## II. Legislation Protecting or Enhancing the Protection of Sensitive Marine Habitats

When considering what legislative framework should be established protect sensitive aquatic habitats, lawmakers and planners will have to decide whether to create large multiple use protected areas or smaller highly protected areas. Kelleher and Kenchington of the Australian Great Barrier Reef Authority argue that “legislation be based upon sustainable multiple use managed areas rather than isolated highly protected areas in a wider area that is unmanaged or is subject to regulation on a piecemeal or industry basis.”<sup>16</sup>

Multiple use protected areas will be most appropriate where there has

been and will continue to be human activity within or adjacent to the marine protected area. While the Australian Great Barrier Reef management system is the example most often referred to, other multiple use protected areas exist in other regions (e.g., Belize, the Cayman Islands, and the United States).<sup>17</sup> In other countries where MPAs can be largely isolated from human activity, small highly protected areas may be appropriate. In New Zealand, for example, several MPAs are being promoted adjacent to off-shore islands which are uninhabited.<sup>18</sup>

Within the Gulf of Aqaba, this raises the question of whether the whole Gulf or a large part of it should be established as a multiple use MPA. However, it should be noted that countries within the Gulf have already taken steps to establish MPAs under site-specific highly protected area legislation.

Regardless of whether the areas established under the MPA legislation are multiple use protected areas or small, highly protected areas, a key role served by this legislation will be to establish a structure that will define the delegation of governmental legal authority for management of the MPA. This may be accomplished either by revising and coordinating existing legislation relating to marine conservation or by enacting new "specific purpose" MPA legislation. The protection of sensitive aquatic habitats should not have to await the enactment of specific purpose legislation if existing legislation is adequate to protect an area. Moreover, it is also often possible to employ existing legislation while more specific legislation is being drafted.

The MPA legislation, whether revised or specific purpose, must also be coordinated with any other legislation affecting the marine environment, such as that concerning coastal management, fishery conservation and management, protection of marine mammals or endangered species, jurisdiction over the seabed, marine transportation, and dumping of waste. It will be important to avoid creating a complex and contradictory patchwork of overlapping legislation. In addition, it is important in the Gulf of Aqaba that the MPA legislation of the four Gulf-bordering countries be consistent and coordinated with each other.

MPA legislation should include the following common elements: (1) a clause declaring the key purpose(s) of the legislation; (2) a legal description of the boundaries of the MPA; (3) mechanisms for coordinating existing management authorities or, where necessary, establishing new management authorities, as well as defining their powers and functions; (4) financial arrangements; and (5) an enforcement regime delineating offenses, penalties and regulatory powers. While all effective MPA laws contain these key features, the details related to these elements should be determined by those with a sound understanding of the affected country or region's legal, institutional, social, cultural, customary, and indigenous norms.



### A. Objectives for Establishing Marine Protected Areas

When establishing a program for protecting sensitive aquatic habitats, it is useful to determine at the outset a list of goals or objectives for the program. Legislation should commence with a clause or section stating its key objective or objectives; this provision is commonly called a "Statement of Purposes." Once an MPA program is underway, the list of declared objectives may be adapted if necessary to new circumstances as they arise. A list of objectives can help guide the development of appropriate protection measures and can assist decisionmakers, planners, managers, users of the area, and the public in evaluating individual management decisions.

An MPA program might include some or all of the following objectives, synthesized from the stated goals of several national MPA programs.<sup>19</sup> The list is neither hierarchical nor exhaustive. The value of such a list is that it provides a country or intergovernmental agency in the Gulf of Aqaba region with at least a basic normative framework within which a habitat protection program can be formulated:

- To protect and carefully manage human use of exceptional or representative examples of aquatic habitats so as to ensure their long-term viability.
- To protect threatened, depleted, rare, or endangered species by preserving habitats critical for the survival of such species.
- To establish genetic reservoirs of species or habitats having commercial value.
- To protect and manage the human use of habitats important to commercially significant species (such as mangrove thickets, which are important as nursery grounds for many commercial fish species).
- To protect, preserve, and manage the human use of marine historical, archeological, cultural and paleontological sites or sites with significant natural aesthetic values.
- To protect areas of a type not yet represented in a country's MPA program.
- To facilitate the public understanding of, and involvement in, the protection of marine and estuarine habitats through education, participation in planning, and recreational activities.
- To allow a broad range of human activities compatible with the protection of sensitive aquatic habitats.
- To provide for marine and estuarine research and training not only for general scientific purposes, but also to enhance management of protected areas.

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- To create control sites suitable for monitoring the environmental effects of development and adjacent land-use practices of other marine environments.

One example of a statement of purpose in MPA legislation can be found in the Government of Belize's Fisheries (Amendment) Act of 1983. This law's declared objectives are:

... to afford special protection to the aquatic flora and fauna of such areas and to protect and preserve the natural breeding grounds and habitat of aquatic life; to allow for the natural regeneration of aquatic life in areas where such life has been depleted; to promote scientific study and research in respect of such areas; and to preserve and enhance the natural beauty of such areas.<sup>20</sup>

If present and potential users of the MPA, non-governmental organizations, and the public are involved in the process of enacting MPA legislation and, in particular, in drafting a statement of purpose, this process can itself contribute to national recognition of the importance of MPAs as resource management tools. The statement of purpose should correspond to a country's overall policy for the management and protection of marine, coastal, and terrestrial protected areas. Such a statement of purpose has been found to be extremely useful during subsequent decisionmaking, such as courtroom deliberations, since it can clarify the reasoning underlying specific MPA provisions.

#### **B. Defining the Geographical Boundaries of Marine Protection Legislation**

While property law requires that boundaries be drawn encircling and distinguishing MPAs from outside areas, it is crucial to understand that marine ecosystems are interrelated, having no distinct biophysical boundaries, and that they may shift geographically over time. Marine ecosystems are not well understood and any approach taken for drawing boundaries should recognize this.

When defining the legal boundaries of an MPA, the ecosystemic boundaries necessary to maintain the integrity of the protected area must first be determined. It is critical that not only the "core" ecosystem or habitats be included inside the protected area, but also any necessary marine or terrestrial buffer zones.<sup>21</sup> Provision might also be made for any terrestrial buffer areas to be designated terrestrial protected areas, either through provisions

in the MPA legislation itself or in conjunction with the appropriate terrestrial protected area legislation.

Other factors apart from these ecosystemic considerations should also be taken into account. These include the legal boundaries established by other legislation or treaties (especially state jurisdiction over seabed areas); the boundaries of private property (particularly in adjacent terrestrial zones); customary, communal, public, or indigenous tenure (e.g., customary fishing rights); the effect, should an area be designated, of displacing activities within the area to new areas; the jurisdictional boundaries of local or regional governmental authorities; the type, intensity, and effect of existing and potential human activities in the area; surveillance and enforcement requirements; the feasibility of managing the area; and the rights of other users (for example, maritime traffic). In addition, provision may be made for granting future private property within a large MPA (perhaps for future tourist development).

### C. Provisions for Managing Marine Protected Areas

Regardless of whether MPAs are to be established by revising existing marine conservation laws or by enacting a new specific purpose MPA law, it will be essential to establish a legislative basis for the creation and maintenance of MPAs. This legislative structure should define the delegation of governmental legal authority for management of the MPAs.

Management of an MPA is linked to the area being protected, the present and future threats to the area, the authority of any international or national administrative bodies over the area or adjacent areas, and the prospect of or desire for coordination between these various administrative bodies.

National MPA legislation should take into account and be shaped by pre-existing regional, international, and other multilateral obligations. Of particular note, with regard to the Gulf of Aqaba, are the international obligations in the Jeddah Convention and Protocol of 1982 and those recommended by the Regional Organization and Action Plan under this Convention.<sup>22</sup> While the Jeddah Convention Area explicitly includes the Gulf of Aqaba, and Egypt, Jordan, and Saudi Arabia are parties, Israel unfortunately is not.

Within the semi-enclosed sea of the Gulf of Aqaba (bounded as it is by these four countries), it is absolutely crucial, for the protection of any sensitive aquatic habitat, that an international arrangement be established to coordinate the activities of all national and international management agencies with responsibilities in the Gulf and all Gulf users. This coordination would ideally occur within a formal, rather than an informal, institutional framework:

The promulgation of rules and regulations by each country protecting specified areas along the coast is simply an inade-



quate means to ensure the preservation of the Gulf and the natural resources upon which most coastal development depends. As pollution has little regard for notions of territorial sovereignty, it is necessary to formulate and institute a regional solution which encompasses the concerns of all four nations.<sup>23</sup>

These international arrangements must, in turn, be given the force of law through national implementing legislation enacted in each of the four Gulf-bordering states. A central issue at the national level is whether MPA legislation should provide detailed administrative powers or only a broad basis for management:

In issues of natural resource conservation it is generally the case that the views of the most powerful local interests in an area are strongly biased to realizing short-term economic benefits. This leads to strong local pressure for over-exploitation. For this reason it is strongly recommended that sufficient detail be written into law for management to be protected from unreasonable local pressures. Detail should however be carefully considered with regard to likely requirements of management because once such administrative detail is written into law there are limits to the flexibility of approach of management in addressing the unexpected.<sup>24</sup>

At the national level, existing management authorities should, where possible, be used for protecting sensitive marine areas as this results in less expense. MPA legislation should coordinate the activities and delineate the responsibilities of these authorities. Any extra support or resources may then be provided to the existing authorities to enable them to perform the tasks necessary for protection of the MPA. New authorities should be established only where strong public support and compelling administrative reasons favor such a step.

The relationship between MPA legislation and other related laws should be clarified. In the example of the Australian Great Barrier Reef, the MPA legislation, zoning plans, and regulations prevail over conflicting provisions of any other legislation (except that relating to navigation of ships and aircraft).<sup>25</sup> Through the careful drafting of interagency agreements, different agencies' respective functions and responsibilities can be delineated. To accommodate the eventuality that interagency conflicts may nevertheless arise, MPA legislation can also include dispute resolution mechanisms. Appropriate linkages with local government authorities can also be promoted through legislative provisions defining local responsibilities for ecologically sound development and other obligations related to the protection of MPAs.

As MPA legislation is being drafted, it may be desirable to encourage the

active participation of the general public, users of the marine environment, and non-governmental organizations such as traditional village communities, clubs, and associations. In addition, the legislation itself may appropriately contain specific, clearly outlined procedures for public participation in the actual implementation and management of the MPAs.

#### D. Financing of Marine Protected Areas

Establishing MPAs is not without cost. The area might not be owned by the government and may have to be purchased or otherwise acquired. The future economic sacrifice in terms of lost opportunity for commercial uses of the area should be considered. However, the creation of MPAs may also prove economically beneficial where, for example, the areas provide nursery grounds for the juveniles of commercial fish species. While planners may find it useful, in some instances, to weigh the economic costs and benefits of different MPA management options, their ability to quantify certain of these factors may be limited. It is generally "difficult to determine the economic value of the [protected area] to society as a whole based on such things as public use, research and interpretative value."<sup>26</sup>

Once acquired, MPAs must be managed and maintained, which can be expensive. A recurring problem with MPAs, particularly those created in nonindustrialized nations, is that they remain unfunded and essentially "paper parks." While the bulk of funds will usually need to be provided through national government appropriations (which should be embodied in the legislation), special consideration should be given to empowering the MPA authority to raise its own funds through user charges or other means.

A range of alternative fundraising tools can be used to support the management of MPAs. In the Netherlands Antilles, marine park authorities have charged entrance fees; sold souvenirs such as T-shirts, caps, bags, postcards, and underwater photographic slides; produced and marketed guidebooks serving the dual purpose of educating visitors about the park's marine habitats and specifying conduct restrictions within the MPA; and charged commercial boat operators a fee for operating within MPA waters.<sup>27</sup> Other financing suggestions have included charging airport taxes, "polluter pays" discharge fees, highway tolls, boater registration fees, and taxes on the extraction of resources such as shells or fish.<sup>28</sup> In Australia, the Great Barrier Reef Authority charges fees for processing and assessing permits for activities on the reef.<sup>29</sup> As another financing mechanism, governments can supplement MPA budgets with the proceeds of any fines or lawsuits associated with violations of MPA regulations.<sup>30</sup> Initial financing to develop an MPA may also be sought from international lending agencies, as well as regional or national development banks.

Beyond the actual management of MPAs, tax incentives can be used to encourage investments that are harmonious with the goals of MPA programs. For example, coastal industries can be assisted in developing dis-

charge treatment facilities through special tax breaks or investment subsidies.<sup>31</sup>

Where local inhabitants or communities lose rights to utilize areas due to their new protected status, experience has shown that compensation, particularly in the form of appropriate employment, will contribute to the success of the MPA. This will be especially true where the success of an MPA depends on the support and active cooperation of local people.

#### E. Enforcement and Regulatory Powers

The MPA legislation should grant adequate enforcement powers to public officials charged with overseeing compliance with MPA regulations. Wardens of marine parks in Israel are given powers equivalent to those of police officers.<sup>32</sup> While the granting of enforcement powers must always be balanced against the interest in safeguarding the freedoms of citizens, enforcement powers must be sufficient to induce compliance with MPA norms.

Enforcement powers relevant to the protection of MPAs might include: sufficient penalties to deter breaches of the legislation<sup>33</sup>; incentives for self-enforcement by users of the MPA; powers sufficient for field officers to take effective enforcement action, including pursuit, arrest, gathering of evidence, confiscation of gear, and laying of charges in the courts; and provisions, where workable, for local people to assist enforcement personnel or to carry out their own enforcement activities.<sup>34</sup>

Offenses within MPAs should be clear, simple, and easy to comprehend, particularly where it is possible that tourists may be likely offenders.<sup>35</sup> Signs and other information (such as leaflets and tourist brochures) concerning these offenses and the importance of preservation of the areas should be prominently located and written in several languages.<sup>36</sup> Newspapers, broadcasting, and other media have also been used in some countries to disseminate the basic code of the MPA laws, especially with respect to public offenses.

To maintain flexibility, MPA legislation should additionally provide the responsible government agencies with authority for promulgating new regulations where necessary to implement the objectives of the legislation. Regulations may provide for: enforcing a management plan; conferring functions upon officers; controlling activities outside the MPA; governing activities within the MPA; and providing for permits, fees, charges, and penalties.

#### III. Selection of Sites for Marine Protected Areas

Following enactment of a legislative structure, it will be appropriate to select new sites for designation as marine protected areas. Information concerning the biological and geophysical aspects and human uses of a

possible site for designation as an MPA should first be collected and analyzed. The criteria for determining whether a site should be designated an MPA will include a variety of factors relating to the objectives of the MPA legislation. These include the biogeographic and ecological significance of the site, the economic and social importance of the site, the human threats to the site, and the feasibility of protecting the site.

The procedure for selecting sites as marine protected areas may consist of two steps. First, the government itself, or through consultants, should examine all existing information concerning the state's marine areas and determine within broad criteria those areas which should be examined in greater detail. Second, each area should then be carefully evaluated regarding its particular merits. This evaluation process should be governed by a list of selection criteria drawn from the elements identified in the statement of objectives of the MPA legislation.

The United States involves the public during the second stage of identifying suitable MPAs, rather than only involving the public in subsequent management planning procedures. It is believed that this early involvement of the public allows for the preparation of more complete selection proposals and for more thorough public discussion and analysis of sites prior to their designation as MPAs.<sup>57</sup>

The biological, chemical, and physical aspects of ecosystems within the area should be catalogued and analyzed as part of the site evaluation process. These might include the area's archeology, historical relics, written and oral history, recent developments, coastal landforms, bathymetry, tides, salinity and turbidity, geology, dominant currents, freshwater inputs, climate, marine wildlife, birds, and migratory animals.

In addition, information should be gathered on the intensity and distribution of the human uses of and human effects upon the area. "User" information should identify the full range of significant human uses of the selected area; where different human populations undertake their activities; at what times of the year, and for how long; and the social, cultural, and economic value of these various uses. Also relevant would be information on the access routes followed by subsistence, artisanal, recreational, and commercial users of the area. A variety of user surveys would be helpful in obtaining this array of information.

It is important that each country establish site selection criteria that conform to its own scientific culture and information base. Acknowledging this constraint, the following is a nonexclusive and nonhierarchical list of criteria, based primarily on a list developed by the IUCN,<sup>38</sup> which may be used in determining whether any particular area should be protected:

- *Naturalness*: To what degree has the area not been subject to human-induced change?
- *Biogeographic Significance*: Does the area contain rare or



unique biogeographic qualities, or is it representative of one or more biogeographic "types"? (Where the objective is to establish MPAs representing the full range of variation within a single country's marine environment, a determination of biogeographic significance can be made nationally. Alternatively, this determination can be based on broader regional or even global criteria.)

- *Ecological Significance*: Does the area support essential ecological processes or life-support systems? To what degree does the area (either by itself or in association with other protected areas) enclose complete ecosystems? Are the boundaries of the proposed MPA easy to identify? Is the area biodiverse or genetically diverse, or does it contain a variety of habitats and species? Does the area contain habitats for rare or endangered species; include nurseries or juvenile areas; feeding, breeding, or rest areas; or rare or fragile habitats for any species?
- *Economic Significance*: What is the area's present or potential economic value? What would be its economic value if it were protected (i.e., what would be the value of the protected area in terms of recreation, tourism, subsistence use by traditional inhabitants, or as a nursery area or source of supply for present or future commercially valuable species)?
- *Social Significance*: What is the existing or potential value of the area to local, national, or international communities due to its historical, cultural, archaeological, traditional, aesthetic, educational, or recreational qualities?
- *Scientific Significance*: What is the value of the area for scientific research or monitoring?
- *International, Regional, or National Importance*: What is the potential of the area to be listed on the World Heritage List, to be declared a Biosphere Reserve, or to be included on a list of areas of international, regional, or national importance? Is it the subject of an international, regional, or national conservation agreement?
- *Threats*: What are the actual and potential external or internal threats to the area? What degree of isolation does the area have from any external damaging influences? (Threats may be posed by vessel traffic; aircraft overflights; commercial and recreational fishing; other recreational activities, such as snorkeling, spearfishing, and specimen collecting; ocean dumping and waste disposal; scientific research; dredging and dredge disposal; disturbing marine mammals and seabirds; anchoring;



salvage operations; oil and gas recovery; and unidentified external sources of pollutants.)

- *Feasibility:* What level of support does the protection of this area have from the community and political institutions? What are the priorities of national or territorial government for MPAs? Are there any indigenous claims to the area? Who owns the seabed and coastal lands of the area? Is the area suitable for education, tourism, or recreation? Is the protection of the area compatible with existing uses or claims, particularly those of locals? What management difficulties may arise and is the protection of this area compatible with existing conservation and management systems? Will the area remain unharmed if it is not legally protected?

A useful technique for assessing the overall selection character or representativeness of several proposed MPAs is to use a rectangular array or matrix where each natural feature or attribute accounts for a column and each site a row. Each site is then assessed and a value assigned at the intersection and finally all sites assessed against each other.<sup>39</sup>

#### IV. Planning and Management of a Marine Protected Area

While the general functions of management authorities may be established or coordinated through the enabling MPA legislation, specific implementation tasks and responsibilities will typically be set forth in a more detailed management plan. The objectives of a management plan should correspond to the statement of purpose of the MPA enabling legislation. Management plan objectives might include the following: (1) to ensure the maintenance of the MPA and its critical habitats, ecosystems, and ecological processes in perpetuity; (2) to separate any conflicting human activities permitted within the MPA; (3) to control uses compatible with preservation of the MPA; and (4) to preserve some areas of the MPA (or perhaps entire MPAs) in their natural state undisturbed by humans (except, perhaps, for the purposes of scientific research or education).

The complexity of any particular management plan will vary and will be primarily determined by the area involved and the degree of human use of the area, as well as by the conventions and procedures of the government agencies involved in management. The particular format chosen may range from small-scale, locally adopted municipal plans, such as those developed in the Philippines,<sup>40</sup> to nationally endorsed legal instruments, such as those prepared for the Australian Great Barrier Reef.<sup>41</sup>

For a small, highly protected MPA, a single set of management provisions may apply uniformly throughout the area. For larger protected areas, particularly those with existing and predicted future human uses, more complex zoning and management plans will be necessary.

### A. Zoning

The concept of zoning in relation to MPAs was devised to resolve possible conflicts between the primary objective of preservation of an area and existing or predicted future human activities within the area. Through the use of zoning, a multiple use MPA is divided into separate zones and subzones, with some of these zones and subzones open to suitable human activities and others protected from human use. Levels of protection within the multiple use MPA may then vary from zone to zone. In some, there will be almost no restriction on activities, while in others there will be almost no human activity allowed.

To allow for flexible implementation and enforcement of these restrictions, users are required to notify the management authority or obtain permits for their activities from the management authority. This authority, in turn, has discretion to permit specified activities with or without conditions attached.

The Australian Great Barrier Reef Marine Park provides a useful example of a multiple-zone MPA plan. These zones fall into three general categories:

- *Preservation Zones and Scientific Research Zones* (equivalent to the IUCN Category 1, Scientific Reserve/Strict Nature Reserve). The objective of a preservation zone is to preserve areas in their natural state undisturbed by humans except for purposes of scientific research which cannot be carried out in other zones. The objective of a scientific research zone is to provide an area where permitted research can be carried out free from the influences of recreational activities, fishing, and collecting.
- *National Park Zones* (equivalent to IUCN Category II, National Park). The objective of the national park zone is to provide for the protection of the natural resources of the area while allowing the public to appreciate and enjoy the relatively undisturbed nature of the area free from collecting and fishing. However, this major zone has been divided (in the case of the Cairns section of the Reef) into a subzone where some permitted recreational and fishing activities are allowed.
- *General Use Zones* (equivalent to IUCN Categories IV, Managed Nature Reserve, and VI, Resource Reserves). Uses in these zones are held at levels that are considered reasonable and do not jeopardize conservation of the Reef ecosystems or its major elements. Commercial and recreational fishing are generally permitted, although replenishment areas and seasonal closure areas have also been established.<sup>42</sup>

Within these major zones, subzones are established with more specific restrictions applicable within their boundaries. Subzones might include

seasonal closure areas, reef appreciation areas, reef research areas, aircraft landing areas, vessel mooring areas, buffer zones, and no-structures areas.

## B. Preparation of Management Plans

The following principal steps should be followed in creating and implementing an MPA management plan: (1) information gathering; (2) public participation; (3) preparation; (4) public review of the draft plan; and (5) final plan and revision. The degree to which a particular country might follow these steps may vary depending on the prevailing political, legal, and social norms within that country.

### 1. Information Gathering

Once a site has been proposed for an MPA, the government, planning agency, or consultants should assess existing information and, if necessary, gather and assess further information concerning the ecosystems and human uses of the MPA.<sup>43</sup> It is important to define questions and consider the applications of the resulting information before commissioning or undertaking these studies. Otherwise, it will be all too easy to spend time, money, and human resources on studies that add to general understanding but contribute little to answering critical questions for planning and management.<sup>44</sup> In the United States, "Sanctuary Management Plans include resource studies plans which identify information needs in each designated sanctuary and describe projects needed to generate data that will improve resource management."<sup>45</sup>

While it is valuable to obtain information concerning the biophysical aspects of the MPA, it is perhaps more important to identify and measure the human uses of, and effects upon, the MPA. This might include identifying access routes to the area as well as subsistence, artisanal, tourist, recreational, and commercial users of the area. The objective should be to predict future levels of human use and their potential effects. It must also be understood that decisions concerning planning and management are rarely made with complete knowledge of the ecosystem processes or human uses of an area, even where significant technical resources can be applied: "In light of general understanding of marine ecosystems and the impact of human activity, the absence of site-specific information is rarely so severe as to justify postponing management in favor of more research."<sup>46</sup>

Further research will, in any case, be undertaken after the management plan is established and during periodic review of the plans. The aim of these investigations must be to reduce progressively the uncertainty on which management decisions are based.

### 2. Public Participation

Prior to the preparation of a plan, the management authority should make contact with and seek comment from the public, commercial and recrea-

tional users, independent scientists, local government, industry, other government agencies, and non-governmental organizations. Suggestions for further information gathering and for the content of the proposed plan should be obtained.

Involvement of resource users in planning will facilitate their understanding of the process. If the views of resource users are properly considered and explanations given for particular planning and management decisions, these users are likely to be more willing to comply with the provisions of the finished zoning plan, even if it does not accord with their desires.<sup>47</sup> Conflicts between different users should be identified and resolved in conjunction with the users during plan development.

The level of public participation will, of course, depend on prevailing political, social, and cultural norms. In Australia, for example, management authorities have utilized a wide range of tools to elicit public and user group comment and participation, including publicity through television and the press, public meetings, information booths, meetings with user groups, and mail-back brochures.<sup>48</sup>

### 3. Preparation of the Draft Plan

Following an analysis of the user group and public comments, a draft management plan should be developed and further materials prepared for public dissemination. These documents should summarize public comments concerning the first phase of planning, explain the plan in lay person's terms, and elicit further comment.

A draft plan, as well as the final plan, should contain the following elements:

- An *Executive Summary* covering the key issues and identifying any necessary decisions. Since the public and many of the final decisionmakers will not have time to read and absorb the details of the plan, it is imperative to provide a clear summary of what they are.
- An *Introduction* to the plan, stating its purposes, identifying its legislative basis and authority, specifying its goals and objectives, and describing the area and interpreting difficult terms.
- A summary *Description of the Resources* and *Description of the Human Uses* of the area, with the details included in an appendix or separate document. The plan should concentrate on the present uses of the area, but also identify past and possible future uses. It should also contain a brief social and economic analysis of the human uses of the area.
- A *Description of the Legal and Existing Management Frameworks*, including fisheries, marine transportation, and other ap-



plicable legal controls on the present uses of the area. If relevant, traditional practices, tenure, or rights to the marine resources should be outlined. Any historic and current conflicts between uses or user groups should also be described. In addition, the plan should describe any present or possible future threats to the proposed MPA, such as pollution (point and non-point), runoff, sewage, industrial pollution, fish processing, tourism, future demands for recreational and other uses, shipping, and sectoral development plans for the region.

- A *Statement of Management Policies*, containing a description and explanation of any zoning restrictions or opportunities for activities within the area. This statement might describe the area boundaries for specific activities (e.g., zoning boundaries); seasonal closures during certain parts of the year (e.g., those critical to life/breeding cycles of species or replenishment areas); size limits and maximum permitted catches for different marine life species; unacceptable equipment or gear (e.g., spearfishing with scuba gear); and licensing or permits required (e.g., to provide specific controls or to limit the number of participants in a form of use). In preparing and implementing these restrictions, care should be taken not to interfere excessively with people's freedom. The Statement of Management Policies should also discuss any interagency agreements relevant to implementing the MPA, and should provide information on the allocation of responsibility among authorities involved in meeting the objectives of the MPA, as well as the institutional mechanisms for resolving any conflicts that may arise. A summary of the *Consultative Processes Followed in the Development of the Plan* may be included, or perhaps issued in a separate document. Additional management policies, including surveillance, monitoring, education, enforcement, administration, budget, regulations evaluation and review, and staffing should also be described. *Appendices*, maps, diagrams, etc. may be added for clarification.

#### 4. Public Review of the Draft Plan

Once the draft plan has been prepared, further meetings should be called, and additional public and user group comment on the draft plan should be elicited prior to preparation of the final plan. Mechanisms used for public participation in stage two of this planning process, discussed earlier, should again be employed.

#### 5. Preparation and Issuance of the Final Plan

Taking account of the comments and information received in response to



the draft plan, the planning agency should then draft a final management plan. Final management plans could be presented to the public for another round of input, before being submitted to the governing body for final adoption.

Once the MPA plan has been formally adopted, there should be provisions for ongoing consultation with affected parties. The final management plan should be supported by education measures to aid those affected by the plan, to help make them aware of their rights and responsibilities under the plan. A well-executed education and public involvement program will help strengthen public and political commitment to the MPA.

#### *6. Review of the MPA Plan*

Revision of the management plan is an important part of the MPA planning process. Review procedures for the management plan should be set forth in the MPA legislation. The period between reviews should be neither so short that a lack of resources to undertake the review is a problem, nor so long that changing conditions within the MPA remain unaddressed. Five to seven years is a usual time period between reviews.

Monitoring of and research into the human impacts, human patterns of use, and the effectiveness of existing management arrangements should be undertaken during the inter-review period, as part of the preparation for the next review. The management plan should then be reassessed and, if necessary, revised as knowledge of the MPA increases and as changes occur in uses both within and outside the MPA. The relevant questions for an MPA plan review might be whether the existing legislation, organizational structures, management and planning mechanisms, and information-gathering systems are adequately providing for the protection of the marine protected area or areas.

#### **V. Conclusion**

This chapter discusses some of the means by which sensitive aquatic habitats within the Gulf of Aqaba may be protected or their existing protection enhanced. While many important issues have been raised, four should be further stressed:

- The Gulf of Aqaba contains some of the world's most outstanding and unique sensitive aquatic habitats (in particular coral reefs) which at present remain largely unharmed.
- These sensitive aquatic habitats, like many other sensitive aquatic habitats in other regions of the world, are threatened by damaging human activities.
- Sensitive aquatic habitats within the Gulf of Aqaba are interconnected with one another and with the wider marine environ-

ment of the Gulf. To protect these habitats, it is essential that human uses of the wider marine and terrestrial environments surrounding them be managed in a manner consistent with their protection. Failure to manage the human uses of the wider marine and terrestrial environments of the Gulf can only result in continued degradation of any sensitive aquatic habitat despite efforts to protect them individually.

- Effective protection of sensitive aquatic habitats within the Gulf compels lasting cooperation within and between the four nations bordering the Gulf. This will require efforts not only from governments and their agencies, but also from users of the marine environment, non-governmental organizations, and above all the public.

#### Notes for Chapter 6

1. Other authors in this report discuss the physical geography of the Gulf of Aqaba, including threats to the Gulf's marine habitats. See Chapter 1, by Khalil Hosny Nancy, and Chapter 2, by Mohammed I. Wahbeh.
2. For example, the Gulf hosts the endangered dugong and the endangered hawksbill turtle. Some sandy beaches within the Gulf serve as nesting sites for these species. CORAL REEFS OF THE WORLD, VOL. 2: INDIAN OCEAN, RED SEA AND GULF 61 (United Nations Environment Programme 1988); see also Brian Dicks, *Pollution*, in KEY ENVIRONMENTS—RED SEA 383, 396 (A. Edwards et al., eds.) (International Union for the Conservation of Nature—Natural Resources Programme 1987).
3. Lev Fishelson, *Marine Reserves Along the Sinai Peninsula (Northern Red Sea)*, 33 HELGOLANDER MEERESUNTERSUCHUNGEN 624, 625 (1980). For a discussion of the coral reefs of the Gulf of Aqaba, see, e.g., DAVID DAROM (MASRY), *THE RED SEA* (Jerusalem: Sadan Publishing House/Steimatzy's Agency); LEV FISH-ELSON, *MYSTERIES OF THE RED SEA* (Tel Aviv: Massada 1984); CORAL REEFS OF THE WORLD, *supra* note 2, at 57-63 (Egypt), 139-43 (Israel), and 271-80 (Saudi Arabia).
4. See WORLD RESOURCES INSTITUTE, 1990-1991 WORLD RESOURCES, A GUIDE TO THE GLOBAL ENVIRONMENT 127-28 (New York: Oxford University Press 1990); see also Y. Loya and B. Rinkevich, *Effects of Oil Pollution on Coral Reef Communities*, 3 MARINE ECOLOGY 167 (1980).
5. LYNN DAVIDSON & KRISTINA GJERDE, *AN EVALUATION OF INTERNATIONAL PROTECTION OFFERED TO CARIBBEAN CORAL REEFS AND ASSOCIATED ECOSYSTEMS* (Greenpeace Int'l and Marine Policy Centre Woods Hole Oceanographic Institution 1989).
6. The International Union for the Conservation of Nature (IUCN) describes this area as the only stretch of Saudi Arabia's Gulf of Aqaba coast with good reefs and has recommended that the area consisting of Humaydah Beach, Bay, and Island,

and the inlet south of Humaydah Bay become a coastal and marine protectorate. See CORAL REEFS OF THE WORLD, *supra* note 2, at 280; IUCN, Saudi Arabia: An Assessment of Management Requirements for the Saudi Arabian Red Sea Coastal Zone (Report to Meteorology and Environment Protection Administration (MEPA), Jeddah, Kingdom of Saudi Arabia, 1987) (draft); A.M.J. Dakkak et al., *Conservation and Management of the Red Sea Marine Coastal Resources of Saudi Arabia*, in PROCEEDINGS OF THE SYMPOSIUM ON CORAL REEF ENVIRONMENTS OF THE RED SEA 653-64 (Jeddah 1986).

7. CORAL REEFS OF THE WORLD, *supra* note 2, at 276; see also IUCN, The Red Sea and Arabian Gulf, Saudi Arabia: A National Coastal Zone Management Program to Balance Future Growth with Protection of Coastal and Marine Resources (Report to MEPA, Jeddah, Kingdom of Saudi Arabia 1987) (draft); IUCN, *supra* note 6.
8. DAROM, *supra* note 3, at 17; see also Lev Fishelson, *Littoral Marine Ecosystems and Marine Parks of Israel*, in PARKE MARINA 453, 464 (Conference proceedings, Castellabate, Italy, Apr. 1973).
9. CORAL REEFS OF THE WORLD, *supra* note 2, at 61.
10. Fishelson, *supra* note 8, at 462. This habitat includes a beach rock conglomerate, soft bottom lagoon with isolated coral colonies, and a fringing coral reef platform. This habitat is described by Fishelson as one of the most complex and diverse within the Gulf of Aqaba. See also CORAL REEFS OF THE WORLD, *supra* note 2, at 139.
11. R. Ormond, *Conservation and Management*, in KEY ENVIRONMENTS—RED SEA, *supra* note 2, at 419.
12. The beach close to Eilat has a man-made lagoon and well-used marina. There are 15 hotels in this area with facilities for reef-based recreational activities. A second tourist area has been established north of the coral reserve, 8 kilometers south of Eilat, where there is also a major new hotel development. See CORAL REEFS OF THE WORLD, *supra* note 2, at 139.
13. Fishelson, *supra* note 8, at 455.
14. Loya and Rinkevich, *supra* note 4, at 177.
15. Dicks, *supra* note 2, at 384.
16. Graeme Kelleher and Richard Kenchington, Guidelines for Establishing Marine Protected Areas 24 (IUCN, IV World Congress on National Parks and Protected Areas, Caracas, Venezuela, Feb. 10-21, 1992).
17. See *Hol Chan Marine Reserve (Belize)*, *Cayman Islands Marine Parks*, and *Looe Key Marine Sanctuary (United States)*, in DAVIDSON & GJERDE, *supra* note 5, at 54-58.
18. See NEW ZEALAND DEPARTMENT OF CONSERVATION, 1991 ANNUAL REPORT (Wellington, New Zealand 1992). The Kermedec Islands Marine Reserve was established in 1990. This subtropical area is about 400 nautical miles northeast of Auckland, New Zealand. The marine reserve surrounds four main islands, extending from the coast out to the limits of the territorial sea.

19. See, e.g. U.S. DEPARTMENT OF COMMERCE, NATIONAL SANCTUARY PROGRAM, PROGRAM DEVELOPMENT PLAN 2 (Washington, DC 1982); AUSTRALIAN GREAT BARRIER REEF MARINE PARK AUTHORITY, ANNUAL REPORT, 1984-1985, at 7 (Queensland 1985).

The objectives of the United States National Marine Sanctuaries Program are to:

1. Enhance resource protection through the implementation of a comprehensive, long-term management plan tailored to the specific resources;
2. Promote and coordinate research to expand scientific knowledge of significant marine resources and improve management decision-making;
3. Enhance public awareness, understanding, and wise use of the marine environment through public interpretative and recreational programs; and
4. Provide for optimum compatible public and private use of special marine areas.

The goal and aims of the Australian Great Barrier Reef Marine Park Authority are as follows:

1. *Goal:* To provide for the protection, wise use, appreciation and enjoyment of the Great Barrier Reef in perpetuity through the development and care of the Great Barrier Reef Marine Park.
2. *Aims:* These aims are subordinate to the primary goal and must be read in conjunction with it and with each other.
  - 2.1 *Social:* (i) to involve the community meaningfully in the establishment and management of the Marine Park; (ii) to minimize regulation of, and interference in, human activities, consistent with meeting the goal and other aims of the Authority; (iii) to achieve through management of the Marine Park primarily through the community's understanding and acceptance of the provisions of zoning, regulations, and management practices; (iv) to achieve competence and fairness in the development and care of the Marine Park through the deliberate acquisition and use of relevant scientific and non-scientific information and techniques in decision-making and other activities;
  - 2.2 *Environmental:* (i) to provide for the protection of the natural features of the Reef, whilst providing for the multiple use of the Reef's resources;
  - 2.3 *Economic:* (i) to minimize costs of developing and caring for the Marine Park consistent with meeting the goal and other aims of the Authority; (ii) to provide for development compatible with the conservation of the Reef's natural resources; (iii) to minimize inhibitions on economic activities consistent with meeting the goal and other aims of the Authority;
  - 2.4 *General:* (i) to adapt the Marine Park and the operations of the Authority to changing circumstances.

20. Belize, The Fisheries (Amendment) Act of 1983, cited in DAVIDSON & GJERDE, *supra* note 5, at 54.



21. During the establishment of Marine Parks in Israel, the adjacent strip of land was included. Fishelson, *supra* note 8, at 458; *see also* Fishelson, *supra* note 3, at 626.
22. Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment, together with a Protocol concerning Regional Co-operation in Combating Pollution by Oil and Other Harmful Substances in Cases of Emergency, Feb. 14, 1982, *reprinted in* NEW DIRECTIONS IN THE LAW OF THE SEA, J. 19 (Kenneth R. Simmonds, ed.) (New York: Oceana Publications 1984).
23. *See* Khalil Hosny Mancy, *supra* note 1; *see also* Fishelson, *supra* note 8, at 465.
24. Kelleher & Kenchington, *supra* note 16, at 22.
25. *Id.* at 14.
26. SANCTUARY PROGRAMS OFFICE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, NATIONAL MARINE SANCTUARY PROGRAM: PROGRAM DEVELOPMENT PLAN apps. C, C-8 (Washington, DC 1982).
27. *See* DAVIDSON & GJERDE, *supra* note 5, at 59.
28. *See* KRISTINA M. GJERDE & RODNEY M. FUJITA, GUIDELINES FOR NATIONAL LEGISLATION TO PROTECT CORAL REEF ECOSYSTEMS 8 (Greenpeace, Environmental Solutions International, Environmental Defense Fund 1992).
29. AUSTRALIAN GREAT BARRIER REEF MARINE PARK AUTHORITY, ANNUAL REPORT, 1989-1990, at 27 (Queensland 1990).
30. This has been used in the United States. *See* DAVIDSON & GJERDE, *supra* note 5, at 59.
31. *See* GJERDE & FUJITA, *supra* note 28, at 9.
32. *See* Fishelson, *supra* note 8, at 465.
33. Recently the Australian Great Barrier Reef Authority raised its penalties to a maximum of \$A 10,000, particularly for marine transport violations. *See* Great Barrier Reef Marine Park Amendment Act, 1991, No. 121, AUSTL C. ACTS, § 59I.
34. Within the Gulf, watchers could be hired from among the local Bedouin. *See* Fishelson, *supra* note 3, at 638.
35. *See id.* at 630-31. For example, in the Israeli marine protected area, the most important among the laws are: (1) all corals and many "non-edible" fish and invertebrates are totally protected and any damage or collection of them not authorized by the authorities will be punished; (2) waste disposal of any kind in the reef region is forbidden and punishable; and (3) fishing activities in the marine reserves are forbidden, although fishing by special permission is possible in special areas designed for this.
36. In the Israeli marine parks, signs concerning the regulation of human activities are customarily written in Hebrew, English, French, and Arabic.
37. SANCTUARY PROGRAMS OFFICE, *supra* note 26, at 5.
38. Kelleher & Kenchington, *supra* note 16, at 19.



39. SANCTUARY PROGRAMS OFFICE, *supra* note 26, at 24-32; *see also id.*, app. D (example of the operation of a Site Evaluation Matrix system).
40. *See* Alcala & White (1985), *cited in* Kelleher & Kenchington, *supra* note 16, at 37.
41. *See, e.g.*, AUSTRALIAN GREAT BARRIER REEF MARINE PARK AUTHORITY, GREAT BARRIER REEF MARINE PARK, CAIRNS SECTION ZONING PLAN (Queensland 1991).
42. Graeme Kelleher, *Managing the Great Barrier Reef*, 29 OCEANUS (Special Issue: The Great Barrier Reef: Science and Management) 13, 16 (Summer 1986).
43. A number of tools may be used in this process: mapping by hand drawn and computer methods; aircraft and satellite remote sensing; cross-sections and sketches; underwater interpretation; photography and filming.
44. Kelleher, *supra* note 42, at 18. Research is also undertaken to improve the development and implementation of management policies and techniques. Such efforts might include: research to determine the appropriate size of buffer areas between the resources and existing or potential activities; the effects of visual and acoustic disturbances on marine wildlife; the effects of various pollutants on corals; or the appropriate user activity consistent with resource protection.
45. SANCTUARY PROGRAMS OFFICE, *supra* note 26, at 15.
46. Kelleher & Kenchington, *supra* note 16, at 30.
47. AUSTRALIAN GREAT BARRIER REEF MARINE PARK AUTHORITY, ANNUAL REPORT, 1984-1985, at 21 (Queensland 1986); *see also* Wendy Craik, *Planning and Management of the Great Barrier Reef Marine Park*, at 5 (unpublished speech given for the Torres Strait Conference, Nov. 19-23 1990).
48. AUSTRALIAN GREAT BARRIER REEF MARINE PARK AUTHORITY, ANNUAL REPORT, 1989-1990, at 16 (Queensland 1991).