

[HOME](#)[MAP](#)[UNEP](#)[IUC](#)[GPA](#)**RED SEA & GULF OF ADEN**

PERSGA

Newsletter of the Regional Organization for the Conservation of the Environment of the Red Sea & Gulf of Aden

AL-SANBOUK

ISSUE 12

SEPTEMBER 2000

THIS ISSUE: CORAL REEFS

Al-Sanbouk is the name given to wooden vessels powered by sail and engine that have taken goods to and from most ports in the Red Sea and Gulf of Aden for hundreds of years.

PERSGA

The Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden - PERSGA - is an intergovernmental organisation dedicated to the conservation of the coastal and marine environments in the region. Its legal basis stems from the Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment known as the Jeddah Convention and signed in 1982. The PERSGA member countries include Djibouti, Egypt, Jordan, Saudi Arabia, Somalia, Sudan, and Yemen. The headquarters are based in Jeddah, Saudi Arabia.

PERSGA is currently executing the Strategic Action Programme (SAP) for the Red Sea and Gulf of Aden. This project is funded by the World Bank, United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP), the Islamic Development Bank (IDB) and other donor organisations. The SAP was prepared following an extensive analysis of regional environmental issues and has been endorsed by the PERSGA Council of Ministers. The SAP provides a cooperatively developed framework for the long-term conservation and management of the coastal and marine resources of the Region. A programme of activities is being carried out through seven complementary components: institutional strengthening, reduction of navigation risks and marine pollution, sustainable use of living marine

resources, conservation of habitats and biodiversity, the establishment of a network of marine protected areas, support for integrated coastal zone management, and the enhancement of public awareness and participation.

Al-Sanbouk is
Under the Patronage of
PERSGA Secretary General,
Dr. Nizar Tawfiq
Editors
Dr. Mohammed Fawzi Chief editors
Dr. Dirar Nasr
Ms. Khulood Tubaishat
English language editor
Mr. Roderick Fleming

Photographs for this issue were kindly provided by Dr. N. Pilcher, and Mr. J. Kuchinke.

To join our mailing list or to receive additional copies please contact:

PERSGA, P.O. Box 53662, Jeddah 21583, Kingdom of Saudi Arabia.

Tel.: +966 2 657 3224

Fax: +966 2 652 1901

Email: information@persga.org

Back issues of Al-Sanbouk can be found at

<http://www.unep.ch/seas/main/PERSGA/index.html>

Al-Sanbouk welcomes all readers to submit articles, reviews, and photographs for publication but cannot guarantee that they will be used.

The aim of the newsletter is to provide information on conservation and development activities taking place in the region together with articles on marine issues of general interest. The contents of the newsletter do not necessarily represent the position or views of PERSGA or the editorial board, nor do they imply the expression of any opinion on the part of PERSGA concerning the legal status of any country, territory, frontier or border. All non-copyright material may be freely reproduced. Al-Sanbouk cordially requests that due reference is made to the source if any news/articles/pictures are reprinted in other publications. Articles appearing under a specific author's name may only be reprinted with the author's express written permission. This newsletter is printed on 100% recycled paper.

In this Issue of Al-Sanbouk:

A Word from the Secretary General

PERSGA Activities

Regional Protocols for the Conservation of Biological Diversity and the Establishment of Protected Areas

Regional Action Plan for the Protection of the Marine Environment from Land-based Activities

Navigation Risks, New Charts and Surveys

Standardisation of Fisheries Data in the Region
Coastal Zone Management and Ecotourism
A Vision for Public Awareness Programmes
Conferences
Missions
Staff Changes
Coral Reefs
Coral Reefs and Coral Bleaching in the Region (Dr. H. Vogt)
Paradise in Peril (Mr. H. Schmid)
Corals and Human Disturbance (Dr. N. Pilcher)
Links to Useful Sites on the Net
International News
Future Events
SAP Task Force Meeting (Khartoum, Sudan)
PERSGA Council Meeting (Cairo, Egypt)
Workshop on Standardisation of Survey Methods (Sharm El-Sheikh, Egypt)
Training Course on Public Awareness (Amman, Jordan)
Second Workshop on the Standardisation of Fisheries Data (Djibouti)
International Coral Reef Initiative Conference (Indonesia)
Training Course on Marine Turtle Conservation (Yemen)

**A Word from the Secretary General,
Dr. Nizar Ibrahim Tawfiq**

The development of regional cooperation that promotes environmental protection and sustainable development of the valuable natural resources of the Red Sea and Gulf of Aden is at the heart of our mission. PERSGA is passing through a stage of growth and development as the number and range of planned activities increases. It is therefore appropriate that an parallel development should take place to Al-Sambouk, our dependable newsletter, a regular source of information on our activities since January 1996.

We are keen to keep you informed about important issues concerning protection of the marine environment in the region. The reader will notice the following important developments in the newsletter:

§ A focus on coral reefs with emphasis on their conservation and management, monitoring, the relationship between international organizations working in the field, and a brief summary of the extent of coral bleaching in the region.

§ The customary section that addresses the numerous PERSGA activities, the meetings that will take place in the near future, - including the second SAP Task Force Meeting and the PERSGA Council Meeting, together with information on other regional and international organisations.

§ The number of issues distributed nationally, regionally and internationally has now doubled.

§ Printing on recycled paper - an environmental message from PERSGA.

We are always pleased to receive your comments and suggestions for the further development of Al-Sanbouk. We would also like to encourage you to

contribute articles to be published in our newsletter.

PERSGA Activities

Regional Protocols for the Conservation of Biological Diversity and the Establishment of Protected Areas

The European Commission (EC) has agreed to provide funding assistance for the preparation of two protocols, one in each of the PERSGA and ROPME regions. They are being prepared in cooperation with ROWA/UNEP and the Gulf Cooperation Council (GCC). A committee for leading the project has been formed comprising representatives from these regional agencies. It is expected that the consultant nominated by the EC to prepare the protocol will start work before the end of the year 2000.

During the meeting of the Conference of the Parties to the Convention on Biological Diversity, held in Nairobi in May 2000, the Secretariat of the Convention also agreed to participate in this project. Dr. Mohamed Abdulrahman Fawzi, Deputy Secretary General represented PERSGA at the meeting.

Regional Action Plan for the Protection of the Marine Environment from Land-based Activities

The first draft of the Regional Action Plan for the Protection of the Marine Environment from Land-based Activities has been prepared. Funding has been provided through the UNEP/Global Coordination Office based in The Hague. The draft document is now being reviewed and as soon as the Plan is ready it will be sent to Member Countries for review prior to an Expert Meeting that will adopt it in its final form.

Navigation Risks, New Charts and Surveys

The first meeting of the SAP Navigation Working Group was held in Amman, Jordan, in April and was opened by Mr. Ghazi Awdat, Deputy Director General of the General Corporation for Environmental Protection of Jordan. The Workshop theme was Hydrographic surveying techniques. Speakers from the United Kingdom Hydrographic Office and the International Hydrographic Organization delivered papers. Amongst the recommendations from the meeting the UK Hydrographic Office were requested to redesign charts of the southern Red Sea in order to cover the proposed Traffic Separation Scheme to the east of Jabal Zuqar, south and west of Hanish al Qubra, and the straits of Bab el Mandeb. They were also requested to redesign the enclosure on UK Admiralty Chart 453 to provide mariners with sufficient navigational data to navigate safely in the proposed traffic separation lanes.

New Vessel Routing Proposals

Considerable progress has been made since the Working Group meeting on new routing proposals and vessel traffic separation schemes. The proposals were

submitted to the International Maritime Organization 'Subcommittee for the Safety of Navigation' on 10 July. The subcommittee has confirmed that the proposals are sound and asked PERSGA to go ahead with hydrographic surveys in selected areas of the southern Red Sea. Draft contract documents for this work have been prepared and circulated to six selected companies and the replies are currently being evaluated.

Standardisation of Fisheries Data in the Region

The First Meeting of the Living Marine Resources Working Group was held at the Fisheries Training Institute in Aden from 29 April to 3 May together with a Workshop on the 'Standardisation of Fisheries Data Collection and Formats'. The Governor of Aden, Mr. Taha Ahmed Ghanem, the EPC Secretary-General, Dr. H. Al-Gunied, and the Rector of the University of Aden, Dr. S. Ba S'urrah, attended the opening session. The Governor delivered a brief welcoming speech at the opening session in which he emphasised the significance of regional co-operation and reiterated the desire that a SAP research and training centre should be successfully established.

The workshop on data collection highlighted the fact that all the data formats currently in use in the region are incomplete with respect to the information required on fishing effort. There is no information on the fishing grounds or the type of fishing effort exerted on each ground. The reliability of the data collected is not high due to the methods used for collection.

The Workshop participants visited the Shuqra fishing complex made up of a government owned fish-canning plant for producing canned tuna, and a number of fisheries service installations. At a meeting with the local Fishermen's Co-operative management the participants were shown the records of fish landed, fish species and prices at the complex. Local journalists from 'Saba News Agency', the daily 'Atthawra,' and '14th October' newspapers covered the opening session and some of the meetings.

Status of Living Marine Resources

A report on the "Status of Living Marine Resources in the Red Sea and Gulf of Aden Region and their Management" has been prepared. The report is comprehensive, covering the resource base, the present fisheries activities, processing and marketing activities, the socio-economic conditions of the fishing communities, the institutional and legal frameworks in the fisheries sector, the aquarium trade, and mariculture. The report also highlights the threats to coastal and marine habitats arising from fisheries that include unsustainable exploitation of the resources, environmentally harmful fishing practices and poaching by foreign vessels.

Coastal Zone Management and Ecotourism

The SAP Integrated Coastal Zone Management Working Group participated in a three-day Regional Workshop on 'Coastal Zone Management for Eco-tourism' organised by CEDARE (with UNEP and PERSGA support) and held at Hurghada, 18-20 June. The workshop allowed for the exchange of ideas and of

experiences gained by countries of the CEDARE region in coastal management for sustainable tourism.

A Vision for Public Awareness Programmes

Ms. Khulood Tubaishat, the Lead Specialist for Public Awareness and Participation (PAP), organised a Working Group meeting and six-day training Workshop on 'Creating a Vision of Environmental Public Awareness Programmes' at CEDARE in Cairo during June. The course improved the capacity of the PAP Working Group and National Board members to deliver effective environmental education and public awareness programmes to schools, local communities, decision-makers, and the public. The training course provided knowledge and skills to the participants about how public awareness programmes can contribute towards marine environmental management and sustainable development.

Conferences

Dr. Fareed Krupp, the SAP Chief Technical Advisor, participated in the International Coral Reef Initiative - Coordination and Planning Committee Meeting (25-26 May 2000, in Noumea) where he presented PERSGA, the SAP, and took part in discussions on the 'Action Plan for Coral Reef Conservation in the Arabian Region'. Mohammed Younis, presented a paper entitled: 'Development of a Regional Network of Marine Protected Areas in the Red Sea and Gulf of Aden' at an 'International Workshop on Policy Options for the Sustainable Use of Coral Reef and Associated Coastal Ecosystems' held in Mombassa, Kenya, 19-22 June. The meeting acted as a valuable forum for the exchange of ideas and the development of new contacts. It also provided participants with an opportunity to assess lessons learnt from recent approaches in coral reef ecosystem management, and to identify priorities for future social, economic and policy research. A visit to Kisite Marine National Park was offered which gave valuable insight into East African MPA management practices. A meeting was held with the Marine Programme Co-ordinator IUCN/East African Regional Office regarding co-operation between PERSGA and IUCN in Northwest Somalia.

Missions

In May the Ms. Khulood Tubaishat went to Sudan to meet the PAP Working Group member, interview suggested PAP Board members and prepare a draft national PAP workplan. Brainstorming workshops were conducted in Khartoum and Port Sudan with different stakeholders in order to prioritise issues of marine conservation that should be addressed by the public awareness programme, and to identify target groups and key messages for delivery. In June Mr. J.B. Collier - Operations Officer at the World Bank, Dr. Fareed Krupp - the SAP Chief Technical Advisor (CTA), and Dr. K. Hariri - Living Marine Resources Lead Specialist met in Sana'a with local World Bank staff and the Environment Protection Council (EPC) to discuss co-ordination between World Bank funded coastal management pilot projects, and the Marine Protected Area and Coastal Zone Management activities of the SAP. A general agreement was reached with the EPC on the integration of the Belhaf/Bir Ali area into the

regional marine protected area network.

In July the CTA together with Dr. D. Nasr, the PERSGA/SAP-Coordinator, and Eng. M. Hassan, the National Programme Coordinator for Sudan, conducted a mission to Khartoum to explain SAP implementation arrangements to the newly appointed Minister of Environment and Tourism and the new Secretary General of the Higher Council for Environment and Natural Resources, Dr. Nadir Awad (the new Task Force member). In addition the mission explored the most suitable venues for the Second Task Force Meeting and other logistics for the meeting.

A pre-assessment survey mission was conducted in Yemen to study PAP status, to visit relevant organisations, public awareness and environment centres, to establish Yemen's PAP Board, and to conduct a training-needs assessment and brainstorming workshop with stakeholders.

Staff Changes

In August Dr. Mohammed Abdullah Ibrahim, from Egypt, joined Dr. Khaled Hariri as part of the Living Marine Resources team.

Coral Reefs and Coral Bleaching in the Region

Dr. H. Vogt

Reefs in the Red Sea and Gulf of Aden

The Red Sea and Gulf of Aden lie within a particularly arid geographical region. High seasonal fluctuations of temperatures and elevated salinity levels result in a naturally stressful environment for shallow subtidal biological communities, many of which exist close to their physiological limits. On the other hand, hard substrates are abundant in these waters and freshwater influx is very limited, resulting in exceptionally clear water, even in near-shore areas. These are favourable conditions for coral growth and fringing reefs, barrier reefs, patch reefs and atoll-like structures are widespread. More than 250 species of stony corals are known from the region, which is the highest species richness in any section of the Indian Ocean. An almost continuous band of coral reefs fringes the shorelines of the northern and central Red Sea, including the Gulf of Aqaba. Coral assemblages in the shallow Gulf of Suez are less well developed. In the central Red Sea corals colonise a series of narrow banks about 3-10 km offshore, forming a large barrier reef running parallel to the coastline. Further south, the shelf becomes broader and shallower, soft bottom substrates prevail and turbidity increases, resulting in a decrease in the extent and complexity of coral reefs. Fringing reefs gradually disappear in this part of the Red Sea, while offshore patch reefs and coral assemblages fringing islands become more numerous. The Gulf of Aden supports surprisingly rich and complex reefs, and the corals surrounding the Socotra islands are particularly diverse.

Regional Coral Bleaching

In 1997-98 the region's reefs suffered, to varying degrees, from the worldwide, coral bleaching event. As a response, Saudi Arabia's National Commission for Wildlife Conservation and Development hosted an "International Workshop on the Extent and Effects of Coral Bleaching in the Arabian Region", which was held in Riyadh from 6-9 February 2000.

Within the Red Sea, no bleaching was observed in the Gulf of Aqaba, the Gulf of Suez or along the Egyptian coast of the main basin. Bleaching was patchy along the Saudi Arabian coast, being more severe to the south. In Sudan, bleaching occurred at several locations, above all south of Port Sudan. In Eritrea, some coral bleaching and die-off was reported, predominantly from shallow waters, but recovery appeared to be fast. Along the Red Sea coastline of Yemen, where reefs are already under considerable human-induced stress, effects of coral bleaching were severe. However, no quantitative data are available. Many areas of the Gulf of Aden were affected by bleaching. In Somalia, almost all corals in an area east of Berbera were killed, whereas further west, corals were only slightly affected. In Yemen, many corals along the shoreline died, and more than half of the corals of the Socotra Archipelago were affected by the bleaching.

Paradise in Peril

Hagen Schmid

Well-known and respected amateur naturalist, diver and author of several books on the marine environment of the Red Sea

Coral reefs are home to some of the greatest diversity of life forms on our planet. They are living structures consisting of thousands of different creatures. The coral polyps themselves are one of the principal builders of these amazing formations. 'Modern' reef building corals are descendants of organisms which lived in our seas more than 225 million years ago, and are quite hardy little creatures which have survived many climatic changes in the past. However, they have never before been faced with the multitude of environmental problems that now confront them.

Approximately 400 species from about 100 genera of coral are the main reef builders in our tropical seas. Their life cycle, shape and feeding habits differ so much from any other living creatures we know that they were not fully understood by early scientists, who described them as plants or plant-animals (Zoophyta). Only in 1725 were they correctly classified as animals by the French scientist, Peyssonnel.

With the help of highly specialised algae called Zooxanthellae, that actually live within the coral polyp, they extract calcium and carbon out of seawater and build their protective exterior skeletons. Every different species constructs a particular shape and size of colony. Because this building work can only take

place with the support of the zooxanthellae and sufficient sunlight, we find nearly all reef building corals in rather shallow water around the Equator, where there is an ample and steady supply of sunshine.

With and around the corals live hundreds of other species that directly or indirectly depend on the structures produced by these tiny builders. Tubeworms or shells bore their way into the solid, protective calcium deposits. Fish, invertebrates and crustaceans hide between the branches. Many animals consider the coral polyps themselves as a nourishing food source, from the small butterfly fish, which feeds only on single polyps, to the large bumphead parrot fish which, with the help of their strong, fused front teeth break off coral pieces and grind the skeletons down to extract the nourishing polyps. They release the undigested remains onto the reef forming sandy patches, which provide a home for other types of animals. When coral polyps die, their stony foundations provide soft corals and sponges with an ideal base on which to settle and start their own colonies. Pieces of broken coral can be cemented together by calcium-producing algae to provide further areas for such life forms to grow. Some fish, and other animals like sea urchins, play an important role by grazing on algae or sponges that might otherwise overgrow and suffocate the corals.

For millions of years these kingdoms were able to flourish, hidden beneath the sea. The ballooning of the human population in the mid 1980's to 5 billion (and in the 1990's to 6 billion), and the accompanying economic and social problems of feeding and settling all these people, has dramatically influenced our environment. Coral reefs, once fished in a sustainable fashion when demand was light, are now plundered and abused by dynamiting, cyanide fishing, shell collecting, pollution, overfishing, and excessive tourism. These once majestic coral formations are now in deep trouble worldwide.

During the last few years scientists around the globe have become increasingly alarmed by the rapid decline in the health of coral reefs. This marked decline has taken place in most of the tropical seas. In the Red Sea the reefs have, so far, remained in a relatively robust state as most of the coastal regions are rather thinly populated. However, there have been local problems around the larger cities like Jeddah, and Yanbu in Saudi Arabia, and on the extensively visited diving sites along the Egyptian coastline.

When suddenly in August 1998 extensive coral bleaching was observed along the central Red Sea coast, the once healthy reefs joined the general decline also seen in the Pacific and the Caribbean. Under a combination of negative environmental circumstances, corals expel their zooxanthellae. These algae normally give the coral colonies their colour, and the loss causes the colony to turn white. The reef building corals affected are mainly those with a massive life-form such as Porites, Favia, and the brain corals, along with leather corals (Alcyoniidae) other soft corals (Nephtheidae), and sea anemones (Stichodactylidae). In some areas 80-90% of the leather and soft corals were affected or killed. Once colourful coral gardens have become stony-white underwater deserts.

The percentage of bleached corals was not constant. There was a significant

variation in different areas. It appears that reefs which have had to cope with other additional sources of stress are much more sensitive to the causes of bleaching. Reefs to the north of the city of Jeddah, where most coastal development is currently taking place, showed much more damage (20-30%) than reefs to the south of the city (5-10%) where relatively little or no development has taken place.

Many possible causes for this sad phenomenon have been suggested. One of the most widely accepted explanations is prolonged higher water temperature, although corals can tolerate quite high temperatures. The damage in shallow areas, where the water can heat up above 40 °C in the summer months, was less than in deeper ones where the temperatures were not as high and were more constant, 28-32° C, depending on the season. Changes in sunlight intensity have also been put forward as a possible cause; however, corals under overhangs or in caves were affected, whereas others in direct sunlight were not.

By October it seemed that the bleaching had come to an end. Some corals appeared to recuperate very slowly but most were dead, and green algae were seen growing on the skeletons. A brownish tint returned to the sea anemones. However it seemed that they had lost some of their stinging ability because wrasses could be seen swimming in and out of the mouths of these once aggressive animals.

With the pollution of our planet we undermine the healthy functioning of our ocean ecosystems, which were in equilibrium over millennia without us in the equation. The question now is how much abuse can the living ocean-system continue to take? Let us remember that our oceans are among the main producers of oxygen for the atmosphere, and a valuable source of food. They should not be used as a site to dispose of our waste and should not be contaminated with pollutants from the land or the air. We need to live compatibly with nature and not to continue to systematically destroy our supporting ecosystems.

Corals and Human Disturbance

Nicolas J. Pilcher
Institute of Biodiversity and Environmental Conservation, Universiti Malaysia
Sarawak,
94300 Kota Samarahan, Sarawak, Malaysia. Email: nick@tualang.unimas.my

Introduction

Coral reefs are centres of marine biodiversity. Reefs are constructed by a host of reef-building (hermatypic) coral species, but also are home to ahermatypic, or non-calcium carbonate depositing corals such as soft corals, black corals and gorgonians. Much like their terrestrial counterparts the tropical rainforests, reefs combine a host of micro-habitats and a diverse array of life-forms that are still being discovered and described. Coral reefs are distributed throughout the

tropics, and a large proportion are located in developing countries.

To understand how human activities affect coral reefs, it is necessary to briefly review their basic life history. Coral reefs are made up of numerous coral colonies. These colonies are made up of thousands of minute coral polyps each of which secretes a calcium carbonate skeleton. The deposition rate for individual coral species varies, but is generally considered to range between 0.1 mm and 10.0 cm per year. The accumulation of these skeletons over an enormously long period of time results in massive, three dimensional geological structures. The actual living tissue however, is only a very thin layer lining the surface. Coral polyps feed by filtering plankton, aided by tentacles tipped with stinging-cells (nematocysts); they also receive organic matter through their symbiotic relationship with minute algae (dinoflagellates) called zooxanthellae. These small algal cells use sunlight to photosynthesise carbonates and water into organic matter and oxygen, both of which are used by the polyp.

Coral reefs support complex food and energy webs that are inter-linked with nutrient inputs from outside sources (such as those brought with ocean currents and run-off from nearby rivers) and from the reef itself (where natural predation and die-off recirculate organic matter). These complex webs mean that any effect on one group of individuals will ultimately impact another, and single disturbances can have multiple effects on reef inhabitants. For example, the complete eradication of the giant Triton *Charonia trinitis* through overfishing usually results in outbreaks of Crown-of-Thorns starfish *Acanthaster planci*. This in turn leads to massive coral mortalities as the starfish reproduce and feed on the coral polyps. Habitats and food sources for reef fishes are then reduced leading to declines in the population of larger predatory fishes. The following sections provide a brief review of human disturbances and their general effects on coral reefs.

Collection of corals

Corals have been mined for construction purposes in several countries including Sudan and Saudi Arabia, broken into manageable sizes or crushed for the manufacture of cement and lime.

Corals are also collected for use in the ornamental trade as curios, souvenirs, or as jewellery. The aquarium industry is also responsible for the coral collection, either for direct sale as live colonies or through the process of fish collecting.

The removal of coral colonies decreases the shelter and niche areas available to numerous other reef inhabitants. Juvenile stages of fishes that seek shelter among the branching species of corals, and worms and ascidians that take up residence on massive life-forms, are deprived of protection and refuges and may become prey to other reef organisms. Furthermore, removal of entire colonies reduces the overall structural stability of the reef, and increases rates of erosion from wave damage.

Destructive Fishing

Destructive fishing pressures are taking their toll on coral reefs. Today this is

done with the use of home-made explosives composed of fertiliser, fuel and fuse caps inserted into empty beer bottles. Blast-fishers hunt for schooling fish such as sweetlips and fusiliers, which aggregate in groups in the open or hide under large coral heads. The bombs are usually dropped into the centre of an area judged to have many fish and after the bomb has exploded the fishermen use dip nets to collect the stunned and dying fish.

Blast fishing also damages corals. Lightly bombed reefs are usually pockmarked with blast craters, but many reefs in developing countries have been reduced to a continuous band of coral rubble instead of a reef crest and upper reef slope. The blasts change the three-dimensional structure of reefs, and blasted areas no longer provide food or shelter to reef inhabitants. Further, once the reef structure has been weakened or destroyed by blast fishing it is much more susceptible to wave action and the reef is unable to maintain its role in coastline protection. Larvae do not settle on rubble and thus replenishment and rehabilitation is minimal. The recovery of such areas has been measured in decades, and only then with complete protection and cessation of fishery pressure of any kind.

One of the most destructive fishing methods involves the use of cyanide. An aqueous solution of sodium cyanide or other chemical is squirted at fish to stun them, after which they are collected and sold to the live-fish trade. In the process of stunning the fish, the cyanide affects corals, small fish and invertebrates. A solution, which is narcotising to large fish, is often lethal to smaller ones. Cyanide has also been shown to limit coral growth, cause diseases, bleaching, and ultimately, in many coral species, leads to death.

Also among destructive fishing practices are normal trawl and purse fishing operations, when these take place close to or over reefs. Trawlers try to operate close to reefs to take advantage of the higher levels of fish aggregated around them, but often end up with their trawls caught on the reefs. Many of these then have to be cut away and discarded, becoming further entangled, breaking corals and smothering others. Spearfishing may also damage corals if fishermen trample and break coral to get at fish that disappear into crevices.

Discharges

Mankind also has an impact on corals through the uncontrolled and often unregulated discharge of a number of industrial and domestic effluents. Many of these are 'point-source' discharges that affect localised reef areas, rather than causing broad-scale reef mortality. Discharges may release chemicals that are debilitating, toxic, or lead to a change in the environmental conditions. The release of fluids high in organic matter or nutrients, such as sewage or abattoir refuse can lead to a phenomenon known as eutrophication. Plague quantities of algae may grow, stimulated by the high nutrient levels. When these die, the bacteria that cause decomposition can deplete the water of oxygen to such an extent that it becomes impossible for corals and other animals to survive. Untreated and partially treated sewage is often discharged where fringing reefs are located close to shore, such as the reefs that fringe the length of the Red Sea. Raw sewage can also result in tumours on fish, and erosion of fins from

the high concentrations of bacteria that develop.

Petroleum hydrocarbons from the oil industry have also caused widespread damage to coral reefs. The levels of oil and its derivatives in the marine environment (many of which are persistent carcinogens) have been correlated with coral diseases in the Red Sea, especially Black Band Disease. Drilling activities frequently occur near reefs, such as along the Saudi Arabian shoreline in the Arabian Gulf. Drilling mud can suffocate reefs and it also contains compounds that disrupt growth and cause diseases. Discharges result in an increase in diatoms (algae) and a decrease in marine fauna in their vicinity.

Many millions of tonnes of oil are transported through the region each year. Oil spills affect coral reefs through smothering, resulting in a lack of further colonisation, as occurred in the Gulf of Aqaba in 1970 when the coral *Stylophora pistillata* was found not to re-colonise oil-contaminated areas. There have been more than 20 oil spills along the Egyptian coast since 1982, some which have smothered and poisoned corals and other organisms.

Industrial effluents also impact coral reefs and their associated fauna and habitats. Discharge of heavy metals may give rise to elevated levels of lead, mercury or copper in bivalves and fish, or elevated levels of cadmium, vanadium and zinc in sediments. Larval stages of crustaceans and fish are particularly affected, and effluents often inhibit the growth of phytoplankton, resulting in a lack of zooplankton, a major food source for corals.

The outflow from desalination plants is typically 5-10 °C higher in temperature and up to 3?10 ppt higher in salinity than normal seawater. These discharges may also include chlorine and anti-scaling chemicals. The higher temperatures decrease the water's ability to dissolve oxygen, slowing reef processes, and usually result in localised bleaching of coral colonies. The higher salinity of the discharges increases coral mucus production and results in the expulsion of zooxanthellae and eventual bleaching and algal overgrowth. Often these waters are also chlorinated and contain compounds that are non-biodegradable and circulate in the environment for years. These compounds are absorbed by phytoplankton and then by filter-feeding corals. Through the complex food webs on the reef these compounds concentrate in carnivorous fishes, which may become poisonous to mankind.

Many airborne particles are also deposited over coral reefs, such as fertiliser dust, or dust from construction activities. At Ras Baridi, on the Red Sea coast of Saudi Arabia, a cement plant operating without filtered chimneys discharges more than 100 tonnes of partially processed cement over the nearby coral reefs each day. The reefs are now smothered by over 10 cm of fine silt.

Solid Waste Dumping

Plastics, metal, wood, rubber, and glass can all be found littering coral reefs. These wastes are often non-biodegradable, or persist over long periods of time, causing damage which is primarily of a physical nature. Solid wastes damage coral colonies at the time of dumping, and thereafter through movements with

natural tidal and surge action.

Construction

Construction activities include coastal reclamation works, port development, dredging, and urban and industrial development. Commercial and residential property development in Jeddah have filled in reef lagoon areas out to the reef crest and bulldozed rocks over the reef crest for protection against erosion and wave action. 'Landfill' activities of this type generally result in increased levels of sedimentation as soil is nearly always dumped without the benefit of screens or silt barriers. Coral polyps, although able to withstand moderate sediment loading, cannot displace heavier loads and perish through suffocation.

The development of ports and marinas also involves dredging deep channels through reef areas for safe navigation and berthing, and damages reefs through the direct removal of coral colonies, sediment fallout, and disruption of the normal current patterns on which the reefs depend for nutrients.

Port Activities

Port activities can have adverse effects on nearby reefs through spills of bulk cargoes and petrochemicals. Fertilisers, phosphates, manganese and bauxite are often loaded and offloaded using massive mechanical grabs which spill a little of their contents on each haul. In Jordan, the death of corals was up to four times higher near a port that had frequent phosphate spills compared to control sites. The input of these nutrients inhibits calcification and increases sedimentation. Algal blooms also develop through input of nutrients (nitrogen and phosphorous compounds), limiting light penetration and depleting dissolved oxygen.

Recreation

The recreation industry has caused small but significant localised damage to coral reefs. Flipper damage by SCUBA divers is widespread, but certain activities, such as underwater photography, finds divers breaking corals to get at subjects and trampling reef habitats in order to get the perfect shot.

Anchor damage from boats is another problem at tourist destinations. Experiments have proven that repeated breakage of corals, such as caused by intensive diving tourism, may lead to substantially reduced sexual reproduction in corals, and eventually lower rates of re-colonisation. In the northern Red Sea, another popular diving destination, efforts are underway to install permanent moorings to minimise the damage to reefs from anchors.

Indirect Effects

Most anthropogenic effects and disturbances to coral reefs are easily identifiable. Blast debris and lost fishing nets can be seen. Pollutant levels and sediment loads can be measured. However, many other man-made or induced problems have indirect impacts on coral reefs that are both problematic to link directly to coral mortality and difficult to quantify. Agricultural practices and logging, for instance, contribute to coral reef degradation through the runoff of sediment, fertilisers and pesticides. These result in the smothering of corals,

limited larval settlement and localised nutrient enrichment.

Global warming, resulting from the Greenhouse effect and the build-up of carbon dioxide in the atmosphere, might also kill corals. The extensive coral-bleaching event that took place in 1998, which was particularly severe in the Indian Ocean region, is accepted as having been the result of a rise in sea surface temperature. Bleaching of coral colonies occurs through the expulsion of zooxanthellae as coral polyps become stressed by adverse thermal gradients.

Coupled with global warming is sea level rise; this is predicted to be 25 cm by the year 2050. If not matched by coral growth, this will mean that corals will be submerged deeper and will not receive the levels of sunlight required for photosynthesis by the zooxanthellae. Additionally, the ability of coral reefs to protect coastlines from erosion will be lost if the waves are able to wash over the newly submerged reefs.

The Future

Mankind has contributed to the widespread destruction of corals, reef areas and their associated fauna through a number of acute and chronic pollutant discharges, destructive processes, and through uncontrolled and unregulated development. These effects are more noticeable where social and traditional practices have changed with a lack of infrastructure, finances, and educational resources. Destructive fishing pressures and the development of coastal industry affects reefs throughout their geographic range. If mankind is to be the saviour of coral reefs in the coming millennium, there is going to have to be a change in fishing practices, and adherence to development and shipping guidelines and regulations, and integrated coastal management programmes that take into account the socio-economic status of people, the environment, and developmental needs.

Links to Useful Sites on the Net

The Internet is a wonderful source of information on coral reefs.

<http://www.seaworld.org> – A simple but valuable introduction to corals and coral reefs.

<http://www.reefcheck.org> – The site for those interested in reef monitoring. Scientists from the region will be trained in Reef Check methodology at a Workshop in Sharm El-Sheikh in September. This method will be used for future monitoring and evaluation of the status of the reefs in the Red Sea and Gulf of Aden.

<http://www.enn.com/news> – Environmental News Network Inc. Visit this site to read a recent report from Margot Higgins on the dispersal of larvae and their role in the protection of the world's declining coral reef resources.

<http://www.oivi.ca> – Ocean Voice International works for harmony between people, marine life and the environment. It is environmental, humanitarian and

global in its concerns. A source of information on some useful publications and videos including "Coral Divers Say No to Cyanide" an 18 minute video film on fishermen who used to collect aquarium fish by stunning with cyanide but have now switched to the use of environmentally-friendly nets.

<http://www.epa.gov/owow/oceans/coral> – This is the site for The International Coral Reef Initiative (ICRI), - information about coral reefs, and activities taking place for their monitoring and protection. Great links to other reef related sites - U.S. Government and NGOs.

<http://www.wri.org> – The World Resources Institute provides information, ideas, and solutions to global environmental problems. Mission - to move human society to live in ways that protect the Earth's environment for current and future generations.

<http://www.reefrelief.org> – Reef relief is a non-profit organisation dedicated to preserving and protecting living coral reef ecosystems through local, regional and global efforts.

International News

EVENTS

IUCN's World Conservation Congress, expected to be the biggest environmental gathering ever to be held in the Middle East, will take place in Amman, Jordan from 4-11 October 2000.

The theme of the Amman Congress is "ecospace", a term indicating that environmental protection at various geographical scales is a prerequisite for the social, economic, and even political security of people. Redefining the frontiers of conservation will address the problem of the current inadequacy in social and spatial organisation for environmental management, involving knowledge, empowerment, and governance at global, national, and local levels. It will link ecosystem conservation with the need to stem the global loss of biodiversity, and thus build on IUCN's traditional strengths in species and protected areas. (Copied from <http://www.iucn.org/amman/content/about.htm>)

News from the States (from the Environmental News Network, see 'Links to Sites on the Net'); reports tell that the U.S. Environmental Protection Agency has granted a Puerto Rican wastewater treatment plant a 20-year extension to comply with the U.S. Clean Water Act. Environmentalists are calling this 'a death act'. Sewage wastewater will be allowed to pollute the coastal environment after only receiving primary treatment - the removal of solids. Secondary treatment using bacteria and aeration to decompose most of the organic material can significantly reduce the level of pollutants entering the ocean. Most of the discharge is occurring in shallow tropical waters and discharge plumes are not properly diluted by the ocean currents.

FUTURE EVENTS

Regional Training Workshop on Industrial Waste Management
PERSGA and ALECSO will hold a regional training workshop on Industrial Waste Management in Aqaba, Jordan during the period 16-20 September 2000. The Workshop will concentrate on the sound management of industrial waste and its effect on the environment. Key issues being covered include:

- New technologies for dealing with industrial waste materials
- Methods of reducing the quantity of waste produced and opportunities for recycling
- Appropriate procedures to ensure compliance with environmental legislation

SAP Task Force Meeting

The Second Strategic Action Programme Task Force Meeting will be held in Khartoum, Sudan on 26-27 September. The Friendship Hotel at Khartoum North has been selected as the venue for the meeting. H.E. Mr. El-Tijani Adam El-Tahir, the Minister of Environment and Tourism in Sudan, will give a welcoming address and Professor Nizar Tawfiq, the PERSGA Secretary General, will take the chair.

The meeting will concentrate on the SAP implementation progress and key achievements, exchange of experience with similar Regional Seas Programmes, in addition to monitoring and evaluation issues.

A one-day retreat for PERSGA staff and all personnel involved with the implementation of the SAP will take place on 28 September following the meeting.

PERSGA Council Meeting

A preparatory meeting for the approaching PERSGA Council Meeting will take place in Jeddah during the period 14-15 October 2000, together with the PERSGA Executive Committee Meeting.

The Fourth PERSGA Council Meeting will take place in Cairo on 4 November 2000. The main topics of the agenda will include:

- § The report of the Secretary General for 1999-2000
- § The budget of PERSGA and the SAP for the financial years 2001 and 2002

Workshop on Standardisation of Survey Methodology

The second SAP Habitat and Biodiversity Working Group meeting will take place on 11-12 September in Sharm El-Sheikh. Each member will present the status of the critical habitats in his country and propose methods of promoting conservation. Following this meeting (on 13-14 September) the Working Group will take part in a Workshop designed to standardise survey methodologies in the region. This will cover important natural habitats such as coral reefs, mangroves, and seagrass beds, as well as important species such as the marine mammals, marine turtles, coral reef fish, and seabirds. Four international experts and the HBC Working Group will be invited to the workshop. Each expert will prepare a set of guidelines describing survey methods suitable for the Region, which will be collated into a single volume titled "A Guide to Standard Survey Methods for the Red Sea and Gulf of Aden". Following the Workshop (16-20 September) a practical session on coral reef monitoring will

be conducted using the Reef Check methodology.

Training Course on Public Awareness

In collaboration with IUCN, Ms. K. Tubaishat (PAP-LS) is organising a second workshop/training course focussing on capacity building for public awareness specialists. This will take place in Amman, Jordan in conjunction with the IUCN Congress, from 3 October. The two-week course will provide training on specific marine issues, how public awareness and participation can be generated, international examples of public awareness programmes in action, strategic thinking and planning, effective presentation skills, and the role of social marketing.

Second Workshop on the Standardisation of Fisheries Data

The Living Marine Resources Working Group, led by Dr. K. Hariri, will hold its second meeting in Djibouti from 18-21 November. The group will review the work on the standardisation of fisheries statistical systems begun at the first meeting, and consider the establishment of an LMR database. Technical papers on elasmobranch identification and stock assessment will be discussed.

International Coral Reef Initiative Conference

The 'Regional Action Plan for the Conservation of Coral Reefs in the Arabian Region' will be presented at the ICRI Conference in Bali, Indonesia (23-29 October, 2000).

Training Course on Marine Turtle Conservation

A training course for regional specialists will be conducted on 4-10 November in Yemen. Specialists will learn about survey methods, data collection and analysis, tagging, measuring and conservation philosophy. The specialists will form a regional Turtle Group and become national trainers in their home countries.

Did You Know?

(Information kindly provided by [The World Conservation Monitoring Centre](#))

–Coral reefs are the earth's most diverse marine ecosystem with as many as 3,000 different species living together on a single reef. They are a valuable source of protein and income for subsistence communities and an important source of tourist revenue for countries around the world.

–Australia's Great Barrier Reef sustains a \$250 million fishing industry and a \$1.5 BILLION tourist market.

–Aquarium fish lovers - if your fish dies in the tank within a week of purchase, then the quality of the fish is suspect. It could have been caught using cyanide. If the vendor says the fish came from Singapore, Taiwan or Hong Kong then most probably it was caught in the Philippines or Indonesia using cyanide.

–The Great Barrier Reef is the largest structure made by living organisms and is visible from outer space.

–Most corals feed at night - so you will get the best photographs of corals with

their tentacles extended during night dives!

–Corals aren't soft and gentle. They are voracious carnivores!

–A single coral colony is a clone of genetically identical animals.

–Corals colonies form a thin sheet of soft, living tissue over the rock surface.

–The reef building corals have plant cells living inside them!

–Australian scientists are developing new sunscreens from chemicals found in some coral species. These chemicals prevent ultra violet light causing tissue damage.

–The rare 'mushroom' corals are protected by the Convention on the International Trade in Endangered Species of Fauna and Flora.

–Some of the massive boulder corals grow less than 0.5 cm per year.

–The branching staghorn corals may grow at 10 to 20 cm per year.