Status of Coral Reefs of the Red Sea and Gulf of Aden Region: 2009

EXECUTIVE SUMMARY

The Red Sea and Gulf of Aden (RSGA) are globally distinguished by their great diversity of marine environments, the number of unique species, and the importance of marine resources to the social and economic development of the region. However, the RSGA region has experienced rapid coastal development in the past four decades. This has been followed, in some places, by degradation of the marine and coastal environments and loss of its potential to sustain the livelihoods of coastal populations. The nations of the region have acted to conserve these environments. PERSGA was established for organizing regional activities, initiatives, and efforts for the conservation and sustainable use of natural resources.

Great advances have been made during the last two decades in management and in the knowledge that has been gained about the marine environment of the RSGA. Data has been collected, and reviews and reports prepared to assist decision making and conservation measures.

Monitoring programmes for sensitive ecosystems were established, during the Strategic Action Programme (SAP), in order to standardize data collection and survey methodology, and to compare the region's status to similar regions in the world. Standard Survey Methods (SSMs) were prepared for the region followed by training of national teams of experts in these methods for accuracy, comparability, and the assurance of future surveys and data collection exercises. PERSGA participated with member countries in two regional surveys of coral reef ecosystems, the first during 2002 and the second during 2008. The two surveys followed the designated SSMs; the latter survey also aimed to determine the minimum number and location of sites for a long-term, regional, coral reef monitoring network.

This report presents data from the 2008 survey. A total of 36 sites (5 in Djibouti, 8 in Egypt, 3 in Jordan, 9 in Saudi Arabia, 4 in Sudan, and 7 in Yemen) were chosen by PERSGA and national team experts. The sites were selected to ensure they demonstrated a range of essential characteristics. These were based on their suitability for long-term monitoring activities and included: accessibility of the sites for future surveys, safety measures, national capabilities of team members, and logistics required in relation to the national facilities available.

Full Reef Check survey protocols, one of the PERSGA-SSMs, were used during the 2008 regional monitoring survey. This survey methodology is designed to provide a rapid, broad scale assessment of the distribution and abundance of a number of fish and invertebrate species that are known to be either indicators of reef health or susceptible to the effects of fishing or collection. The method also provides a quantitative assessment of sessile benthic cover, including corals. In addition, this survey method collects variable data about different types of impact or impact symptoms, such as trash, coral damage, and coral bleaching.

In order to fix the survey location at each site for comparable long-term monitoring, a detailed mapping of the exact position of each reef site was made in advance with the aid of Google-earth images, GPS, in-situ photographs, and Admiralty charts. The mapped positions were adjusted, or fine-tuned, directly after the field visit to each site. A test of the ease of relocating the reef sites using the revised maps was done during the survey period in consultation with national team members.

Data from the regional survey of 2002 (from 52 sites) was reviewed and standardised to be comparable with the 2008 data. This step was essential as the data sheets of the Reef Check were modified in 2006 by changing some indicator species and methods of data analysis and interpretation. Comparisons between data of 2002 and of 2008 were carried out to detect spatial and temporal changes. A one-way ANOVA test was performed for the abundance/coverage of each indicator using compiled data for the different countries to detect any regionally significant differences ($p = 0.05$). Data gathered during the two regional surveys (2002 and 2008) were compiled for each country and are included in the appendices at the end of this report. Furthermore, detailed maps of the surveyed locations and bottom profiles of each site are also included. Comparisons with similar data gathered from other regions of the world were carried out. The key findings of the analysis for the whole RSGA region are as follows:

- Butterflyfish, indicators of the ornamental fish trade and overfishing, showed a mean abundance slightly increased in 2008 over 2002. These abundance levels

however, were found to be lower than those recorded for the Indo-Pacific region as a whole during 1997-2001.

- Sweetlips (Haemulidae), used as an indicator for line-fishing and spear-fishing, showed similar abundances in the 2008 and 2002 surveys. These abundances were found to be higher than those recorded for the Indo-Pacific region during 1997-2001.

- Grouper (with length greater than 30 cm), indicators for overfishing by line-fishing and spear-fishing close to reef areas, showed mean abundances slightly decreased in 2008 compared to 2002. However these levels were higher than the recorded abundances for the whole Indo-Pacific region during 1997-2001, but lower than those recorded for the Red Sea in the same period.

- Snapper, an indicator for overfishing by nets close to reefs, showed a sharp decrease in mean abundance in the 2008 surveys compared to 2002. These abundance levels were still much higher than the abundances recorded for the whole Indo-Pacific region in 1997-2001.

- Parrotfish, an indicator for overfishing and controlling algal growth over coral reefs, had similar mean abundances in 2008 and 2002. Similar abundance was recorded for the whole Indo-Pacific region in the 1997-2001 surveys.

- Lobsters, an indicator for overfishing through direct collection from reefs, were not found at 94% of sites during either the 2008 or 2002 surveys, indicating severe overfishing. Absence of lobster records in 90% of the sites was recorded for the whole Indo-Pacific region during 1997-2001 surveys.

- Long-spined sea urchins, *Diadema*, an indicator of problems with reef health if in high abundance, showed a decrease in mean abundance in 2008 from 2002. Higher abundance was recorded for the whole Indo-Pacific region in 2000 than in RSGA during 2008.

- Triton gastropods, an indicator of curio collection, were not found at about 90% of sites during either the 2008 or 2002 surveys, indicating severe collection of this shell. A similar situation was recorded for the whole Indo-Pacific region during 1997-2001.

- Giant clams, indicators for collection as food, curio, and ornamental shellfish, were recorded at about 70% of the surveyed sites during 2002 and 2008. The recorded shells were <20 cm in length, which are difficult sizes for collection. Higher abundances were recorded for the whole Indo-Pacific region in the 1997-2001 period.

- Sea cucumbers, an indicator for collection as exported food, were recorded in more sites during 2008 than in 2002, but with smaller sizes (mostly ≤10 cm), which might reflect the disappearance of the large, commercial-sized individuals that are targeted by fishermen. Most areas of the Indo-Pacific region were cleaned-out of sea cucumbers by 2001.

- Crown-of-thorns starfish (COTS), which can cause major damage to reef corals during outbreak periods, were detected at around 35% of the surveyed sites in both 2002 and 2008, and with higher abundances toward the southern end of the Red Sea. Lower abundances were recorded for the whole Indo-Pacific region during 1997-2001 surveys.

- Similar mean percentage cover of hard corals was recorded in 2008 and 2002 for the whole RSGA region. Most of the sites had 10-50% coverage. Only 4 sites out of 36 (2008) and 7 sites out of 52 (2002) showed hard coral coverage of 50-70%. Similar percentage covers were recorded for the Indo-Pacific region during 1997-2001.

- Nutrient indicator algae (NIA), an indicator of high nutrient input to the sea, showed a sharp decrease in its coverage in 2008 from 2002. According to other global monitoring data, the RSGA region showed lower symptoms of high nutrient loads, such as from sewage pollution.

Some recommendations are suggested as priority actions to assure better monitoring of the coral reef environment which will help in the evaluation of conservation measures taken at national and regional levels. These recommendations are:

1. Long-term coral reef environmental monitoring programmes should be developed at the national level (in countries where such programmes are not yet executed), so that monitoring resources can be allocated in a logical manner that best supports management's goals and assures monitoring continuity.

2. For all countries, PERSGA recommends setting up a network of monitoring sites using Reef Check methodology as a first step towards "regional and globally comparable" national monitoring programmes. When this network can be successfully funded and maintained, then sites where more detailed monitoring is suitable can be added as financial and scientific personnel become available.

3. An "ideal" two-level monitoring programme would have a few high-resolution sites using more detailed survey methods such as those given in English et al. (1997), and a larger number of lower-resolution sites monitored using the Reef Check method.

Such methods are included in the PERSGA-SSMs so that more detailed monitoring protocols can be added when national teams have sufficient capacities and facilities.

4. Due to the fact that the Reef Check protocol is based on community participation and volunteer work, PERSGA and the official environmental authorities in each country can use NGO support to engage volunteers in regular monitoring surveys. Reef Check teams can then be mobilized to survey many more sites than is currently possible. Accordingly, national teams can focus on more intensive methods at the high-resolution sites, which are much more costly, staff and funding, and each country can define the number of high-resolution sites according to its capabilities and needs.

5. PERSGA should facilitate the cooperation of regional scientists with international networks of scientists that are engaged in monitoring global sea water temperatures for early warning signs of coral bleaching.

6. PERSGA maintains such integration with global initiatives but further efforts should be advanced at the national level. National monitoring programmes should be designed and implemented. In addition, networking national monitoring programmes and including all data within the PERSGA database will facilitate the preparation of regular regional status reports, allow regional and global comparisons to be made, and assist in appropriate decision making and conservation efforts.

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