PREFACE

> More than fifty millions of years ago, long, long, long before man built his first crude hut, a bizarre, intricate form of life began construction of the world's greatest edifices. Time passed and Earth was transformed. Battling against wind and wave, thwarted and harassed by the icy breath of a planet in the throes of the ice ages, this pulsing mass worked on and on and on. While mountains lifted and seas drained and continents floated over the face of the Earth, the diaphanous creatures perfected their craft . . . the blind, unthinking workers toiled to the rhythms of the oceans, steadily building up and out. From ions dissolved in the sea, they shaped delicate microscopic crystals that were wedded to older tissues— day after day, millennium after millennium. The accretions grew into massive boulders, and slowly, very slowly, into giant walls and buttresses that could withstand the poundings of the oceans.
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> Douglas Faulkner, Living Corals (New York: Clarkson N. Potter, Inc., Distributed by Crown Publishers, Inc., 1979) p.17.

The breathtakingly beautiful coral reefs of the world cover less than a half of one percent of our planet's sea floor. And yet, these magnificent underwater empires are home to an estimated 25 percent of all oceanic species, a dazzling diversity of sea creatures. Like the teeming metropolis of Rome, a coral reef "was not built in a day." Rather, the coral heads in a reef grow at a painstakingly slow average rate of half an inch per year and require epochs of geological time to amass into reefs and coral cays.

Coral reefs, in addition to providing food and shelter for countless varieties of marine life, provide benefits beyond estimation for humankind. Healthy reefs are essential for an adequate supply of seafood to nourish the world's populations and sustain regional fishing industries. Reefs enhance tourist businesses by attracting millions of divers and by continuously supplying coastal beaches with shimmering white sand, the fine-grained rubble of dead corals and calcareous reef algae. By breaking waves, reefs protect nearby shorelines from soil and sand erosion and from the brunt of ravaging hurricanes. A wealth of commercial and medical applications has been discovered for corals and other components of the reef community. From coral reefs come additives for cement and mortar, compounds used in violin varnishes, substances for surgically replacing broken human bones, and promising treatments for infections, viruses, arthritis, asthma, and cancer. Scientists agree that this is only the tip of the iceberg as far as important findings and innovations which will result from continued research of coral reefs.

In recent years, as appreciation for the remarkable and irreplaceable coral reefs has increased, so also has grown the alarming realization that the reefs are in trouble. It has been said that we are literally "loving our reefs to death." Souvenir shops have taken their toll as reefs are chipped away to make coral curios for tourists to buy. The most accessible reefs are rapidly deteriorating due to the sheer numbers of visitors. Even the slightest touch of a hand or a swim fin can crush the fragile polyps that constitute a coral head, exposing the entire head to algal overgrowth or bacterial infection.

Over and above the damage done by careless snorkelers and divers, anchor impacts, accidental boat groundings, and propeller damage, reefs around the globe are dying as the result of pollution of their native waters. Fishing boats, cruise ships, and cargo vessels jettison tons of garbage and debris into the oceans each year. Coastal deforestation and development are responsible for clouding near shore waters with sediments that smother corals and deprive them of needed sunlight. In some cases, land development has led to increased freshwater runoff which has killed or stunted nearby reefs. Well-established agricultural practices have the unfortunate consequence of tainting seawater with toxic pesticide runoff. Fertilizer, sewage, and phosphate-laden detergents leaching into the sea have promoted algal blooms which rob the water of oxygen and lead to coral disease. Oil drilling and manufacturing enterprises have also contributed to the demise of coral reefs by diminishing water quality.

Efforts are underway around the world to reduce destructive reef fishing and pet shop/aquarium collecting practices—-especially those that use dynamite, cyanide, and bleach—-and to raise awareness of the problem of overcollecting which has been documented to drastically upset the delicate natural balance of the reef ecosystem.

Yet another dire threat to corals is the often irreversible “bleaching” which results when corals are subjected to such stresses as excessive increase in water temperature. It is reported that more than 80 percent of the Atlantic’s reefs have suffered from bleaching since 1988, and serious incidences of bleaching have been noted on the Great Barrier Reef as well as on Indo-Pacific reefs. Many investigators attribute the bleaching to global warming which has resulted as modern civilization has filled Earth’s atmosphere with a variety of pollutants that trap heat which otherwise would have dissipated into outer space (i.e., the “greenhouse effect”).

In the face of these ominous worldwide threats to coral reefs, *now* is the time to take action to preserve the sea’s finest treasures. The year 1997 has been officially designated by the United Nations as **THE INTERNATIONAL YEAR OF THE REEF**, a year to launch what must be an ongoing campaign to educate people of all ages about the marvels of coral reefs and the need for their conservation.

This manual is a compilation of some of the finest teaching activities available on coral reefs, gathered from around the globe. Teachers will find exercises and projects for students in grades four through eight which can be integrated into all disciplines of learning—reading, writing, math, science, social studies, arts, drama, recreation—and even classroom refreshments. Some of the activities are simple and can be quickly conducted while others will require more extensive preparation and time to perform. The text of many activities in this teacher’s guide is written for classroom instructors, however, some activities address students directly. When utilizing this manual, a photocopier may prove useful for preparing handouts or overhead transparencies. Material in this manual may be copied solely for educational purposes and may not be sold for a profit or presented without proper credit to the original sources.

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