



## PERSGA ACHIEVEMENTS

### TWO DECADES OF PROGRESS IN MARINE & COASTAL CONSERVATION

The following report of activities is included in PERSGA report “*Status of coral reefs of the Red Sea and Gulf of Aden region: 2009*” which will be released mid-February 2010.

#### Background:

PERSGA can trace its origins back to the early 1970's. The Arab League Educational, Cultural and Scientific Organization, ALECSO, with the assistance of UNESCO, convened a meeting in Bremerhaven, Germany in 1974 where initial ideas for interdisciplinary research were discussed. Subsequent meetings identified key regional concerns and proposed plans of activity, which gave rise to the Programme for the Environment of the Red Sea and Gulf of Aden known as “PERSGA”. An interim secretariat was established in Cairo to implement this programme, under the auspices of ALECSO. The secretariat moved to Jeddah in 1980.

One of the most significant achievements of PERSGA has been the development of new international laws. In February 1982 the plenipotentiaries of the governments in the region signed The Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment (the Jeddah Convention) together with a Protocol Concerning Regional Co-operation in Combating Pollution by Oil and other Harmful Substances in Cases of Emergency. The main focus of the Convention concerns the prevention, reduction and fight against pollution. It also includes an Article directing the contracting parties to establish a regional organization to implement the agreement.

This regional organization was established in September 1995 under the umbrella of the Arab League. At the first Council Meeting in Egypt, the Cairo Declaration formally announced the creation of the Regional Organization for the

Conservation of the Environment of the Red Sea and Gulf of Aden, which keeps the title “PERSGA”.

PERSGA is governed by a Council. This is composed of the Ministers in charge of the environment from each of the Member States. The Council meets annually to approve technical and financial policies. The daily affairs are managed by the PERSGA Secretariat, a small but dedicated team of professionals drawn from the countries of the region. The Kingdom of Saudi Arabia hosts the PERSGA Secretariat in Jeddah and all of the Member States contribute to the budget.

PERSGA has implemented, and continues to implement, a large number of projects throughout the RSGA with funding from ALECSO, the Islamic Development Bank, GEF, other international donors, and member states. The PERSGA Secretariat is based in Jeddah and is hosted by the Kingdom of Saudi Arabia. The establishment of PERSGA has been a pivotal step in a regional approach to sustainable use and conservation of the marine resources and environments. A regional approach to the marine environment is essential given the semi-enclosed nature of the Red Sea and the transboundary nature of many issues.

One of the most ambitious programmes executed by PERSGA was the Strategic Action Programme (SAP) for the Red Sea and Gulf of Aden, planned from 1995 to 1998 and carried out between 1999 and 2003. The SAP was funded through the Global Environment Facility (GEF) implementing agencies (UNDP, UNEP, and the World Bank), the Islamic Development Bank, and the PERSGA member states. The SAP’s global objective was to safeguard the coastal and marine environments of the RSGA and ensure sustainable use of its resources. The SAP’s activities were organised around the following objective-based components:

- 1- Institutional Strengthening to Facilitate Regional Cooperation;
- 2- Reduction of Navigation Risks and Maritime Pollution;
- 3- Sustainable Use and Management of Living Marine Resources;
- 4- Habitat and Biodiversity Conservation;
- 5- Development of a Regional Network of Marine Protected Areas;
- 6- Support for Integrated Coastal Zone Management;
- 7- Enhancement of Public Awareness and Participation; and
- 8- Monitoring and Evaluation of Programme Impacts.

The SAP was highly significant for the RSGA environment, for PERSGA member states capacity for conserving the RSGA and managing its uses, and for the future socioeconomic development of the region. Large projects funded by the

international donor community and RSGA countries were implemented throughout the RSGA in the last decade, e.g. the Red Sea Regional Framework Project, and projects in the Socotra Archipelago, Djibouti, Egypt, Jordan, Saudi Arabia, and Yemen. These have provided a large amount of new scientific information and understanding about the RSGA, management actions, and capacity building.

*Reduction of Navigational Risks:*

New charts of the southern Red Sea have been published for use by international shipping, based on a major new hydrographic survey of the area between the Hanish Islands and Bab el Mandeb that was initiated by PERSGA. These charts are designed improve the safety of navigation in this important area of the RSGA. A new chart of Port Sudan showing recent developments in the port has been produced by the United Kingdom Hydrographic Office (UKHO), based on data supplied through PERSGA. A new planning chart of Yemeni waters covering the area between the maritime border with Saudi Arabia to a line east of the Socotra Archipelago was published by the UKHO on 21 December 2006. This chart forms the basis of a Yemen Fisheries Chart covering the same area, which is marked with a grid dividing the area into squares covering 100 square nautical miles for the purpose of recording fish catches. Capacity building in navigation safety/hydrographic surveying and chart re-scheming, has been achieved through training workshops held throughout the region. One or more new tide gauges in the Gulf of Aden will form part of a tsunami early warning system for the Indian Ocean. The proposed new tide gauge at Aden could provide vital information on long term sea level changes in the region.

*Management of Coastal and Marine Resources:*

There has been recent, substantial progress in the management of the marine resources of the Red Sea and Gulf of Aden. A regionally applicable manual of standard survey methods for key habitats and key species in the Red Sea and Gulf of Aden has been produced. Collection of essential baseline data on key habitats and species (coral reefs, mangroves, seabirds, turtles) and preparation of up-to-date status reports has taken place. There have been substantial gains in scientific knowledge of Red Sea and Gulf of Aden corals, coral communities, and reefs. Regional action plans (following regional surveys) were developed for corals, mangroves, turtles and breeding seabirds and are being implemented nationally via national action plans. The signing of the Protocol Concerning the Conservation of Biological Diversity and the Establishment of Protected

Areas by PERSGA member states in December 2005 provides a regionally coordinated approach to conservation. A Regional Master Plan for the Regional Network of Marine Protected Areas has been produced. Progress is occurring towards the complete establishment of the RSGA Regional Network of Marine Protected Areas: two proposed marine protected areas were officially declared in 2005 (Iles des Sept Frères and Ras Siyyan in Djibouti and Mukawwar Island and Dungonab Bay in Sudan) and management plans are being implemented in each one. A zoning plan was developed for the Socotra Archipelago Marine Protected Area. Survey design guidelines for marine protected areas (MPAs) have been prepared and ecological and socio economic surveys have been completed at four proposed MPAs. Site-specific master plans, with management guidelines, have been prepared for four proposed MPAs with the involvement and participation of local stakeholders. A large number of managers and scientists have been trained (via workshops and on-the-job training) in marine protected area management, field surveys, and monitoring techniques. There has been an international, regional and national exchange of experience. Substantial progress has been made in the field of integrated coastal zone management (ICZM). This includes:

- Approval of ICZM plans for the Aden Governorate and their implementation;
- Completion of coastal profiles in Sudan and Djibouti and preparation of ICZM plan for Sudan;
- Establishment of a regional ICZM working group and raised awareness of the need for and use of this tool in coastal management;
- Improvements in regional capacity in remote sensing and GIS applications;
- Design, creation and establishment of a GIS unit at PERSGA with global internet access; and
- Incorporation of all biodiversity, protected area, ICZM and other data from the Strategic Action Programme into the GIS for full programme integration.

PERSGA's environmental awareness programme concentrated on conservation including the production of the Environmental Education Learning Supplement, and the implementation of more than 17 community participation projects. Five public environmental information centres and 150 school nature clubs have been established within the region, with associated teacher training. These activities have resulted in raised awareness of PERSGA and its activities at the national, regional and international level.

*Controlling of Sea-Based Activities and Sources of Pollution:*

In general oil spills around the world are reducing due to initiatives by IMO and other factors. PERSGA has achieved significant success in getting new routing measures adopted for use by international shipping in the southern Red Sea. PERSGA has established a new lighthouse fitted with an AIS (Automatic Identification System) on the Hanish Islands. Capacity building in combating oil pollution, in port state control, marine incident investigation, navigation safety/hydrographic surveying, contingency planning and ballast water management has been achieved through training workshops held throughout the region. PERSGA has established the Marine Emergency Mutual Aid Centre at Hurghada (EMARSGA) and this is receiving support from the International Maritime Organization. National contingency planning in the Red Sea and Gulf of Aden has improved and national plans are now in place in all member states. The capacity to carry out port state control of ships has improved in recent years. On the other hand, the signing of two Protocols, i.e. “Regional Co-operation in Combating Pollution by Oil and other Harmful Substances in Cases of Emergency-February 1982”, and “Mobilization of Personnel, Equipment, and Material during Emergency-July 2009”, by PERSGA member states provide a regionally coordinated approach to the prevention, reduction and fight against pollution in emergency cases.

*Controlling of Marine Pollution from Land-Based Resources and Activities:*

Recent changes in management practices have led to some environmental improvements, especially on the coral reef adjacent to the Phosphate Port, Aqaba. The signing of PERSGA’s Protocol Concerning the “Protection of the Marine Environment from Land-Based Activities in the Red Sea and Gulf of Aden” in September 2005, and the implementation of the Regional Environmental Monitoring Programme (concerning the water quality parameters) are substantial outcomes. Capacity building has been achieved (via training workshops) in integrated coastal zone management, environmental impacts of development projects, management of solid wastes in industrial areas, environmental inspection, and improvement of wastewater management. National programme of action for the protection of the marine environment from land-based activities was prepared for Yemen and Jordan, while for the other countries still in preparation. A preparatory and fund raising phase of the Regional Programme of Action for the Protection of the Marine Environment from Land-Based Activities is being prepared for the Red Sea and Gulf of Aden comprising the following:

- Collection of relevant information for the development of four projects in the following fields:
  - collection, treatment and disposal of municipal wastewater,
  - identification of pollution hot spots and sensitive areas,
  - management of marine litter, and
  - assessment of the quality of bathing waters and beaches;
- Production of the joint PERSGA/UNEP publication “Financing for the Environmental Conservation of the Red Sea and Gulf Aden”; and
- Organization of a regional training course on municipal wastewater treatment management.

There has been a rapid uptake of GIS (including a regional GIS database in PERSGA) as technology to support risk assessments for pollution.

*Management of the Living Marine Resources:*

The regional status of the living marine resources in the Red Sea and Gulf of Aden has been assessed and baseline information has been collected. There has been a substantial rise in capacity in fish stock assessment, data collection and analysis; environmentally sound aquaculture; fisheries management; and ornamental fish assessment and management. Two training facilities and a reference collection centre have been established and equipped, the first in Aden-Yemen and the second in Jeddah-Saudi Arabia. There is an increased awareness among decision makers of the complementary linkages between conservation of the environment and sustainable development. A system is in place for the standardized collection and transfer of fisheries data. Information has been obtained for Egypt, Jordan, Djibouti, Saudi Arabia and Yemen on the trade in ornamental fishes and its impact on the environment. A management plan for ornamental fishes has been prepared. The management of elasmobranch fisheries has improved through: training; an identification guide; a management plan; and improved data collection. New fisheries regulations have been issued in Egypt, Saudi Arabia and Yemen. Additionally, fisheries management plans were prepared for Socotra (Yemen) fisheries and rock lobsters.

*Regional and National Conservation Action Plans:*

PERSGA has issued Regional Action Plan (RAP) for conservation of coral reefs in the Red Sea and Gulf of Aden Region, as well as plans for conservation of marine

turtles, mangroves, and seabirds. These RAP contain priority actions with these major objectives:

- Integrated Coastal Zone Management;
- Education and awareness;
- Marine Protected Areas (MPAs);
- Ecological Sustainable Reef Fisheries;
- Impact of Shipping and Marine Pollution; and
- Research, Monitoring and Economic Valuation

Each RAP addressed specific actions, expected results and performance indicators and quality assurance through a set of priority actions for the conservation and sustainable development of coral reefs in the Region. The Plan was developed in recognition of the great economic, ecological, and aesthetic importance that these ecosystems provide and in response to the serious existing threats posed by increasing human and natural impacts. Many of the region's reefs are growing near the climatic extremes of reef development and are particularly vulnerable to any increase in disturbance. The seriousness of the threat was demonstrated by major coral reef bleaching in 1997 and 1998, causing massive death of corals and other reef organisms in the Gulf of Aden and parts of the Red Sea. Over the next several decades, predicted increases in these disturbances may cause major disruptions in reef function and the loss of associated resources for human use.

Given the differences in priorities, capacities and other aspects among the RSGA countries, the RAPs needed to be adapted to suit each particular country. Therefore national action plans (NAPs) were developed for the countries, to facilitate implementation of the actions at the national level. This is achieved through identifying national stakeholders, mechanisms, institutions, etc., and integrating the RAP activities into the existing national ICZM plans. In individual countries, implementation will occur through integrated networks of national and local working groups, government departments, agencies and personnel, non-governmental organisations and other stakeholders. Therefore, NAPs provides a set of priority actions for the conservation and sustainable development of coral reefs taken in consideration the priorities of the concerned country.

The implementation of NAPs and RAPs in the Region varied according to the national capacities, constraints and priorities. However, the support of the international agencies and donors is much appreciated to assist in overcoming these constraints. PERSGA has integrated the implementation of RAPs and NAPs into the 2004–2014

strategic plan and established an On-Ground Activities Programme to directly support the implementation of NAPs according to resource availability.

*State of the Marine Environment Reporting in the RSGA Region:*

It is clear that managing human use of the marine and coastal environments of the RSGA will be most effective when based on a solid foundation of knowledge. This knowledge that has been built up by a long history of endeavour in the bio-physical and social sciences, allows managers, scientists, decision-makers and the wider community to devise appropriate management strategies that respond to the impacts of human uses confronting them. It also provides them with the hard evidence needed to assess the effectiveness of their decisions. A major problem has been that the available information was available in fragmented sources. No baselines had been established against which the success, or otherwise, of management could be gauged. The absence of long-term monitoring limits the understanding of the magnitude of natural variations in marine ecosystems and consequently the ability to interpret the meaning of changes due to human activities.

PERSGA published “the State Of the Marine Environment Report (SOMER) for the Red Sea and Gulf of Aden” in 2006. This report based on the recent collected data, results and analysis of the surveys as part of the regional monitoring programme, and various activities carried out by PERSGA and its member states during the SAP project (1996-2005). Furthermore, the materials reviewed in SOMER included a large number of papers from the published scientific literature. The report reviews as well, the progress and achievements and the indicators of this. The SOMER also points to the need for continued action in many priority areas, and aims to support continuing efforts towards the sustainable use and conservation of the Red Sea and Gulf of Aden.

Since the publication of SOMER, it is evident that this report provided a foundation for improved decision making at all levels, and increased awareness and understanding of environmental trends and conditions (their causes and consequences) among all stakeholders and internationally. The report also provided source material for academic studies and a baseline of integrated information against which future assessments can be compared. Accordingly, PERSGA planned to prepare SOMER in regularly basis every 4 years, and the next SOMER will be published during the second half of 2010.

*Establishing Marine Protected Areas and Regional Network:*

During the initial PERSGA-SAP it was decided that an ecosystem approach to conservation and management was most appropriate to assure long-term sustainability of the region's critical habitats and populations of globally important species. This would be achieved by establishing an integrated regional network of Marine Protected Areas (MPAs) supported by effective integrated management and planning. Sites were selected to be representative of the region's biogeography (and include representative habitat types and species as well as bird and turtle nesting sites, and seagrass beds used by dugong) and cultural heritage, and include feeding, breeding and roosting sites, larval sources and sinks, and migratory routes of key biota.

When all MPAs in the RSGA region are counted, it will count 75 MPAs have been established or recommended. Twelve MPAs of them were selected, by PERSGA regional and national experts, during SAP for the regional network of MPAs: Iles des Sept Frères and Ras Siyyan (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 Sa'adadin Islands, Saba Wanak (Somalia); Sanganeb Marine National Park; Mukawwar Island and Dugonab Bay (Sudan); Socotra Islands; Belhaf and Bir Ali area (Yemen).

There are a number of issues for existing and proposed MPAs. Few of the declared MPAs are managed appropriately. There is limited technical capacity and experience throughout the region in MPA management. Some countries lack the necessary pool of experts to provide the knowledge, training and skills necessary for MPA management. Much of the existing capability in MPA management is at the Ras Mohammad National Park (Egypt), the best example of a fully functional MPA in the region. Lack of surveillance and enforcement in MPAs is widespread in the RSGA. There are gaps within existing MPAs in representation of regionally significant and representative habitats.

PERSGA-SAP has delivered specific training to MPA managers, scientists and rangers from the region to address the lack of expertise in MPA management. Courses have covered management issues, marine and coastal surveys and monitoring, scuba diving, ranger duties, policing and public relations. The first course was held at the Ras Mohammad National Park. PERSGA-Regional Protocol Concerning the Conservation of Biological Diversity and the Establishment of Protected Areas, requires contracting parties to:

- (i) protect, preserve and manage in an environmentally sound and sustainable manner areas that are unique, highly sensitive or regionally representative, notably by the establishment of protected areas; and
- (ii) adopt appropriate planning, management and supervision including legislation and monitoring measures for the protected areas.

In addition nations shall draw up a “List of Protected Areas of Importance to the PERSGA region”. Contracting parties are also required to develop management plans and a list of sites of special importance for possible future declaration as MPAs. PERSGA’s, in progress, Framework of Action for 2006–2010 lists activities to implement the Protocol. These include actions to verify critically threatened areas and to establish monitoring programmes for habitats and biodiversity.

A Regional Master Plan (RMP) for the Network was produced (PERSGA, 2002) that included guidelines for the development of individual site-specific management plans. This RMP facilitates the endeavours of individual countries to select and manage their MPAs. In addition, survey design for proposed MPAs was published in 2002 (PERSGA/GEF 2002) to assess the national teams and decision making.

#### *Regional Responses for Monitoring of Marine Environment:*

PERSGA started to develop a manual of standard survey methods (SSMs) in 2001 (PERSGA, 2004), covering methods of rapid assessment, and methods for the detailed assessment of intertidal habitats and mangroves, corals and coral communities, seagrass and seaweeds, subtidal habitats, reef fishes, marine turtles, seabirds, and marine mammals. The development of standard survey methods facilitates the acquisition of population data and monitoring.

Training and capacity building in the standard survey methods followed the first steps of the SSMs manual and has produced national and regional specialist teams competent to carry out the standard survey methods. Regional training workshops were held for mangroves and intertidal habitats; turtles; ornamental fishes, data collection and analysis of the trade in ornamental fishes; corals; seagrass and algae; breeding seabirds; elasmobranch identification, sampling and stock assessment methods.

Sixteen surveys were conducted within the region, executed by regional specialists trained through the SAP, in order to evaluate the present status of habitats and species and prepare the groundwork for conservation plans.

There have been a number of responses to the coral damage caused by dive tourism in Egypt. Installation of mooring buoys helped reduce anchor damage on dive

sites all round the Egyptian Red Sea. Further management responses, such as additional rangers, intensive patrolling, producing awareness materials, entrance fees, and diver management plans, significantly reduced the impacts of divers and diving boats.

Pilot surveys of the status of coral reefs in PERSGA countries were undertaken (PERSGA, 2001). Detailed assessments of the coral reefs of PERSGA countries were undertaken and a regional status report (PERSGA, 2003b) and regional action plan (RAP) were produced (PERSGA, 2003a). Furthermore, a regional survey for coral reef status was carried out during 2002 engaged all the trained national experts in the field surveys, and a regional report was prepared, Status of coral reefs in the Red Sea and Gulf of Aden, Hassan et al. (2002a).

National monitoring programmes for coral reef communities not yet taken place in most of PERSGA member states, except in Egypt and Jordan. In Egypt where an intensive monitoring programme, led by the EEAA, have been established for both Sharm El-Sheikh area and Hurghada-South area in late 90<sup>th</sup>. This monitoring programmes are using very advanced methodologies (i.e. fixed photo-quadrat technique) and need competent experience, due to the objectives of the national monitoring programme (Kotb, et al., 2001). In Jordan, the Marine Science Station of Aqaba are carrying out monitoring programme using line transect technique as a routine reef monitoring protocol in some sites along the southern part of Aqaba reefs. Furthermore, some irregular monitoring efforts occur in Yemen, Saudi Arabia, and Sudan, through some of the national scientists there, but the irregularity of the data, surveyed sites, and the different methodologies makes the data not comparable.

The need to avoid anchoring on coral reefs is emphasised in Admiralty Sailing Directions, which list the positions on anchoring points, and on charts of the RSGA. For example, Admiralty Chart 159, Red Sea, Suez to Berenice, contains the following note: Protected Reefs: Vessels should only use the fixed moorings on or adjacent to coral reefs in Egyptian coastal waters between:

- a) latitudes 26° 37' N and 27° 02' N,
- b) latitudes 27° 08' N and 27° 26.3' N,
- c) locations around the Strait of Tiran and in the Gulf of Aqaba stated in the note),
- d) reefs surrounding El-Akhawain (26° 19' N, 34° 33' E) are also protected and damage to the coral may lead to prosecution. Except in an emergency anchoring on these reefs. For further information see Admiralty Sailing Directions.

Damage to coral reefs due to ships grounding the reefs has also occurred in various parts of the RSGA, including the waters of Egypt, Saudi Arabia, Sudan and

Yemen. In most cases the ships causing the damage are prosecuted by the relevant national authorities. PERSGA has published in 2009 a guideline to assess the member countries to establish national legislation and system (PERSGA, 2009) for compensation of reef damaged by ship grounding. The different national compensation regulation and experience in the RSGA countries were assessed in this guideline and recommendations for establishing, improving and standardizing of such regulations were emphasised.

A regional database for key habitats and species and Biodiversity Information System provides information for decision makers and researchers about the status of marine species in the RSGA were established in PERSGA headquarters.

A Regional Reference Collection Centre was established in early 2003 within the premises of the Faculty of Marine Science, King Abdulaziz University in Jeddah, Saudi Arabia. A training course for the managers of the Centre was held in the Senckenberg Museum (Frankfurt, Germany). On-the-job-training was provided for the technicians working in the Centre.

Continued progress also be underpinned by the implementation of PERSGA's Framework of Action for 2006–2010, which outlines specific programmes to be achieved by PERSGA.

#### *On-Ground Activities Programme:*

In the aftermath of the Strategic Action Program (SAP), the Region has witnessed an appreciable progress in its capacities for sustainable management of coastal and marine environment. The most prominent features of these were development and adoption of knowledge-based, specific and long-term Regional and National Action Plans (RAPs and NAPs) for management of important marine habitats (coral reefs, mangroves, seagrass beds), species (seabirds, marine turtles and mammals), marine protected areas, living marine resources and coastal zones. Despite the considerable and continuous efforts made through the PERSGA-Training Programme, the existence of some gaps in the technical know-how, together with shortage in finance represent major constraints impeding proper implementation of the action plans developed. The idea of establishing On-Ground Activities Programme emerged as an outstanding down-to-earth approach to assist the member states. The programme was then initiated by PERSGA with the objective of supporting national on-ground projects addressing sustainable development and implementation of the action plans.

The national projects of the On-ground Activities Programme focus on various topics of national concerns, such as protecting or rehabilitating coastal/ marine habitats, removing threats to coastal environments, supporting implementation of national conservation management plans, education and training activities that raise community awareness, knowledge or skills on coastal/ marine conservation issues. The programme has proved to be one of the most effective and rewarding programmes implemented by PERSGA, because of the tangible achievements attained in all member states, despite the fact that a relatively short period of time elapsed since it has been launched in 2006. The On-ground Projects which implemented so far till the preparation of this report are:

- Support ICZM in Sudan – 2006/2007;
- Education for sustainable development, Jordan - 2006/2007;
- Establishment of regular water quality monitoring programme, Jordan - 2008/2009;
- Ecotourism and Management of mangrove areas in Hamata, Egypt – 2007/2008;
- Public awareness and participation in coastal environment protection, Djibouti – 2007/2009;
- Coral Reef Conservation in Jeddah, KSA-2007-2008;
- Support ICZM planning in Jizan and Asir, KSA – 2007/2008;
- Rehabilitation and management of sea-cucumber fishery, Yemen – 2007/2008;
- Management of Reef Recreation Activities in Aqaba Coast, Jordan-2009.

#### *Sustainable Financing of Coral Reef Conservation:*

The wide range of coral reefs and their ecological and economic importance to the Region mandate that special attention be given to development of sustainable financing mechanisms for their conservation. Key to success is establishing the principle that coral reefs are economic resources and that their users should pay fees, where appropriate. PERSGA in cooperation with UNEP-ROWA are preparing a guideline for the “Economical Evaluation of the Marine and Coastal Resources in RSGA region”, in-press. The guideline aims to assess the nations of the Region to economically evaluate their natural resources in a regionally prospective.

Few successful models of self-financing of the coral reef conservation efforts are found in the Region and are taken by PERSGA to be replicated elsewhere within the Region. For instance, the innovative work undertaken by Egypt in the Egyptian Red Sea Reefs for the conservation of these resources, which includes the use of an “Environmental Cost Recovery Charge”. The non-traditional financial resources to

support implementation of the regional and national level, such as the Saudi Environmental Awareness Programme, which funded jointly by the government and the private sector.

*Strengthening Regional and International Cooperation:*

PERSGA member states have approved many new environmental laws and standards in the last two decades, and since the adoption of Jeddah Convention and PERSGA establishment. In their determination to strengthen participation in regional and international agreements, the cooperating parties have signed or ratified a number of Conventions. In addition, a number of GEF-supported projects have been launched in some cooperating countries. International efforts and cooperation with the Region have focused on a number of critical areas, such as, capacity building and institutional development, environmental baseline data, and information services.

On the other hand, and especially during the last decade, PERSGA initiated and established several cooperations with many of the international and regional organizations such as, UNIDO, IMO, World Bank, UNEP, ALECSO, Arab League, ROPME, IUCN, Islamic Bank, and Reef-Check. PERSGA also succeeded to establish a number of Memorandums of Understanding and Agreements with many of these organizations.

PERSGA contributed to the global reports "Status of Coral Reefs of the World" with the Red Sea and Gulf of Aden chapters during 2000, 2002, 2004, and 2008 published by AIMS (Pilcher and Al-Suhaibany, 2000; Hassan et al., 2002b; Kotb et al., 2004; Kotb et al., 2008), and continuing the cooperation in several other global reports concerning the RSGA region. Moreover, PERSGA is considered the focal point for the RSGA to several international initiatives and organizations, such as GCRMN, ICRI, ICRAN, WCPA-Marine, and cooperate to present the RSGA environmental status and information to the international community.

## RECOMMENDATIONS

Significant progress in conservation of the marine environment of the RSGA has been made in a relatively short time. However, further actions are needed to ensure continued progress, such as the full implementation of the regional protocol of Biodiversity and the regional MPAs network, RAPs, NAPs, and other related agreements should be targeted to be fully active. Following are some recommendations need to be executed to assure better monitoring for the coral reef environment which

helps in the evaluation of the conservation measures taken in the national and regional levels. Such evaluation leads to continued progress in marine environment conservation and sustainability of the marine resources.

1. To be useful, monitoring using PERSGA-SSMs methodology (Reef Check) should be carried out every year with sufficient replication (number of sites) to provide a comprehensive view of the reefs of interest. Pairing in mind, that the present 36 regional monitoring sites should be within the future monitoring sites. There are tradeoffs between investing in more replication at different geographic and temporal scales. For example, quarterly surveys at one location will provide a more accurate picture of reef health – particularly with respect to highly mobile fish. But this may limit the number of locations that can be surveyed and thus give a biased picture of the overall health in the region. *Ideally, a long-term coral reef environment monitoring programme should be developed at the national level (in countries not yet having such a programme executed), so that monitoring resources can be allocated in a logical design that best supports management goals.*
2. Standard Reef Check alone is not sufficient to provide a complete picture of coral reef health. Ideally, a long-term monitoring plan should include both Reef Check and some more taxonomically detailed surveys. PERSGA-SSMs included GCRMN life-form and English et al. (1997) survey methodologies as more detailed techniques include e.g. fish families, fish size estimates, coral genera, and coral colony sizes. Unfortunately, such detailed surveys require teams of highly trained scientists and are more time consuming and costly than Reef Check. In most countries, an initial goal of establishing a network of Reef Check sites alone is already a serious challenge. Currently, PERSGA planned to participate with the countries in two years intervals regional monitoring surveys using SSMs-Reef Check methodology. *Therefore, for all countries at the time being, PERSGA recommends setting up a network of monitoring sites using Reef Check methodology as a first step towards a “regional and global comparable” national monitoring programme. When this network can be successfully funded and maintained, then sites where more detailed monitoring is carried out can be added as financial and scientific personnel become available.*
3. A number of issues must be considered when using the SSMs-Reef Check protocol for long-term monitoring. The most important are taxonomic specificity, temporal and spatial replication. Each of RSGA countries has specific needs, capabilities,

and resources that will require a custom design. An “ideal” two-level monitoring programme would have a few high-resolution sites using more detailed methods such as English et al. (1997), and a larger number of lower-resolution Reef Check sites. Such methods are included in PERSGA-SSMs for this reason of applying more detailed monitoring protocol when national teams have the sufficient capacities and facilities. In a two-level monitoring programme Reef Check has several roles. First, it is a relatively fast method that allows a team to gather a snapshot of the health of reef corals, other invertebrates and fish at up to two sites per day. As more sites are surveyed in a particular area, the resolution of the snapshot is increased.

4. Because Reef Check is based on major inputs from volunteers and based mainly on community participation, *PERSGA and the environmental official authorities in each country can use the NGOs support to engage volunteers in the regular monitoring surveys, then Reef Check teams can be mobilized to survey many more sites than is possible. Accordingly, the national teams can focus in more intensive methods for the high-resolution sites, which are much more costly in time, staff and funding, and each country can define the number of high-resolution sites according to its capabilities and needs.* In addition, the Reef Check sites can be resurveyed by volunteers more frequently than the high-resolution sites. If Reef Check surveys are repeated at quarterly intervals, they can then act as an early warning system for major anthropogenic changes such as bleaching, overfishing, eutrophication and sedimentation.
5. On the other hand, *PERSGA should facilitate the cooperation of regional scientists with international networks of scientists engaged in monitoring global sea temperatures for early warning signs of coral bleaching.* In particular, coral research into the sensitivity and resilience of RSGA coral reefs (especially those reefs that form part of the Regional Network of Marine Protected Areas) to bleaching event should be actively supported and encouraged.
6. There is a need to integrate current and future research and monitoring into global initiatives, and the ongoing research and monitoring of PERSGA nations. *PERSGA is maintaining such integration with the global initiatives but further efforts should be continued at the national level. National monitoring programmes should be design and carried out. In addition, networking the national monitoring programmes with PERSGA headquarters data-base to facilitate regular regional*

*status reports, which assist the decision making and conservation efforts in a regional and global comparable approach.*