

PROTECTING THE GULF OF EILAT/AQABA

The grim state of the Eilat's coral reef sparks new efforts to protect one of the world's unique sites

As the northernmost coral reef ecosystem in the western Indo-Pacific region, the Gulf of Aqaba is a precious resource for all of the countries bordering it - Israel, Egypt, Jordan and Saudi Arabia. The Gulf is 180 km long, an average of 16 km wide and an average of 900 meters deep (reaching a maximum depth of 1,850 meters). Israel's border spreads on the northwestern part of the Gulf along a 14-km coastal strip. The Gulf's water reportedly supports a dense population of hundreds of species of corals, 1270 species of fish, and 1120 species of mollusks. The diversity of fish and coral species combined with a host of other natural features make the Gulf an increasingly popular tourist destination.

However, the fragile ecological system of the Gulf of Aqaba is endangered. Eilat's coral reef is threatened by such anthropogenic sources as the port and the phosphate terminal, the Eilat-Ashkelon Oil Pipeline, mariculture, municipal sewage, the municipal marina, vessels, industrial plants and hotels, and even scuba divers and snorkelers.

Eilat's Pollution Prevention Station

To respond to these growing threats, a marine pollution prevention station was set up between the reef reserve and the oil terminal. Today, with the aid of the modern equipment at its disposal, the station stands at the forefront of the struggle to prevent the pollution of the Gulf of Eilat/Aqaba. It is manned on a 24-hour-a-day basis by professional marine pollution inspectors who are empowered with criminal enforcement capabilities.

Because of the oceanographic and meteorological conditions of the Gulf, time is of paramount importance in cases of oil spills. The station is capable of dealing with spills as large as a few hundred tons from large vessels. However, vigilance, surveillance, supervision and treatment also extend to smaller scale incidents and operational spills from small vessels and pleasure craft. Primary reliance remains on containment and recovery techniques in order to collect and pump the oil by means of skimmers, vacuum trucks and manual and mechanical methods supplemented by the use of advanced sorbents. The station's response capability has been dramatically increased with the addition of a marine pollution combat vessel in January 2002.

“Sviva II”: Eilat’s First Marine Pollution Combat Vessel

In 2002, an oil combat vessel was incorporated into the Gulf of Eilat/Aqaba’s preparedness system. The \$870,000 boat, dubbed “Sviva II,” provides a swift and efficient response during pollution events along the coasts and at any point within the heart of the Gulf.

The vessel has a low draft and is equipped with propulsion and maneuvering capabilities adapted to shallow water (the coral reef area) operations and to coastal landing for loading and unloading of special equipment (by means of a special door at its bow).

At the site of pollution, the vessel can deploy special oil containment equipment, capable of isolating and independently treating oil spills spanning dozens of cubic meters. The vessel is equipped with powerful hydraulic systems and an integral crane for operating oil-skimming equipment at sea. It includes oil recovery tanks with a 30 cubic meter capacity and a system for fuel discharge and transfer to external tanks.

Non-oil sources of pollution in Eilat are also being addressed with considerable success. Since 1996, the Eilat municipality has stopped discharging its sewage into the Red Sea and diverts its effluents through a 40-kilometer long pipeline to the north of the bay where the reclaimed wastewater is used to irrigate date fields. Another source of wastewater, the municipal marina, has also undergone major improvements, including sewage treatment. In January 2002, a loading chute that minimizes dust emissions was installed in the phosphate terminal which enables the loading of dry phosphates and potassium on to ships while minimizing dust dispersion into the air. Previously, dry chemicals were dropped into ships from a height of eight meters, a process that created a dust cloud, which settled on the surrounding area and the sea. Major efforts have also been invested in increasing diver education to avoid damage to the coral reefs, and limits have been placed on scuba and snorkeling activities in sensitive areas.

Deterioration of the Coral Reef

Yet despite these and other efforts, a marked deterioration in water clarity and quality in the coral reef area has been noted in recent years. Eilat’s coral reefs are plagued by lost diversity, decrease in coral cover, low rates of coral-larval settlement and recruitment, decreased rates of coral reef calcification, coral mortality, and increasingly intense macro-algal blooms during the spring. Findings show that in 1996, about 70% of the corals in the Eilat area were alive and 30% dead; today, the situation is reversed with only 30% living corals and 70% dead!

It has been suggested that Eilat’s waters are suffering from sustained inputs of nutrients. Sources of pollution that add to the overall organic and nutrient loading include sewage, waste from the marina, nutrient release from the loading procedures for bulk carriers in the harbors, and fish-farming which adds nutrients to the water through fish-feed. Over the past five years, total nitrogen in the deep water of the northern Gulf appears to have doubled, but with seasonal variations.

To help assess the environmental impact of the nutrients which are released directly into the environment, a committee consisting of the directors general of the Ministries

of Agriculture, Environment and National Infrastructures was appointed a few years ago. Following extensive deliberations, it decided to appoint an international expert team to identify existing and potential sources of pollution, assess the carrying capacity of the Gulf, and formulate recommendations for minimizing pollution and environmental pressures. The expert team considered ten factors contributing to pollution in the Gulf: fish farms, phosphate dust, sewage, groundwater inputs, siltation, marina activities, oil spills, diving activities, water temperature, and port-ballast water. It concluded that there have been multiple stressors on the coral reefs of Eilat over the past 25 years. Current environmental pressures include inputs of nutrients from fish farms, siltation from construction and diving activities.

Recommendations for Improvement

Much of the controversy concerning the causes of deterioration of Eilat's coral reefs has focused on the role of two commercial fish farms (floating fish cages), which are located close to the Jordanian-Israeli border at the northern tip of the Gulf of Eilat/Aqaba. The annual production of these farms is about 2000 tons while the feeding quantity has been 4150 tons of a 45% protein diet (recently reduced to 40%).

Although the international expert team concluded that further monitoring and research would be needed in order to assess the carrying capacity of the Gulf, it recommended a risk management approach which would include a reduction of nitrogen loading by the fish farms and by other remaining sources. Specific recommendations for the short-term (until further analysis of the carrying capacity of the Gulf is conducted) include the following:

- An immediate three-step process to reduce nitrogen loading by 30% by reducing the maximum size of the fish grown in cages and by reducing the protein content and amount of the feed as well as improving feeding techniques. Reducing the permitted amount of feed from 4150 tons to 3600 tons per year (40% protein content) will reduce the annual output of nitrogen to about 180 tons as opposed to some 260 tons today.
- A gradual shift to rearing of juvenile fish on land (up to 50 g), beginning with a shift of 10 g juvenile fish to land.

The team also noted that although there has been a significant decrease in diver damage to the coral reefs as a result of improved training programs and diver education, large scale diving continues to pose a threat to the corals. Therefore, it recommended construction of a large artificial reef to reduce tourist and diver impacts on natural reefs and to absorb the local impacts of carbon and nitrogen loading from the fish farms.

Another important issue related to ballast waters and the associated risk of transfer of exotic species and disease agents. Although the harbor authorities strictly adhere to the International Maritime Organization (IMO) Guidelines on offshore exchange, open-ocean exchange may not be adequate. Because of the sensitivity of the coral reef area, additional measures should be developed particularly for container ships which have the Mediterranean as their last port of call.

Masterplan for Eilat

In February 2002, the National Planning and Building Board approved a masterplan for the Eilat coast without designating an area for fish cages in the sea and called for limiting building in the northern beach to a distance of 200 meters from the water line. In August 2002, the District Planning and Building Commission of the Southern Region decided that the fish cages will not be included in the masterplan for Eilat and that the fish cages will be removed from the sea. The National Planning and Building Board is to decide on the timetable for their removal. According to the decision, the fish farms will be required to relocate to a land location according to a set timetable. The feasibility of the technology for land aquaculture will be reviewed in the near future by means of a commercial pilot.

The masterplan for Eilat is based on the principles of sustainable development, and focuses on recreation and tourism while taking consideration of the long-term social, economic and tourism development of the city. The Ministry of the Environment and green organizations consider the recent series of decisions in Israel's planning agencies to constitute important steps forward on the road toward protecting the Gulf of Aqaba and its unique coral reef.

Proposals for the Future

In light of the ecological emergency in the Gulf of Eilat/Aqaba, the Ministry of the Environment has called for the adoption of the precautionary principle which dictates a stop to any activity suspected of causing damage until it is proven that it is not harmful. Priority is therefore being focused on stopping all potential threats to the delicate ecosystem of the Gulf of Eilat/Aqaba – whether fish farms, sewage, phosphate dust or visitor pressures. In the interim period, efforts will concentrate on monitoring the Gulf of Eilat/Aqaba in order to better understand trends and links between different pollutants, especially the fish cages and the coral reef. The Ministry of the Environment, along with the Ministries of Agriculture and Infrastructures, has already allocated NIS 1.5 million for this purpose.

In parallel, a masterplan for underwater parks and artificial reefs in the Gulf of Eilat/Aqaba is being drawn up in order to reduce diving activity in the coral reef and to minimize potential damages. The plan is based on the findings of a scientific committee which reviewed the environmental impacts of establishing artificial reefs in the Gulf of Eilat/Aqaba and recommended specific sites and professional criteria for their establishment.

Hope for Recovery?

The deterioration of Eilat's coral reef has elicited a host of reactions from Israel's governmental, academic and public institutions. All agree that the situation is grave; there is considerable disagreement, however, concerning the underlying causes and the necessary solutions.

While research on the Gulf of Eilat/Aqaba has been ongoing for over 30 years, systematic long-term monitoring or assessment of environmental conditions in the Gulf has not been undertaken nor has a comprehensive study of its physical and chemical processes been conducted. Following the peace treaty between Israel and Jordan, the two countries agreed to develop a Binational Red Sea Marine Peace Park

within the framework of an “Agreement on Special Arrangements for Aqaba and Eilat.” The Agreement called on the parties to “collaborate in research efforts on coral reefs and marine biology, and implement comparable policies and regulations designed to protect the coral reefs as a tourist attraction which is soundly managed from an ecological point of view.”

Marine Peace Park

With special funds from the Middle East Cooperation Program (MERC) of the U.S. Agency for International Development, the *Red Sea Marine Peace Park Cooperative Research, Monitoring and Management Program* (RSMPP) was launched in 1999. The three-year project brought together the resource management agencies and marine research institutions in Jordan and Israel, under the coordination of the U.S. National Oceanic and Atmospheric Administration. While the original tasks of this project were to document the ecological structure, the water circulation and the water chemistry of the Gulf of Aqaba, growing evidence of coral reef deterioration led the Israeli group to focus, as well, on the sources of eutrophication and its effects on the coral reefs. The results were widely publicized and led to a major public campaign on behalf of the protection of the Gulf of Aqaba.

Today, in line with the recommendations of the international expert team, the Ministry of the Environment has approved a framework plan for a national monitoring program in the Gulf of Eilat/Aqaba, which will be carried out by the Interuniversity Institute of Eilat in cooperation with Israel Oceanographic & Limnological Research and with experts of research and academic institutions throughout the country. The goal of the monitoring program: continuous, long term monitoring of environmental and biological parameters in open waters, the coral reserve and the sandy habitats in the Gulf of Eilat/Aqaba. The monitoring program aims to discover ecological/environmental changes and to identify the causes of such changes.

The results of the national monitoring program—which will relate to water and coastal quality, flora, fauna and sediments—will be reported to public and government bodies that are responsible for the conservation, development and management of the Eilat marine ecosystem.

The information in this article is largely based on the report entitled “Evaluation of Pollution in the Gulf of Eilat” which was submitted by the International Expert Team in December 2001. The team was composed of Professor Marlin J. Atkinson of Hawaii, Professor Yehudith Birk of Israel and Professor Harald Rosenthal of Germany. Special thanks to Rani Amir and Alon Zask of the Marine and Coastal Environment Division of the Ministry of the Environment for their input.