

# THE CORAL REEF TEACHER'S GUIDE

## REEF RELIEF®

*a nonprofit membership organization dedicated to  
Preserve and Protect Living Coral Reef Ecosystems  
through local, regional and global efforts*



**Reef Relief** • Post Office Box 430, Key West, Florida 33041 • (305) 294-3100 • (305) 293-9515  
**Captain Roland Roberts House Environmental Center** • New Plymouth, Green Turtle Cay, Abacos, Bahamas • phone/fax (242) 354-4014  
[www.reefrelief.org](http://www.reefrelief.org)      e-mail: [reef@bellsouth.net](mailto:reef@bellsouth.net)

# THE CORAL REEF TEACHER'S GUIDE

---

*Developed by:* Ruth Brown  
Jana Gentry-Gruber  
Joanne Hardesty  
Mary Meyer  
Marcy Roth  
Jo Thompson  
Wendy Weir

*Edited by:* Bill Alevizon, PhD  
Joanne Hardesty  
David Kline  
DeeVon Quirolo  
Marcy Roth  
Wendy Weir

*Illustrated by:* George Mauro  
Wendy Weir

*Photographs by:* Larry Benvenuti  
Hal Beral  
Milton Beral  
Terry J. Brown, MD  
Jim Gollin  
Marianne Hegeman  
Jim Larson  
Christopher McLeod  
James W. Porter, PhD  
Craig Quirolo  
DeeVon Quirolo  
Wendy Weir

*Design and  
Production by:* Graphics Unlimited  
San Rafael, CA

Special thanks to The Turner Foundation, The Goldman Fund and the members of REEF RELIEF for financial support.

Copyright 1998, Revised 2004 REEF RELIEF  
All rights reserved. Permission to  
reproduce for classroom use only  
allowed without prior written approval.



---

# Table of Contents

Acknowledgements ..... vi  
Introduction ..... vii  
How to Use the Teacher's Guide ..... viii

## **BACKGROUND INFORMATION**

### **What and Where are the Coral Reefs?**

- What Is Coral? ..... 1-1
- The Coral Body ..... 1-1
- Corals and Their Plant Partners ..... 1-2
- Food Sources ..... 1-2
- Reproduction and Growth ..... 1-2
- Types of Corals
  - Hard Corals ..... 1-4
  - Soft Corals ..... 1-5
- Location of Coral Reefs ..... 1-5
- Distribution ..... 1-5
- Coral Reef Formation ..... 1-7
- Types of Reefs ..... 1-7

### **Life on the Coral Reef**

- The Coral Reef Ecosystem ..... 2-1
- Reef Zones ..... 2-1
  - Lagoon ..... 2-2
  - Reef Crest ..... 2-4
  - Reef Face ..... 2-5
  - Valuable Relationship ..... 2-6
- The Food Chain ..... 2-7
  - Herbivores ..... 2-8
  - Omnivores and Carnivores ..... 2-9
  - Decomposition ..... 2-9
- Predation and Protection
  - Methods of Predation ..... 2-10
  - Methods of Protection ..... 2-12

**Benefits, Threats, and Solutions**

- The Value of Coral Reefs ..... 3-1
- Threats to Corals ..... 3-2
  - Natural Threats ..... 3-3
  - Human-Caused Threats ..... 3-3
- Threats to Coral Reefs in the United States ..... 3-6
- Solutions ..... 3-9
  - Education and Action ..... 3-9
  - Reef Relief: Protecting North America's
    - Only Coral Barrier Reef ..... 3-10
    - Negril Coral Reef Conservation Society, Jamaica.. 3-12
    - Reef Mooring Buoys for Guanaja,
      - Bay Islands, Honduras ..... 3-13
      - Abacos, Bahamas ..... 3-14
    - Coral Reefs in Cuba ..... 3-16
    - The Miskito of La Mosquitia, Honduras ..... 3-19
    - The Kuna of Kuna Yala, Panama ..... 3-20
    - The Filipinos of the Philippines ..... 3-21
- What You Can Do ..... 3-23

**LESSON PLANS**

- Lesson Plans for K-5** ..... E-1
- The Edible Coral Polyp ..... E-2
- "I'm A Coral Polyp" Color Page ..... E-3
- Calcium Carbonate and Coral ..... E-4
- Where in the World are those Coral Reefs? ..... E-5
- Tempting Tentacle Problems ..... E-8
- Coral Reef Zones Color Page and 3-D Mural ..... E-11
- Coral Reef Color Page and Mural ..... E-15
- Coral Reef Life Cards ..... E-19
- Coral Reef Poetry ..... E-26
- Coral Reef Pop-Up Cards ..... E-28
- Coral Reef Connections ..... E-29
- Loads of Life Big Books to Share ..... E-33
- Sample That Reef Life! ..... E-34
- Careful With Your Plastics! ..... E-35
- Coral Reef Word Find ..... E-37
- Unsettling Sediments ..... E-39
- How You Can Help Reef Relief! ..... E-40
- Student Assessment ..... E-43

<b>Lesson Plans for 6-8</b> .....	M-1
Introductory Lesson .....	M-2
Mapping the Reefs .....	M-4
Coral Forest Two-Syllable Poetry .....	M-9
Diving Expedition .....	M-10
Create a Creature .....	M-17
Windows to the Sea .....	M-19
Coral Reef Mural .....	M-20
Student-Generated Research Fold-Out Book .....	M-23
Reef Links Crossword Puzzle .....	M-25
Positive Posters .....	M-27
Advice Column .....	M-28
How You Can Help Reef Relief! .....	M-29
Student Assessment .....	M-31
<b>Lesson Plans for 9-12</b> .....	H-1
Where in the World? .....	H-2
Reef Formation Animation .....	H-4
Who Am I? .....	H-8
3-D Mobile .....	H-10
Coral Reef Comparisons .....	H-11
Coral Reef Word Find .....	H-12
Living Together in a Coral Reef Community .....	H-14
Fishy Problems .....	H-17
Don't Teach Your Trash to Swim .....	H-19
Destructo Diver .....	H-22
Benefits, Threats and Solutions Crossword Puzzle .....	H-25
Student Assessment .....	H-28

**RESOURCES**

• Glossary .....	4-1
• Bibliography .....	4-3
• References for Students .....	4-4
• Educational Merchandise .....	4-5
• Order Form .....	4-9
• Coral Reef-Related Organizations .....	4-10
• Reef Relief Membership .....	4-12

## **Acknowledgements**

**We would like to give special thanks to the following people whose dedication and efforts were integral to the development of the Coral Reef Teacher's Guide.**

Wendy Weir - for the original concept and creation of the **Teacher's Guide** which was first published in 1996 by Coral Forest, a coral reef conservation organization that combined its educational efforts and activities with REEF RELIEF in 1998.

Joanne Hardesty - Sea View Elementary School, Salton City, CA

Janet Hill and the students of Sea View Elementary and West Shores High School, Salton City, CA

**The following individuals reviewed the curriculum for scientific accuracy:**

Bill Alevizon, PhD - Author, *The Pisces Guide to Caribbean Reef Ecology*

Sue J. Estey, PhD - Environmental Defense Fund

**The following teachers field tested lessons with students:**

Anne Brandon - C.A. Weis Elementary School, Pensacola, FL

Pattyanne Corsentino - Denver Public Schools, Denver, CO

Elena Robles - Lake View High School, Chicago, IL

Pam Roller - Galveston Elementary School, Galveston, IN

Kim Russell - Yik Wo School, San Francisco, CA

Lori Speelman - Bollman Bridge Elementary School, Jessup, MD

Jan West - New Briton Middle School, Capitola, CA

All of the teachers from the National Marine Educators Conference, the California Science Teachers Association Convention, and the National Science Teachers Association Convention who used our sample lesson plans in their classroom

**Special thanks to DeeVon Quirolo and Joel Biddle for revisions made in 2004.**

## **Introduction**

**C**oral reefs have been called the “rainforests of the sea”. They are the most biologically diverse marine ecosystem on Earth and one of the most fragile of Earth’s environments. And they are being destroyed at an alarming rate.

Coral reefs are found in 109 countries, but it is estimated that they have been damaged or destroyed by human activity in at least 93 countries. With each reef lost, countless forms of unique tropical marine life moves closer to extinction and indigenous communities are forced to move from their ancestral lands.

Some of the threats to coral reefs include pollution from sewage, fertilizers and pesticides, oil spills and hydrocarbon pollution, destructive fishing techniques and overfishing, mining, siltation from coastal development and logging, habitat loss from land development, and recreational overuse and abuse. These human-made threats cause irreparable damage when allowed to continue unchecked.

REEF RELIEF is a non-profit membership organization dedicated to protecting living coral reef ecosystems through local, regional and global efforts. In 1998, Coral Forest and REEF RELIEF combined efforts to protect coral reefs. This **Coral Reef Teacher's Guide** was first produced by Coral Forest and is now available through REEF RELIEF. One of the most important ways that we can protect coral reefs is by increasing awareness, support, and scientific knowledge of these complex underwater environments. The development and distribution of the **Coral Reef Teacher's Guide**, an interdisciplinary curriculum for grades K-5, 6-8 and 9-12, is an important part of this effort. The information available in this guide enables teachers and students to learn about the beauty and diversity of life on the coral reef, its incredible value to people and related ecosystems, the threats that it is facing, and the possible solutions to these threats. We hope that with this knowledge you will find a deep respect, understanding, and appreciation for coral reefs, and will work to protect their health and the lives of native coastal people dependent upon them for survival.

Human-kind is not separate from Nature. We live on this Earth. We are a part of this Earth. We must be responsible for our actions. Let us put our energy into protecting the coral reefs, the oceans, and the Earth, thereby ensuring a quality of life for all.

Sincerely,



Wendy Weir

Board Member, REEF RELIEF

# How to Use the Teacher's Guide

The **Coral Reef Teacher's Guide** presents interdisciplinary, hands-on curriculum for grades K-5, 6-8, and 9-12. It has been created in an interesting and informative manner to encourage students to think about the complexity of coral reefs and their surrounding environment, the threats that they are facing, and the possible solutions to these threats. The guide also presents students with different ways to take action to save the reefs, thereby instilling in them the understanding and confidence that they can improve the world in which they live.

## ORGANIZATION OF THE MATERIALS

The **Teacher's Guide** is divided into three sections:

- Background Information
- Lesson Plans: K-5, 6-8, and 9-12
- Resources

All information contained in these sections may be reproduced for classroom use.

**Background Information** - The Background Information provides teachers of all grades with extensive information about coral reefs. It addresses three major areas:

- What and Where are the Coral Reefs?
- Life on the Coral Reef
- Benefits, Threats, and Solutions.

Each area is designed to give teachers in-depth knowledge about coral reefs so that they can effectively instruct their students and use the lesson plans.

**Lesson Plans: K-5, 6-8, and 9-12** - These lesson plans have been created by master teachers for teachers, and they have been extensively field tested in the classroom. They are designed to offer challenging, fun, and creative activities which will encourage students to think about and gain a knowledge of the diversity of life on the coral reef and its interrelationship with other ecosystems and human-kind. The lessons are interdisciplinary, effectively integrating multiple subjects such as math, science, language arts, art, geography, and social science. They are also spirally integrated with each grade level building upon the previous one.

**Resources** - At the end of the **Teacher's Guide** is a resource section containing a glossary, bibliography, references for students, list of coral reef-related organizations, educational merchandise, and action programs. This material

supports and enhances the teacher's ability to present information about coral reefs in an efficient and thorough manner. The videos, slides, and CD-ROMs are especially effective because they provide outstanding visual images of coral reefs for those who have never seen or visited them.

## **ORGANIZATION OF THE LESSON PLANS**

Although the lesson plans are divided into three sections, K-5, 6-8, and 9-12, they can be used interchangeably based upon the level of the students. Each lesson plan is coordinated with the material in the Background Information. At the top right-hand corner of the page is printed the section in the Background Information to which it relates. For instance, the "Edible Coral Polyp" relates to *What and Where are the Coral Reefs?*, the "Coral Reef Coloring Page" relates to *Life on the Coral Reef*, and "Unsettling Sediments" relates to *Benefits, Threats, and Solutions*.

At the beginning of the lesson plan is listed the Objective of the lesson, the Vocabulary used, the Interdisciplinary Index involved (i.e. science, art, language art), the Materials needed, the step-by-step Presentation of how to perform the activity, and the Follow-up/Extension to the activity. Some of the lesson plans also include a summary of the relevant background information needed for the lesson.

## **STAY IN TOUCH . . . . .**

REEF RELIEF would like to remain in contact with the teachers and students who have used this **Teacher's Guide**. If you have any suggestions, comments, new information, or need assistance, please let us know.

We also enjoy receiving lesson plans that students have completed, such as coloring pages, poetry, essays, and action letters. At times, we include pictures or copies of students' work in our slide presentations and newsletters in order to give people a better understanding of how children are contributing to and making a difference in our society.

Thank you for teaching students about the beauty of life on the coral reefs, and for helping to make our Earth a better and healthier place to live. Those who learn to respect all life are the ones who work to preserve it.



### **REEF RELIEF**

Post Office Box 430, Key West, Florida 33041  
(305) 294-3100 • fax (305) 293-9515

#### **Captain Roland Roberts House Environmental Center**

New Plymouth, Green Turtle Cay, Abacos, Bahamas  
telephone/fax (242) 365-4014

www.reefrelief.org      e-mail: reef@bellsouth.net