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TOWARDS CONSERVATION OF A GLOBALLY SIGNIFICANT ECOSYSTEM: THE RED SEA AND GULF OF ADEN¹

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The Red Sea and Gulf of Aden (RSGA) are renowned for their unique marine and coastal environments and species. An extreme pace of unmanaged development and a severe shortage of technical and conservation expertise threatened these globally important conservation values. Spurred to action, a period of intense activity in marine conservation, training and science by individual nations, the region, and the international donor community began in 1995. Many gains were made in marine environmental and resource management, however, I will confine this overview to marine conservation. Marine conservation in the RSGA highlights the need for the most basic foundations to be laid by building political support and understanding, growing technical and management expertise, gathering relevant scientific information, and addressing the socio-economic issues that threaten conservation values. The primary sources for much of the information presented here can be found in PERSGA (2006).

The global conservation values of the RSGA include: the diversity of coral reef habitats in the central Red Sea of Saudi Arabia and Sudan; a distinctive biogeography and large number of endemic species; the Sinai's unique coral reefs; coral reefs actively accreting in *sharms* (estuaries); the atoll-like formation of Sanganeb Atoll in Sudan; extensive stands of mangroves in the southern Red Sea; and the unique biodiversity of the Socotra Archipelago. There are 31 Important Bird Areas of which the Hurghada (Egypt) and Socotra Archipelagos (Yemen) are globally significant. Globally significant nesting sites for green turtles occur at Mukkawar Island (Sudan) and Ras Sharma (Yemen). The Red Sea coast of Saudi Arabia is one of the most important areas for dugong in the world and the Sudan population of dugong may be the most important remaining on the coast of Africa.

Since the 1960s the great pace of development that occurred in parts of the Red Sea, and is unlikely to have occurred anywhere else on Earth, had profound consequences for conservation. This rapid development arose from the growth of the petroleum-based economies. The relevant data are impressive. Four RSGA states (Egypt, Saudi Arabia, Sudan, Yemen) produce 15.5% of the world's oil. Daily 12.54 million barrels of oil are exported from these countries, mostly by sea. In 2004 16,850 ships passed through the Suez Canal to enter or leave the Red Sea. In 2005 504 oil tankers and 64 gas tankers left the port of Yanbu (Saudi Arabia). The use of the RSGA as a transit route for much of the world's petroleum gives the marine environment a global strategic focus and is a major challenge to conservation.

THE CONTEXT OF CONSERVATION

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Marine conservation in the RSGA occurs in an extreme physical setting. Coasts are backed by dry, largely arid hills and semi-desert regions. The Red Sea is the warmest of the world's seas and the Gulf of Aden is strongly affected by the northeast and southwest monsoons. The Red Sea is the most saline water body in direct contact with world oceans and ambient salinity levels may be very close to many species' physiological limits. The semi-enclosed nature of the Red Sea means the renewal time for the entire water body is around 200 years. Primary productivity throughout most of the Red Sea is low because the thermocline prevents nutrient recycling.

Achievements and difficulties in marine conservation cannot be appreciated in isolation from socio-economics. Since the 1960s many countries have experienced war, domestic unrest, social and economic upheaval, drought, and famine. The growth of petroleum-based economies created a divide between the richer, more developed northern countries and the less developed southern countries that directly affects their technical and management capacity and opportunity to fund conservation. Of the 177 nations listed in the 2006 Human Development Index the four southern nations (Djibouti, Eritrea, Sudan, Yemen) were ranked 148, 157, 141 and 150 respectively (there was no entry for Somalia). Egypt, Israel, Jordan and Saudi Arabia were ranked 111, 23, 86 and 76 respectively.

GROWTH AND CHANGE

"In the late 1960s, probably 98% of the total Red Sea coast was in practically virgin condition..." ORMOND (1987 page 406). By the 1980s major localized impacts were occurring and likely to worsen. Dynamic port development was necessary to handle the growth in trade, cargo volumes and numbers of ships. Navigational charts relied on data that was inadequate for modern navigational purposes thereby greatly increasing the risk of collisions and major pollution events. Coral reefs were being impacted in the vicinity of urban and industrial centres from land-filling and dredging, port activities, sewage, and tourism. Three-quarters of mangrove stands were impacted from camel grazing, felling, cutting, solid wastes, sewage, burial by mobilized sand dunes, or obstruction to tidal flows. The disposal of solid waste caused localised problems for coastal habitats in all countries. Sharks were being over-fished and over-fishing by industrial trawlers in the Gulf of Aden depleted cuttlefish and deep-sea lobsters. Industrial trawl fisheries in the Red Sea placed considerable pressure on shrimp stocks.

A cooperative regional approach to conservation was essential given the semi-enclosed nature of the Red Sea and the trans-boundary nature of many issues and important species. The required technical and management expertise was beyond the capacity of many countries, necessitating support from neighbouring countries and the international community.

INITIATIVES

As a starting point for recent progress, the Sea to Sea Conference in Jeddah (1995) drew together managers, scientists, and decision-makers from the Gulf and RSGA regions and the international donor community. The conference reviewed current knowledge and innovative management, and highlighted many emerging issues. Also in 1995 the Regional Organization for the Conservation of the Red Sea and Gulf of Aden Environment (PERSGA) was formally established by the seven member states: Djibouti, Egypt, Jordan, Saudi Arabia, Somalia, Sudan and Yemen.

One of the most ambitious programmes implemented by PERSGA was the Strategic Action Programme for the Red Sea and Gulf of Aden (1995-1998). The Programme was funded through the Global Environment Facility, implementing agencies (UNDP, UNEP, World Bank), the Islamic Development Bank, and PERSGA member states. The Programme's objective was to safeguard the coastal and marine environments of the RSGA and ensure sustainable use of its resources.

Other large projects funded by the international donor community and individual nations were also implemented e.g. the Red Sea Regional Framework Project, and projects in the Socotra Archipelago, Djibouti, Egypt, Eritrea, Jordan, Saudi Arabia, and Yemen.

PROGRESS IN CONSERVATION

An ecosystem approach to conservation is most appropriate to assure long-term sustainability of the RSGA's critical habitats and populations of globally important species. An important step towards achieving this was the establishment of an integrated regional network of marine protected areas (MPAs) to represent the region's biogeography, habitats, bird and turtle nesting sites, dugong feeding grounds, seabird breeding and roosting sites, larval sources and sinks, migratory routes of key biota, and cultural heritage.

Twelve sites were selected for the regional network of MPAs: Iles des Sept Frères and Ras Siyan (Djibouti); Ras Mohammed National Park; Straits of Gubal (Egypt); Aqaba coral reefs (Jordan); Straits of Tiran; Wajh Bank, Sharm Habban and Sharm Munaybirah; Farasan Islands (Saudi Arabia); Aibat and Saad ad-Din Islands, Saba Wanak (Somalia); Sanganeb Marine National Park; Mukkawar Island and Dugonab Bay (Sudan); Socotra Islands; Belhaf and Bir Ali area (Yemen). When other MPAs are counted, 75 MPAs have been established or recommended for the RSGA.

When the Network was established in 2002 the only declared MPAs were: Ras Mohammad National Park, Aqaba Marine Park, Farasan Islands Marine Protected Area, Sanganeb Marine National Park, and Socotra Islands group National Protected Area. Progress is continuing towards the complete establishment of the Network: two were officially declared in 2005 (Iles des Sept Frères and Ras Siyan in Djibouti and Mukkawar Island and Dugonab Bay in Sudan) and management plans are being implemented in each. A zoning plan was developed for the Socotra Archipelago Marine Protected Area.

A manual of standard survey methods was published for rapid assessment, intertidal habitats and mangroves, corals and coral communities, seagrass and seaweeds, subtidal habitats, reef fish, ornamental fish, marine turtles, seabirds, and marine mammals. The standard survey methods is facilitating the acquisition of regionally consistent population data and monitoring by trained, regional specialist teams.

Further training has occurred in marine protected area management, fish stock assessment, fisheries data collection and analysis, environmentally sound aquaculture, fisheries management, integrated coastal zone management, and environmental impacts of development projects. Two sub-regional Fisheries Research and Training Centres were established at the Fisheries Manpower Training Centre (Aden) and King Abdulaziz University (Jeddah).

There have been substantial gains in scientific knowledge of corals, coral communities, and reefs. Regional surveys led to regional action plans for the

conservation of corals, mangroves, turtles and breeding seabirds. National action plans were developed to facilitate national implementation of the regional needs. Given the discrepancy in capacity among countries, the action plans were adapted to suit each particular country. National implementation is occurring through integrated networks of national and local working groups, government departments, agencies and personnel, non-governmental organisations and other stakeholders. A management plan for ornamental fish was prepared. Elasmobranch management has improved through training, an identification guide, a management plan, and improved collection of catch data.

A regional database for key habitats and species, a Biodiversity Information System and a regional GIS database were established in PERSGA to inform decision-makers and researchers. A Regional Reference Collection Centre was established in 2003 within at King Abdulaziz University in Jeddah, Saudi Arabia.

In 2005 PERSGA member states signed the Protocol Concerning the Conservation of Biological Diversity and the Establishment of Protected Areas. The Protocol provides for: the protection and conservation of species; the protection of selected marine and coastal areas; the application of a common management framework throughout the region (including integrated coastal area management; environmental impact assessment; restoration of ecosystems and populations of species; criteria for selection of additional protected areas); specific measures (such as access to genetic resources and technology exchange); and an institutional framework for national implementation and oversight of the Protocol.

CONTINUING CONSTRAINTS AND NEEDS

Information gaps prevent an assessment of the current status of some species (breeding seabirds, marine mammals, marine turtles) and many habitats (sabkha, saltmarsh, sandy shores, rocky shores, seagrass, subtidal soft substrata). The taxonomy and distribution of many groups of marine organisms is poorly documented. Extensive coastal development and commercial benthic trawl fisheries mean there is an increasing need for monitoring soft bottom fauna. Knowledge on the movement of invasive aquatic species carried in ballast water remains very limited. The institutional and technical capacities for research, monitoring and stock assessments remain weak in Djibouti, Sudan and Yemen, requiring long-term investment in university education and the training of young researchers.

A number of areas proposed for the Regional Network of MPAs have not been officially declared and some declared MPAs require site-specific management plans. The potential performance of some MPAs is compromised by a general lack of surveillance and enforcement, implementation of management plans, and management expertise. There are gaps in representation of regionally significant and representative habitats and species (mangroves, turtle nesting and feeding, breeding seabirds).

Specific conservation action is required for the breeding seabird White-eyed Gull (*Larus leucophthalmus*), which is Near Threatened. Dugong in the Mukkawar Island and Dugongab Bay MPA (Sudan) are being impacted by fixed fishing nets. Sharks are heavily exploited, especially in Sudan, Djibouti, Yemen and Socotra Archipelago. Shark fishing nations have limited management measures to ensure sustainable exploitation. This difficulty is compounded by: a general lack of knowledge of the number of species and of the species that are significant in catches, limited catch and effort statistics, exploitation of juveniles in pupping and nursery

areas, unregulated shark finning, and increases in illegal fishing by foreign vessels and fishers operating outside their territorial waters.

Small numbers of people can be trained at one time and the region suffers from the migration of skilled people to other regions able to provide more lucrative and stable livelihoods. There is a continuing need for conservation capacity building in planning and implementation of relevant control mechanisms (legislative or procedural), surveys and monitoring, integrated coastal zone management plans, environmental assessment methods, marine protected area planning and management, and pollution management strategies.

Continued progress requires some fundamental developments in a number of key areas: poorly developed environmental and fisheries legislation in some countries, lack of funding (for research, management, monitoring, surveillance and enforcement), lack of political will to implement management, and lack of expertise and experience in marine conservation. There is minimal enforcement of regulations and penalties for infringements are too low to act as an effective deterrence and encourage compliance. Coordination between ministries responsible for fisheries, conservation and the environment is weak or inadequate and the agencies carry out their activities independently.

Lack of funding has constrained human resource development, the development of national and regional monitoring, control and surveillance systems, and research and monitoring. The implementation of regional programs is constrained by the socio-economic variations among the member countries of the region. A lack of infrastructure in many rural areas in Sudan, Somalia and Yemen's Red Sea coast limits the expansion of artisanal catches and often results in poor quality and, consequently, reduced earning potential for rural fishermen. Infrastructure needs to be installed or upgraded for waste-water (including sewage) collection and treatment, solid waste collection and disposal, communications, and navigational aids. Conservation and resources management in the member countries of PERSGA is still dominated by top-to-bottom decisions. Participatory approaches involving all stakeholders in fisheries management are totally lacking. There has been limited use of community-based monitoring.

The recent progress in marine conservation has resulted from the commitment of local experts, scientists and managers, with the support of the international donor community. Continued progress needs to build on the successful partnerships and mechanisms that have developed in the last decade.

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