

Coastal Resources Management

A Guide to Public Education Programs and Materials



Michèle H. Lemay and Lynne Zeitlin Hale

KUMARIAN PRESS



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Preface

A Coastal Resources Management Project (CRMP) was initiated in 1985 by the United States Agency for International Development (USAID) in cooperation with The University of Rhode Island. The purpose of the CRMP is to assist selected governments in managing coastal resources and resolving conflicts in resource use by creating and implementing programs for integrated coastal resources management. Thailand and Sri Lanka were the two pilot countries in Asia selected for the project, and Ecuador, in Latin America, was the third.

A considerable amount of practical experience in coastal resources management has been gained in recent years through this and other projects. Public education programs have played an important role in creating support for CRM in all instances. Education efforts were most effective when the techniques and content were tailored to local needs and projects were carried out by local groups.

Most coastal managers are committed to education programs as a means of advancing CRM in their own region or country. However, the process of initiating a program, getting others involved, selecting the best techniques, and finding funds to produce materials is a considerable task.

We found during the course of the CRMP that access to a variety of brochures, guides, school, and audio-visual materials generated enthusiasm and ideas for locally produced materials and programs. Examples from different cultural settings helped managers consider the techniques that would work best in their country. Seeing relevant materials available free of charge or at low cost encouraged creative thinking on how to get started with limited funds.

This guide was compiled in recognition of the need for and interest in public educational materials for coastal resources management. It provides convenient access to CRM materials and offers guidance in designing effective and locally appropriate public education programs for CRM.

Stephen Olsen, Director
Coastal Resources Center
The University of Rhode Island

Part I
Introduction

1. The Role of Public Education Programs in Coastal Resources Management

If initiatives in coastal resources management (CRM) are to succeed and be effective, not only must they be technically sound, but they must be accepted as necessary, reasonable, and fair. Well conceived and carefully targeted public education programs are essential in creating a context in which effective management is possible. Resource management is often about people and their relationship to resources. Education provides a means of communicating with people and motivating them to change their beliefs and behavior in ways that are more compatible with sustainable use of the resource base.

But what are the tangible benefits of public education programs for coastal resources management?

Increased awareness of coastal resources management problems and ways to solve them helps create a demand for effective resources management. An informed and caring community is perhaps the most essential element for creating a lasting framework for CRM.

Public education programs play an important role at all stages of the CRM process, from the initial identification of problems to the implementation of management strategies. During the early stages of the CRM process, public education programs can accomplish the following:

- build consensus that a set of coastal problems needs special attention and an integrated approach;
- clarify the perspectives and local interests that have to be considered in resolving specific coastal issues; and
- generate a receptive political and social context for changes in policy.

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In the subsequent stages of the CRM process, public education programs can:

- get users, interest groups, the media, and others to volunteer information and ideas, and generally help in carrying out CRM projects and activities;
- effect an integration of coastal ecology and management in the formal curriculum of the local school system;
- help in monitoring changes in public and political perception of coastal issues and priorities; and
- create a long-term commitment in the community to the wise use of coastal resources.

An important point to remember is that time should be devoted to educational activities throughout the entire CRM process. The messages, target audiences, and techniques will change as a program evolves, but the need for local support and involvement persists. Two common mistakes made by planners and managers are 1) to wait too long to begin public educational activities, and 2) to discontinue the dialogue once the "planning" stage is over.

Although both are essential ingredients of effective CRM, a public education program should not be confused with a public participation program. Public education programs increase awareness and help motivate people to want to prevent resource degradation and to solve resource management problems. They create a positive context for CRM. Public education programs can be carried out by a wide variety of public and private organizations (e.g., government agencies, public schools, universities, and private voluntary organizations).

Public participation programs, on the other hand, are designed to involve individuals and groups in the formulation and implementation of specific resource management strategies. They are carried out by the group responsible for the preparation of a specific plan, program, or development. Public education promotes public participation. As a good starting place for learning more about increasing public participation in natural resources management, we suggest *Community Management: Asian Experience and Perspectives*, edited by David C. Korten (Kumarian Press, 1987).

2. Putting Together a CRM Public Education Program

The process of putting together a public education program for CRM is similar to creating an environmental education program. Several excellent manuals can help you design such programs. Before getting started, you may want to refer to *How to Plan a Conservation Education Program*, Wood and Wood (1986), and *Step by Step: How Conservation Education Works*, Lieberman (1985), for general guidance. (See Section 10: Education Planning Guides.)

One effective approach used to formulate public education programs is summarized below. It is designed to focus attention on key resource management issues. The approach emphasizes local participation in public education projects and the overall resource management process. Also, it recognizes that the public education program must be an integral part of a coastal resources management strategy.

STEP 1. ANALYZING THE LOCAL CONTEXT AND DEFINING THE MAJOR COASTAL ISSUES

This activity is part of the early phase of creating a CRM program, when coastal issues must gain prominence on the political agenda. To carry out this step, the group concerned with solving coastal problems (that is, the private voluntary organization or government agency) needs to identify the coastal issues and problems that will serve as the focus of the CRM public education program. The group may choose to begin with issues where a widespread lack of public awareness appears to be a major factor in resource deterioration. Littering, water pollution, collection of protected species, and deterioration of coastal habitats are a few examples. The outcome of the analysis will be a clear statement of each problem, along with its social and economic context, and will serve as the foundation in defining program objectives and content and in selecting target audiences.

Questions to keep in mind while defining the coastal problems to be addressed in the public education program:

- What is the scale and significance of the problems?
- Are there important social, economic, or ecological dimensions to each problem?
- Have technical causes been identified?
- Have technical solutions been identified?

STEP 2. IDENTIFYING TARGET AUDIENCES

The purpose of this step is to identify segments of the population that are directly affected by coastal problems and whose support is essential to the solution of the problems. Examples of common target audiences are fishermen, coastal property owners, tourists and tourism-related businesses, local politicians, and national government officials. The manager needs to know how these audiences are currently affected by selected CRM problems, their information needs and expectations, their role in the CRM process, and the incentives and motivating factors for their participation. The outcome of this step is a detailed profile of the different groups selected as targets for an education program.

Questions to keep in mind as target audiences are identified:

- Who has a direct stake in CRM?
- Who will be directly affected by the CRM program or strategy?
- Who uses coastal resources?
- Who decides how coastal resources will be allocated?
- Do these audiences have special information needs?
- Do they have a unique perspective or knowledge of coastal issues?

STEP 3. IDENTIFYING THE MESSAGE AND PROGRAM CONTENT

In this step, the public education program formulates educational goals and objectives and organizes the program's content into distinct messages. Program objectives state what the educational program intends to accomplish. They should be specific and attainable. Objectives are best stated as measurable changes in the awareness, knowledge, and skills of one or several target audiences. Educational objectives should also relate directly to the achievement of overall CRM goals.

Messages are the actual information to be communicated to selected target audiences. Messages must be simply stated and technically accurate. This combination requires that communicators and technical CRM staff work together to define messages. Effective public education messages relay

relevant information about the coastal issue or problem and what can be done to solve the problem.

Questions to keep in mind:

- What is the education program attempting to accomplish?
- Are the target audiences directly affected by resource deterioration? In what ways?
- What role will these audiences play in implementing possible solutions?
- What do people need to know or feel strongly about in order to act?

STEP 4. SELECTING EDUCATIONAL TECHNIQUES

Having clearly defined the objectives and content of the education program, the manager is now in a position to consider the appropriate techniques for communicating the CRM message to target audiences. Common techniques include printed and audio-visual materials, mass media, exhibits, and special events. Each technique has its limitations and advantages. These are discussed further in the guide, but remember that the effectiveness of any technique depends on local conditions. Public education programs are usually more effective when several communication techniques are used in combination.

To select techniques for a CRM public education program, the manager must know how information customarily flows within the community (and to target audiences), the scale of the problem, the nature and complexity of the information that needs to be communicated, and the resources and funds available.

Questions to keep in mind:

- How do the various target audiences keep informed?
- How accessible are the target audiences? Are there convenient distribution networks?
- Is the educational message simple? or complex?
- How much money is available? What are the local resources (both financial and human) that can be drawn upon?

STEP 5. EVALUATING THE PROGRAM

This vital aspect is often neglected. The real test of an educational program is how it contributes to the success of the CRM program. Some examples of tangible accomplishments are: increased compliance with a coastal permit program; reductions in the occurrence of destructive coral reef fishing practices; and increased political attention to solving coastal problems.

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Substantial changes in behavior require time, and it may be necessary to define benchmarks indicating partial progress. Some form of evaluation is always possible if the program's intended outcome is defined in clear and realistic terms at the outset (Step 3).

Questions to keep in mind:

- Did the information reach target audiences?
- Was the message accurately conveyed by mass media?
- Did people understand the information?
- Was there a response from the target audiences?

3. How to Use This Guide

The guide describes techniques and presents materials used in coastal resources management programs worldwide. These materials have been grouped into the following: Brochures and Guides, School Curriculum Materials, Audio-Visual Materials, Educational Posters, Reading Materials and Activities for Children, and Special Events and Mass Media. Education planning manuals and newsletters that contain CRM materials are also included as an additional resource for the CRM manager.

Since this is a sourcebook, the emphasis is on printed materials that are readily available. The sourcebook is selective and does not attempt to be comprehensive. We have included materials which we feel can be of practical use to individuals and groups initiating public education programs on coastal resource issues. Remember that printed materials represent only part of a full-scale public education program and that multi-media approaches (which combine printed materials, public media, and special events) tend to be more effective in reaching audiences with varied interests.

The guide gives the advantages and limitations of each technique. It provides guidelines for the content and design of materials and their application to the CRM process. The guide also includes an annotated listing of materials which illustrate the use of each technique in CRM. The notations explain how content and techniques are used to solicit the interest of a target audience, to communicate information on an issue, and to encourage local support and action.

Because of our work with and special concern for CRM in tropical developing countries, we have emphasized publications on tropical habitats. We have also included materials available in Spanish (indicated by SPA) and bilingual materials (indicated by ENG/SPA). Materials in languages other than English or Spanish are not included. Recognizing the constraints of

starting a public education program in developing countries, we have highlighted materials that are low in cost and innovative. Materials available free of charge are indicated (look for FREE after the address).

If your objective is to establish a public education program for CRM, we recommend that you:

- **EXAMINE THE EDUCATION PLANNING PROCESS**

Review the basic steps for creating public education and answer the questions in Section 2.

- **REVIEW THE GUIDELINES**

Review the discussion of techniques, including the specific advantages and limitations of each. Select those techniques most likely to meet your program needs and constraints.

- **ACCUMULATE EXAMPLES**

Begin to collect examples of the types of materials you want to develop. This guide can help you obtain a variety of CRM materials such as brochures, school packets, and newsletters, and many of these are available free of charge.

You can use these examples to stimulate ideas, to discuss future projects with local educators, and to understand what is likely to work best in your area. You may be able to use some of the materials listed in this guide with only slight modifications.

- **FIND PARTNERS AND LOCAL GROUPS TO WORK WITH**

Local teachers, environmental organizations, tourist and other business associations, religious groups, and diving clubs can be important partners for creating CRM education programs. Get them involved right from the start in formulating educational projects, organizing special events, building an exhibit. The task will be more manageable, the content will truly reflect local thinking, and their involvement will contribute to the success of the overall CRM program.

- **KEEP COSTS DOWN**

Lack of funds is a universal constraint in establishing public education programs. As demonstrated in this guide, managers worldwide have found innovative ways of keeping costs down. Remember that to be effective, a brochure or special event does not need to be expensive. In the guide, we have emphasized low-cost materials that use

humor, imagination, and local tradition to make an impact on their audience.

Other ways to keep costs down are to:

- work cooperatively with local institutions;
- ask local writers and artists to volunteer their skills and artwork;
- get private corporations to sponsor events or to cover production and printing costs of materials;
- get promotional support from local media; cultivate media contacts and use press releases and meetings to help them disseminate accurate and current information about your coastal program; and
- sell selected materials (brochures, guides, and posters, for example) as souvenirs to tourists.

• **CONTRIBUTE TO THE NETWORK**

When we started collecting educational materials for this guide, we soon realized that only a few of the materials that exist worldwide are readily available. While we were able to include some publications produced in developing countries, these are only a small portion of the materials that exist.

If you have produced educational materials for CRM or know of such materials, we invite you to send a copy to the address below. The publication will be included in the collection.

Send your suggestions and comments to:

*Coordinator, Public Education Programs
Coastal Resources Center
Narragansett Bay Campus
The University of Rhode Island
Narragansett, RI 02882 USA*

Part II
Guide to Materials

4. Brochures and Guides

This section of the guide describes a selection of brochures, guidebooks, and other short publications aimed at enhancing public awareness of coastal and marine habitats, protected species, resource management issues, and human activities in coastal areas worldwide.

The collection encompasses a range of materials from low-cost brochures and leaflets to more expensive booklets of up to forty pages. Common elements among these materials are:

- The content is aimed at a broad audience or the general public, with technical details kept to a minimum.
- The emphasis is on simple messages introducing the reader to a coastal resource, issue, or program.
- The format is designed to attract attention and provide visibility for the coastal topic being introduced to readers.

Educators have found interesting and sometimes amusing ways of explaining to the public why an issue (such as coastal pollution) is important and how individuals can help. Some of the best brochures are modest productions that make effective use of a clear message along with simple and humorous graphics. The best examples are designed with users' information needs and interests in mind.

Brochures are among the most commonly used educational tools in resource management. They are useful early in the process of launching a program, when members of the public may have a limited awareness of coastal areas and their values. With their concise format and visual impact, brochures can help disseminate clear and consistent messages about CRM to large numbers of people. Brochures are most effective when they answer frequently asked questions about a CRM program and provide a point of contact for more information.

Brochures are used in CRM for various purposes such as explaining the mission and policies of a national or local CRM program. Several CRM programs have developed a series of brochures on coastal habitats or issues of local importance such as coral reefs, mangroves, or coastal erosion. A coordinated series can be an attractive way of introducing readers to a portfolio of coastal topics without overwhelming them with information.

Other common applications of brochures have been: instructional pamphlets or fact sheets explaining regulations or permit procedures; coastal guides that introduce a coastal region (resources, uses, issues) to visitors and tourists; and brochures describing a special coastal community project or initiative such as a "Coastwatch" program. The listing below includes examples of these and other applications.

In selecting techniques for a public education program, review the advantages and limitations of brochures listed in Table 1.

Selected Materials

The listing of brochures and guides is organized as follows. Under the GENERAL COASTAL THEMES category are included items designed to introduce all aspects of a coastal area (or a coastal resource management program) to a varied audience. If you are about to begin an educational component for your CRM program, this is a good place to start.

The best brochures convey the notion that coastal areas are important to many sectors of the population for cultural, economic, and ecological reasons. Some brochures (Barile, 1980; UNEP, 1984) explain the "why" and the "how" of coastal management in simple terms. They also offer practical suggestions for how people can participate in a CRM program.

Under the COASTAL AND MARINE HABITATS category are listed brochures on coral reefs, mangroves, seagrasses, beaches, estuaries, rocky shores, and wetlands. Some of these publications are excellent sources of basic information on coastal habitats for managers contemplating a brochure or an exhibit for their area. Several agencies have produced a series of coastal habitat brochures (for instance, the Florida Department of Natural Resources and the Great Barrier Reef Marine Park Authority). By providing accurate information in a consistent format, these series enhance people's awareness of the diversity and value of their coasts, while also giving the CRM agency and its programs a distinct identity.

The category SPECIES includes brochures on plants and animals of special concern to coastal resource managers, such as sea turtles, commercial fish and shellfish, and marine mammals. To be effective for CRM, a species brochure has to explain the link between the status of the species and the quality and supply of coastal habitats.

TABLE 1. ADVANTAGES AND LIMITATIONS OF BROCHURES

What are the ADVANTAGES of using brochures for a CRM public education program?

Brochures are useful for communicating simple messages of general interest to large numbers of people. They can be produced in several languages.

Brochures are a good vehicle for communicating zoning information, regulations, and permit requirements.

Brochures are relatively easy to distribute through existing networks (i.e., through community groups and trade associations) and through the mail.

Readers can keep brochures for future reference.

Brochures are considered to have both an informational and a "souvenir" value for readers.

Brochures offer flexibility in format and content, so that specialized brochures can be designed to reach specific target audiences such as divers, tourists, or fishermen.

The condensed format lends itself to brief, high-impact messages with illustrations and photographs to reinforce the message.

What are the LIMITATIONS of brochures compared to other educational techniques?

Effectiveness is dependent on the initial impact of graphics and text. Some audiences may not be inclined to read the information. Poor design can dampen interest.

Brochures require good non-technical writing and access to design services.

Readers can be passive to a brochure's message. Target audiences difficult to motivate with printed materials alone.

Brochures are not suitable for communicating complex messages.

Brochures can be expensive to produce and can become quickly out of date.

Under COASTAL USES we have included specialized brochures targeted to coastal users such as fishermen, developers, divers, and boaters. The emphasis is on communicating in a positive and friendly manner special regulations and permit requirements that these users need to comply with while in coastal areas. The most effective brochures offer a clear, no-nonsense explanation of why compliance is important, and suggest a contact for further information.

The category COASTAL ISSUES lists brochures that focus attention on a locally important coastal issue. The issue is often related to a public safety or health concern such as water contamination or loss of coastal property. The tone of these brochures is not alarmist, but rather presents a clear statement of the problem and what can be done to avoid it.

Under COASTAL AND MARINE PROTECTED AREAS, we have included brochures designed to introduce visitors to the multiple values of protected areas. They also deal with the role of visitors in achieving integrated resource management.

General Coastal Themes

Barile, D. 1980. *Man Meets Coast*. Florida Sea Grant College Program. This is a delightful 30-page book about the coast illustrated with cartoon drawings. Aimed at children and adults alike, this book introduces readers to several coastal habitats, their uses and economic importance, the effects of various types of coastal development, and the need for coastal resources management. A concluding section explains how local communities and individuals can act in support of CRM. Highly recommended for coastal managers looking for appealing ways of communicating with local residents.

Available from: Marine Advisory Program, Florida Cooperative Extension Service, GO22 McCarty Hall, University of Florida, Gainesville, FL 32611 USA. FREE (single copies).

Florida Department of Natural Resources. n.d. *Florida Coasts*. Aimed at Florida residents, this brochure has relevant information on the state's coastal system. It introduces the general public to topics such as coastal erosion, dune stabilization and protection, the coastal construction control line, estuaries, and oil spills.

Available from: Florida Department of Natural Resources, Marjory Stoneman Douglas Bldg., 3903 Commonwealth Blvd., Tallahassee, FL 32303 USA. FREE.

Florida Department of Environmental Regulation. n.d. *Florida Coastal Management Program*. This leaflet presents the fundamental aspects of Florida's coastal zone management legislation and programs. The information is

directed to Florida residents, particularly policymakers, community leaders, resource managers, and local interest groups.

Available from: Florida Department of Environmental Regulation, 2600 Blair Stone Rd., Tallahassee, FL 32399-2400 USA. FREE.

Maine Cooperative Extension Service and others. 1986. *The Maine Seacoast*. Maine Sea Grant College Program. This 12-page booklet is a good example of an overview of a coastal region. Topics covered include: the Gulf of Maine, coastal processes, fishing, coastal communities, conservation at sea and conservation on land. Basic principles of CRM are illustrated with maps and black-and-white photographs and using examples from the Maine coast. While aimed at the general public, the information can be adapted for use in secondary and college-level classrooms.

Available from: Sea Grant Communications, 30 Cobourn Hall, University of Maine at Orono, Orono, ME 04469 USA. FREE.

Marine Conservation Society. 1986. *Help Us Protect the Splendor of the Sea*. This is an excellent example of a publication produced by a non-profit environmental organization with corporate sponsorship. This attractive brochure invites members of the public to participate in the Society's coastal conservation programs.

Available from: Marine Conservation Society, 4 Gloucester Rd., Ross-on-Wye, Herefordshire, HR9 5BU United Kingdom. FREE.

Hulm, P. 1985. *Oceans and Coastal Areas*. United Nations Environment Programme. This 32-page booklet introduces the ecological and economic importance of coastal areas. Targeted to policymakers and resource managers worldwide, the booklet presents selected issues (e.g., deterioration of mangroves and coral reefs, waste disposal) and introduces the rationale for sustainable development of coastal and marine areas.

Available from: Programme Activity Centre for Ocean and Coastal Areas, United Nations Environment Programme, P.O. Box 30552, Nairobi, Kenya. FREE.

Coastal and Marine Habitats

Braakhekke, W.G., and M. Marchand. 1987. *Wetlands—The Community's Wealth*. The European Environmental Bureau. This 24-page booklet describes the importance of wetlands in both tropical and temperate areas. Aimed at an international audience of resource managers, the booklet introduces the Ramsar Convention on wetlands of international significance. A section reviews the unique problems and challenges facing developing countries.

Available from: The European Environmental Bureau, 29 Rue Vautier, B-1040 Brussels, Belgium. FREE.

Commonwealth of the Northern Marianas. n.d. *Exploring Underwater in the Northern Marianas*. CNMI Coastal Resources Management Program. This colorful guidebook explains the importance and recreational value of nearshore coral reef habitat in the Western Pacific. The brochure, which is targeted to tourists and recreational users, includes a code of conduct for divers, snorkelers, and boaters using coral reefs.

Available from: Coastal Resources Management Office, Nauru Bldg., Saipan, Commonwealth of the Northern Marianas 96950 USA. FREE.

Florida Department of Natural Resources. 1987. *Florida's Beach and Shore Preservation Program*. This leaflet presents the major aspects of Florida's beach protection program: dune stabilization, coastal setbacks, and information management. The information is directed to coastal land owners and residents. This effective low-cost production is illustrated with black-and-white drawings.

Available from: Florida Department of Natural Resources, Division of Beaches and Shores, Marjory Stoneman Douglas Bldg., 3900 Commonwealth Blvd., Tallahassee, FL 32303 USA. FREE.

Florida Department of Natural Resources. 1987. *The Underwater World of Florida's Seagrasses, Estuaries—Cradle of the Ocean, Florida's Coral Reefs, Florida's Salt Marshes, Florida's Mangroves—Walking Trees*. This is a series of brochures designed as an introduction to Florida's coastal habitats. Illustrated with color photographs and black-and-white line drawings, each brochure explains the characteristics of a habitat, its importance within the coastal region, losses to the habitat and historical sources of impact, and compatible use. This series, which has been distributed statewide, is aimed at enhancing general public awareness of the ecological values of Florida's coast.

Available from: Florida Department of Natural Resources, Bureau of Marine Research, P.O. Box F, St. Petersburg, FL 33731 USA. FREE.

Great Barrier Reef Marine Park Authority and Queensland National Parks and Wildlife Service. 1985-87. *Reef Notes (The Crown of Thorns, Reef Region Fisheries, The Coral Polyp, Soft Corals, Fringing Reefs, Coral Cays)*. A series of colorful brochures designed to explain coral reef ecology and management issues to the users and visitors of the Great Barrier Reef. The series can also be used in exhibits and adapted for classroom use at the secondary and college levels.

Available from: Education/Information Section, Great Barrier Reef Marine Park Authority, P.O. Box 1379, Townsville, Queensland, 4810 Australia.

Koornsta, K., N.V. Leeuwen, and S. Tougaard. n.d. *Be Wise with the Waddensea*. Dutch Society for the Preservation of the Wadden Sea. This is a well-designed booklet on one of the world's largest estuarine systems.

Topics covered include the ecological, economic, and cultural values of the system, and sources of disturbance (land reclamation and water pollution). The booklet makes effective use of oblique aerial photographs and habitat sketches.

Available from: Landelijke Vereniging tot Behoud van de Waddenzee, Het Waddenhuis, P.O. Box 90, 8860 AB Harlingen, The Netherlands. FREE.

Marine Resources Council of East Central Florida. n.d. *The Indian River—An American Lagoon*. Aimed at local homeowners, boaters, and fishermen, this brochure includes a fact sheet and illustrated map of the lagoon. Using concise text, it explains the major issues involved in managing the lagoon and what people can do to maintain the economic and environmental values of the system.

Available from: Marine Resources Council of East Central Florida, Florida Institute of Technology, 2915 Vassar St., Melbourne, FL 32901 USA. FREE.

National Oceanic and Atmospheric Administration. 1982. *Our Fragile Coral Reefs*. This colorful brochure introduces the reader to the nature and ecology of coral reefs, the value of reefs to people, and existing threats to the reefs. The brochure offers recreational users helpful tips to avoid anchor damage, boat groundings, and trampling. The public is asked to help protect coral reefs by complying with existing federal and state regulations.

Available from: NOAA, Office of Coastal Resource Management, 1825 Connecticut Ave., N.W., Washington, DC 20235 USA. FREE.

Nature Conservancy Council. 1983. *The Conservation of Estuaries*. Nature Conservancy Council Interpretive Branch. This attractive 10-page booklet is a good primer on estuaries. It presents a clear and convincing case for the need to conserve estuaries in the United Kingdom. Historical trends, value for wildlife, threats to, and management of the estuaries are among the topics covered, with much of the information of interest to policymakers and resource managers. The text is complemented by line drawings, maps and color photographs.

Available from: Nature Conservancy Council Interpretive Branch, Attingham Park, Shrewsbury, SY4 4TW United Kingdom. FREE (single copies).

Nature Conservancy Council. 1987. *Coastwatch*. Nature Conservancy Council Interpretive Branch. This leaflet describes eight types of habitats found along Britain's coastline. It introduces the general public to a volunteer program for surveying these habitats nationwide.

Available from: Nature Conservancy Council Interpretive Branch, Attingham Park, Shrewsbury, SY4 4TW United Kingdom. FREE (single copies).

Sensabaugh, W.M. 1975. *The Beach—A Natural Protection from the Sea*. Florida Sea Grant College Program. This booklet describes the features of a beach that make it effective in protecting upland areas, and discusses the effect of littoral drift and the function of sand dunes. While the information is aimed at coastal property owners, it can also be used in a classroom setting.

Available from: Florida Sea Grant College Program, University of Florida, Bldg. 803, Gainesville, FL 32611 USA. FREE (single copies).

Stevely, J., and L. Rabinovitz. n.d. *Mangroves: A Guide for Planting and Maintenance*. Florida Sea Grant College Program. This is an 8-page guide on the biology and ecological importance of mangroves. Aimed particularly at local organizations and land owners, the guide includes instructions for planting seedlings, transplanting, air-layering, and pruning.

Available from: Florida Sea Grant College Program, University of Florida, Bldg. 803, Gainesville, FL 32611 USA. FREE (single copies).

Wells, J., and C. Peterson. 1986. *Restless Ribbons of Sand*. Louisiana Sea Grant College Program. This booklet describes the formation, structure, and ecology of barrier islands of the Atlantic and Gulf coasts, their value, impacts of industrial activities on them, and management efforts. Illustrated with excellent diagrams and photographs, this booklet is designed in part to sensitize community leaders and managers to the special land-use requirements of barrier islands. Provisions of the Coastal Barrier Resources Act are introduced.

Available from: Louisiana Sea Grant College Program, Center for Wetland Resources, Louisiana State University, Baton Rouge, LA 70803-7507 USA. FREE.

White, A. 1987. *Coral Reefs: Valuable Resources of Southeast Asia*. ICLARM Educational Series 1. This 36-page booklet offers a complete introduction to the characteristics, uses, and threats to Southeast Asia's coral reefs. The information is suitable for varied audiences worldwide, including university students, decision makers, and the media. Illustrated with excellent color photographs and line drawings. Highly recommended.

Available from: ICLARM, MCC P.O. Box 1501, Makati, Metro Manila, Philippines.

Zedler, J.B. 1985. *Salt Marsh Vegetation: Examples from the Tijuana Estuary (Vegetacion de la marisma: Ejemplos del Estuario del Rio Tijuana)*. California Sea Grant College Program. This 40-page booklet is designed as a field guide. It describes the diversity, importance, and sensitivity of salt marsh vegetation using the Tijuana estuary, which is located at the California-Mexico border, as an example.

Available from: California Sea Grant College Program, A-032, University of California, La Jolla, CA 92092-0232 USA. ENG/SPA. FREE.

Species

Florida Department of Natural Resources. 1985. *Protecting Manatees (Mantenga precaucion)*. This is an example of a high-impact, low-cost leaflet advocating the protection of a coastal species. Brief and to the point, the leaflet explains the threats to manatees in coastal waters, the location of manatee reserves, fines for harrassment and other violations, and how boaters, fishermen, divers, and the general public can minimize impacts.

Available from: Florida Department of Natural Resources, Marjory Stoneman Douglas Bldg., 3900 Commonwealth Blvd., Tallahassee, FL 32303 USA. ENG/SPA. FREE.

Florida Department of Natural Resources. 1987. *Save the Manatee—the Vanishing Floridian (Salve al manati—Los manatis de la Florida estan desapareciendo)*. This color brochure describes the status of manatees in Florida, threats to their existence, and the laws protecting them. It explains how divers, boaters, and fishermen can reduce harrassment in areas used by manatees.

Available from: Florida Department of Natural Resources, Marjory Stoneman Douglas Bldg., 3900 Commonwealth Blvd., Tallahassee, FL 32303 USA. ENG/SPA. FREE.

Florida Department of Natural Resources. 1987. *Sea Turtles*. This 2-page flyer describes Florida's sea turtles, threats to their survival, and how the general public can help protect the animals.

Available from: Florida Department of Natural Resources, Marjory Stoneman Douglas Bldg., 3900 Commonwealth Blvd., Tallahassee, FL 32303 USA. FREE.

Orr, K. 1985. *The Life Story of the Spiny Lobster*. Rare Animal Relief Effort (RARE). This 20-page non-technical booklet produced for the Caribbean Environmental Education Program describes step by step the life history and status of the spiny lobster. It stresses the economic importance of the species and the need to maintain harvestable populations through wise use. It includes a very effective section on how people can help maintain the resource through their own actions. A similar booklet is available on queen conch, another species heavily harvested in the Caribbean.

Available from: World Wildlife Fund-US, 1250 24th St., N.W., Washington, DC 20037 USA. FREE.

van Meter, V.B. 1983. *Florida's Sea Turtles*. Florida Power and Light Company. A complete and factual booklet on sea turtles, beautifully illustrated with line drawings, the booklet describes this species found in Florida's coastal waters. It also gives the physiology, behavior, mortality factors, and facts on conservation of sea turtles. One section suggests how citizens can contribute to the species survival. This is a good example of corporate sponsorship of CRM educational materials.

Available from: Florida Power and Light Company, P.O. Box 029100, Miami, FL 33102 USA. FREE.

Coastal Uses (Coastal Fisheries, Tourism, Aquaculture, Recreation, Coastal Development)

Commonwealth of the Northern Marianas. 1987. *The Permit Process for Coastal Resources Management*. The brochure is designed to help coastal property owners decide under what circumstances property improvement projects may require a coastal permit. It anticipates and answers frequently asked questions about permit applications, costs, and processing.

Available from: Coastal Resources Management Office, Nauru Bldg., Saipan, Commonwealth of the Northern Marianas 96950 USA. FREE.

Marine Conservation Society. 1985. *The Seashore Code*. This brochure uses a convenient "postcard" format to describe the appropriate code of conduct for visitors to Britain's beaches and coastal areas. Written in a direct and straightforward style, it urges recreational users to care for sea creatures, watch out for nuisance animals and tides, keep cars off beaches, and avoid littering. This is also an excellent example of a brochure stressing volunteer compliance to wise use (as opposed to stressing regulations).

Available from: Marine Conservation Society, 4 Gloucester Rd., Ross-on-Wye, Herefordshire, HR9 5BU United Kingdom. FREE.

National Oceanic and Atmospheric Administration. 1986. *Key Largo National Marine Sanctuary Mooring Buoy System*. This leaflet explains the location and use of mooring buoys designed to avoid anchor damage to coral reefs. To encourage diving at buoy locations, the leaflet includes information on underwater features in the vicinity of the buoys.

Available from: Key Largo National Marine Sanctuary, P.O. Box 1083, Key Largo, FL 33037 USA. FREE.

National Oceanic and Atmospheric Administration. 1986. *Keeping Your Keel off Coral*. This one-page leaflet offers tips to recreational boaters on how to avoid grounding their vessel on the shallow reefs of southern Florida.

Available from: Key Largo National Marine Sanctuary, P.O. Box 1083, Key Largo, FL 33037 USA. FREE.

Southwest Wetlands Interpretive Association. 1987. *A Walker's Guide to the Tijuana River Estuarine Reserve*. Two-color brochure aimed at birdwatchers and hikers using a sub-tropical salt marsh. Includes guidelines on how to identify shorebirds and appreciate the various habitats.

Available from: NOAA, Office of Coastal Resource Management, 1825 Connecticut Ave. N.W., Washington, DC 20235 USA. FREE.

Saba Marine Park. 1987. *Saba Marine Park—Anchorages and Mooring Buoys*. Includes information for resident and visiting boat owners and yachtsmen

on the use of mooring buoys located on Saba's fragile coral reefs. Good example of a low-cost effective brochure targeted to a specific user group.

Available from: Saba Marine Park, Fort Bay, P.O. Box 18, The Bottom, Saba, Netherlands Antilles.

University of Southern California Sea Grant College Program. 1977. *Scuba Safety*. This is a 4-page brochure on scuba diving safety.

Available from: USC Sea Grant College Program, Institute for Marine and Coastal Studies, University of Southern California, University Park, Los Angeles, CA 90089-0341 USA. FREE.

U.S. Army Corps of Engineers. n.d. *Are You Planning Work in a Waterway or Wetland?* This brochure explains the permit procedures for local dredging, filling, and construction of breakwaters, jetties, and groins in coastal areas of the United States. The information is targeted to coastal land owners and developers.

Available from: U.S. Army Engineer District, Corps of Engineers, P.O. Box 1715, Baltimore, MD 21203 USA. FREE.

Coastal Issues (Pollution, Public Health, Erosion)

Fundacion de Parques Nacionales y Medio Ambiente. 1987. *Comercializacion de la fauna silvestre panamena*. This color brochure is designed to sensitize Panamanian travelers and tourists to the illegal trade of endangered species, including marine turtles. It explains Panama's commitment to the Convention on International Trade and Endangered Species (CITES). The brochure was part of an exhibit at Panama's Herrera International Airport.

Available from: Fundacion de Parques Nacionales y Medio Ambiente, P.O. Box 6-6623, El Dorado, Panama. SPA.

Hardaway, S., and G. Anderson. n.d. *Shoreline Erosion in Virginia*. Virginia Sea Grant College Program Educational Series No. 31. This 25-page booklet is designed as an introduction to coastal erosion processes. Aimed at coastal property owners, it describes measures for combating erosion.

Available from: Virginia Sea Grant College Program, Marine Advisory Service, Virginia Institute of Marine Science, Gloucester Point, VA 23062 USA.

Marine Conservation Society. n.d. *Free with Every Seaside Holiday (Clean Britain's Beaches Campaign)*. This is an effective, low-cost leaflet on sewage pollution prepared by a non-government organization as part of a nationwide campaign to clean Britain's beaches. It invites the general public, and particularly recreational beach users, to participate in the campaign to curb sewage pollution.

Available from: Marine Conservation Society, 4 Gloucester Rd., Ross-on-Wye, Herefordshire, HR9 5BU United Kingdom. FREE.

Wilson, M., S. Criswell, and M. Donnelly. 1987. *Impacts of Deforestation and Other Land-Based Activities on Tropical Coral Reef Communities*. Center for Environmental Education. Directed to the general public, this paper describes how coastal habitats are interrelated and the effects that coastal sedimentation has on these habitats.

Available from: Center for Marine Conservation, 1725 DeSales St., N.W., Suite 500, Washington, DC 20036 USA. FREE.

Coastal and Marine Protected Areas

Silliman University. *Apo Island Marine Reserve*. This brochure explains the rationale for designating this coral reef a reserve and gives its management regime. The reef's historical background, use guidelines, and facilities are also described. Illustrated with line drawings and a map.

Available from: Marine Laboratory, Silliman University, Dumaguete City 6200, Philippines. FREE.

Florida Department of Natural Resources. *Aquatic Preserves*. This publication describes Florida's statewide system of coastal aquatic preserves, the rationale for designation, and location. Illustrated with color photographs, and includes a state map.

Available from: Florida Department of Natural Resources, Division of Recreation and Parks, Marjory Stoneman Douglas Bldg., 3900 Commonwealth Blvd., Tallahassee, FL 32303 USA. FREE.

Great Barrier Reef Marine Park Authority. *Ours to Use Wisely—The Great Barrier Reef*. This introductory brochure explains the legal status of the Great Barrier Reef Marine Park and its management framework.

Available from: Great Barrier Reef Marine Park Authority, P.O. Box 1379, Townsville, Queensland, 4810 Australia. FREE.

Government of Belize. *Hol Chan Marine Reserve*. The brochure describes the resources and use zoning of a coral reef reserve. The information is clearly targeted to users, tourists, and divers, with several diving safety tips. Produced with corporate sponsorship.

Available from: New York Zoological Society, P.O. Box 282, Belize City, Belize. FREE.

INDERENA, Division de Parques Nacionales. *Parque Nacional Isla de Gorgona*. This publication describes the coastal resources, visitor use, and management of this tropical island park. Illustrated with color photographs and a map.

Available from: INDERENA, Division de Parques Nacionales, Diagonal 34 No. 5-84, Bogota, Colombia. SPA. FREE.

National Oceanic and Atmospheric Administration. *Key Largo; Looe Key*. These two brochures of the U.S. National Marine Sanctuary Program describe the significance and habitats of these two coral reef marine parks.

Available from: Marine and Estuarine Management Division, NOAA, 1825 Connecticut Ave., N.W., Washington, DC 20235 USA. FREE.

Portfolio for Development and Natural Resources, Grand Cayman Islands. *Welcome to Cayman—Things Every Visitor Should Know About Our Conservation Laws and Our Marine Parks*. This brochure is an excellent example of how the government of a small Caribbean island can communicate its system of coastal and marine laws (including marine park regulations) in a coordinated manner to tourists and other users of coastal resources. The brochure includes zoning maps for the island's marine parks and a summary of marine conservation regulations.

Available from: Office of the Principal Secretary, Government Administration Bldg., Grand Cayman Islands, BVI. FREE.

van't Hof. *Saba Marine Park*. This brochure describes the rationale for the designation of this multiple-use marine park in the Caribbean. The emphasis is on the tangible and intangible benefits of the marine park to island residents. It is a good example of effective targeting of a brochure to a local situation. Illustrated with a map showing diving locations.

Available from: Saba Marine Park, Fort Bay, P.O. Box 18, The Bottom, Saba, Netherlands Antilles. FREE.

U.S. National Park Service. *Everglades, Biscayne, Buck Island Reef*. These are basic orientation brochures for national park visitors. They describe access, regulations, habitats (i.e., coral reefs, mangroves, salt marshes), and key species. Illustrated with color photographs and detailed, convenient maps for visitor use.

Available from: U.S. National Park Service, International Office, Washington, DC 20240 USA. FREE.

U.S. National Park Service. *Virgin Islands National Park Biosphere Reserve*. The brochure describes the rationale and significance of the designation of this national park as an international biosphere reserve. The emphasis is on the objectives of the program, research, and cooperation. Illustrated with color photographs.

Available from: U.S. National Park Service, International Office, Washington, DC 20240 USA.

5. School Curriculum Materials

Many government agencies, museums, aquaria, and nature organizations now make available educational packets that explore marine and coastal ecology topics for all school grade levels. While most of the school packets included in our listing were developed for teachers in the United States, the activities and background information can be used as examples for educators working in other countries.

Several packets focus on tropical habitats and resources (e.g., Hernandez, n.d.; Great Barrier Reef Marine Park Authority, 1985; Griffith and Williams, 1985; World Wildlife Fund, 1986). In addition to serving as examples for developing local curricula, these materials are also good sources of information and present valuable ideas for exhibits and brochures. Make them available or circulate them to your local school system, natural history museums, or community organizations.

School packets are growing in popularity as an educational technique in CRM. They are most effective when used for the following purposes:

- providing local teachers with the materials needed to incorporate coastal themes in their lesson plans for science, social studies, geography, or art;
- familiarizing teachers with local services, resources, and facilities (such as a coastal park) that can be used to teach coastal ecology at selected grade levels;
- offering special class activities (such as a simulation game) or a series of experiments intended to enhance students' appreciation of coastal issues; and
- suggesting activities that demonstrate a relation between a coastal problem and scientific principles that are part of the standard science curriculum.

The success of CRM materials designed for school use depends largely on the willingness of teachers and the school system to incorporate the topic in the standard curriculum. For this reason, school packets usually require close consultation with teachers, school administrators, and departments of education during their development.

In addition, remember that school materials and programs are most effective when: clearly stated, and measurable educational goals and objectives are established early on; materials are designed to be compatible with ongoing educational activities and adopted courses of study; there is room for teacher creativity and innovation; and materials are targeted to specific grade levels and subject matter areas (*Alliance for Environmental Education*, 1983).

In selecting techniques for your public education program, you may want to review the advantages and limitations of school materials as listed in Table 2.

Selected Materials

The following school materials are primarily targeted to teachers at the elementary and secondary levels. The materials listed under GENERAL COASTAL THEMES can be used in a variety of classes, including science, history, and geography. The materials listed under COASTAL AND MARINE HABITATS and SPECIES are aimed at science and biology classes. Most publications include a section explaining how to prepare lesson plans and organize classroom experiments.

General Coastal Themes

Barile, D. 1985. *Man Meets Coast—A Game of Coastal Issues*. Florida Sea Grant College Program. This is an educational game for 30 to 75 players who assume various roles to explore and resolve coastal issues facing their fictitious community. Designed for both adults and junior or senior high school students, the game proceeds from neighborhood meetings to meetings of common interest groups and concludes with a county commission hearing to decide policies regarding issues such as fishing in canals, dredging of a ship channel, and regulations for coastal water supply.

Available from: Marine Advisory Program, Florida Cooperative Extension Service, GO22 McCarty Hall, University of Florida, Gainesville, FL 32611 USA.

Byrnes, Ann (Ed.). 1988. *Project Reef-Ed*. Great Barrier Reef Marine Park Authority. Written by a team of leading Australian marine educators, this 400-page book is designed to assist teachers in organizing field trips to and classes on the Great Barrier Reef. The book includes suggestions for planning trips to a reef and other group activities, safety tips, and goals for reef

education. A special section on educational activities contains a wealth of ideas for conveying the natural and human dimensions of coral reefs using a multidisciplinary approach. Themes such as the reef as a human resource, human impacts, perceptions, and management and conservation are introduced and explored in a very creative and refreshing manner.

Available from: Great Barrier Reef Marine Park Authority, P.O. Box 1379, Townsville, Queensland, 4810 Australia.

TABLE 2. ADVANTAGES AND LIMITATIONS OF SCHOOL MATERIALS

What are the ADVANTAGES of school materials over other educational techniques for a CRM program?

School materials can be designed to reach a large number of students (in a coastal province, state, or nation).

They are convenient for teachers in rural areas, who may not have ready access to CRM information, and they also allow sufficient flexibility so that the material can be adapted to specific local circumstances.

The material can be incorporated into science, social studies, geography, and art classes.

If properly developed in cooperation with teachers, school materials are perceived as a benefit of a CRM program.

School materials represent a reliable long-term investment in changing local attitudes and values.

School packets can often be adapted or used at community fairs and by various children's associations.

They are relatively easy to distribute within the school system.

What are the LIMITATIONS of school materials over other educational techniques for a CRM program?

School materials may require much time, effort, and money to produce. They may also require a lengthy approval process prior to being added into the school curriculum.

Teachers may require specialized training in order to use the school packets in the classroom.

Hernandez, V.F. n.d. *Conozcamos el mar (Let's Learn About the Sea)*. University of Puerto Rico Sea Grant College Program. This 135-page activity book was designed for use by high school students attending a Sea Grant-operated marine summer camp, Cajaya Marine Festival. The publication is divided into four sections: Marine Inhabitants, Physics of the Sea, Coasts of Puerto Rico, Camp Activities. The text includes a glossary, suggestions for simple classroom experiments, and illustrations.

Available from: University of Puerto Rico Sea Grant College Program, Department of Marine Sciences, Mayaguez, Puerto Rico 00708 USA. SPA.

Neill, B., and L. Ellis (Eds.). 1985. *Understanding Our Coastal Resources: A Workbook for the Ocean Sciences*. This is a 154-page workbook directed at high school students of the Commonwealth of the Northern Mariana Islands. It was designed to answer the need for a locally produced natural science curriculum. Topics covered include oceanography, coastal and marine habitats, taxonomy, natural and human-related effects on coastlines, and coastal management. In addition to basic reading material, the workbook includes multiple-choice worksheets, suggestions for essay topics, and classroom projects.

Available from: Coastal Resources Management Office, Nauru Bldg., Saipan, Commonwealth of the Northern Marianas 96950 USA.

Schweitzer, J., E. Coleman, and L. Weber. 1982. *Seascope: A Marine Activity Book for Elementary Schools*. Louisiana Sea Grant College Program. This packet contains 10 separate study units aimed at grades 4-6. The units cover topics such as the uses and nature of water, marine ecology, estuaries, shells, marsh ecology, crawfish, and boats and boating terms. Word games, experiments, and illustrations are used to teach students the basic principles of coastal ecology. Each unit includes a teacher's section with background information, lesson objectives, and a glossary.

Available from: Louisiana Sea Grant College Program, LSU Center for Wetland Resources, Louisiana State University, Baton Rouge, LA 70803-7507 USA.

University of Southern California Sea Grant Program. 1983. *Wet and Wild: A Multi-Disciplinary Marine Education Teacher Guide (Humedo y salvaje)*. This series includes six bilingual units designed for grades K-6. 1. *The Physical Ocean* deals with oceanography (currents, climate, waves, shoreline). 2. *Ocean Management* introduces the concepts of territorial sea, coastal management, and Law of the Sea. 3. *Research* initiates students to the challenges and tools of underwater research. 4. *The Biological Ocean* describes marine plants, seashore life, fish, and marine mammals. 5. *The Economic Sea* introduces the multiple uses of coastal and marine areas (mining, transport, recreation). 6. *Marine Ecology* examines the ecological processes of coastal and marine habitats. Each unit takes an innovative and multidisciplinary approach to the teaching of marine science, offering ideas that

can be incorporated into art, math, social studies, drama, and other disciplines. The units include background information for teachers, lesson plans with ideas for classroom activities, bibliographies, and film lists. Highly recommended.

Available from: USC Sea Grant Program, University of Southern California, University Park, Los Angeles, CA 90089 USA. ENG/SPA.

University of Southern California Sea Grant Program. 1982. *Marine Studies Idea Book for Teachers Grades K-6 (Estudios marinos, un libro de ideas para profesores de grados K a 6)*. This is a 75-page resource book for the development of lesson plans by the elementary school teacher. Ideas and activities are presented around four multidisciplinary themes. Whales and whaling (Theme 1) are used to introduce maritime history and commerce, conservation, and traditional coastal cultures. Marine myths and folklore (Theme 2) convey changing perceptions of the sea. Marine adaptations (Theme 3) illustrate physical and ecological factors on marine life. A concluding section on ocean management (Theme 4) deals with the politics of the coast, fisheries management, and Law of the Sea.

Available from: USC Sea Grant Program, University of Southern California, University Park, Los Angeles, CA 90089 USA. ENG/SPA.

Wright, E.L. 1985. *Decision Making: The Chesapeake Bay*. An Interdisciplinary Environmental Education Curriculum Unit. Maryland Sea Grant College Program. Aimed primarily at high school science or social studies classes, this multidisciplinary packet provides a considerable amount of information about the Chesapeake Bay as both a political entity and a coastal ecosystem. It involves students in a simulated decision-making process, and introduces basic resource management concepts of public participation, stakeholders, and policy making. The unit contains: a teacher's guide, suggested activities, student materials, and a Chesapeake data bank.

Available from: Cornell Maritime Press, P.O. Box 456, Centreville, MD 21617 USA.

Coastal and Marine Habitats

Great Barrier Reef Marine Park Authority and Gould League of Victoria, Inc. 1985. *The Great Barrier Reef Junior Survival*. Designed for senior primary and junior secondary students, this booklet provides an overview of Australia's Great Barrier Reef, its coral habitats, marine fauna, and uses. The booklet includes a reef conservation and safety code and helpful tips for schools planning trips to the reef.

Available from: Great Barrier Reef Marine Park Authority, P.O. Box 1379, Townsville, Queensland, 4810 Australia.

Greer, J. (Ed.). 1979. *Food Webs in an Estuary. A Marine Science Education Workbook*. Maryland Sea Grant College Program. This workbook introduces the subject of food chains and food webs using simple examples from an estuarine system. The content is aimed at middle to junior high school grades. Although the focus is on Chesapeake Bay, the material can be adapted to other estuaries. The unit contains a teacher's narrative, a section describing class and field activities, and a resource section with diagrams of simple estuarine food chains.

Available from: Cornell Maritime Press, P.O. Box 456, Centreville, MD 21617 USA.

Griffith, S.A., and E. Williams. 1985. *Corals and Coral Reefs in the Caribbean*. Caribbean Conservation Association. This attractive 48-page booklet is geared to the reading level of the upper primary school. Each section introduces an aspect of coral reefs in the Caribbean (e.g., the coral polyp, types of coral reefs, uses of reefs, snorkeling, reef fauna, the reef ecosystem, reef destruction). Each section includes a list of classroom or field projects that can be carried out under almost any circumstances. Illustrated with simple but attractive drawings. Highly recommended.

Available from: Caribbean Conservation Association, Savannah Lodge, The Garrison, St. Michael, Barbados.

Mississippi-Alabama Sea Grant Consortium. 1982. *Man and the Gulf of Mexico Educational Series* (4 Vols.). University Press of Mississippi. This series is composed of four volumes that can be used individually or as a set for instruction on the secondary and college levels. *Marine and Estuarine Ecology* (Vol. 1) presents the fundamentals of marine and estuarine ecology. *Marine Habitats* (Vol. 2) introduces five habitats—salt marsh, mud flat, sound, beach, and the barrier island. The text emphasizes the interdependency of coastal plants and animals and contrasts the manner in which these organisms adapt themselves to their habitat. *Diversity of Marine Plants* (Vol. 3) discusses biological classification and suggests experiments on seagrasses. *Marine Animals* (Vol. 4) introduces the physical characteristics, behavior, and habitat of common estuarine and marine animals. Each unit includes a glossary, diagrams, and instructions for experiments.

Available from: Mississippi-Alabama Sea Grant Consortium, Caylor Bldg., Gulf Coast Research Lab, Ocean Springs, MS 39564 USA.

Nature Conservation Council of New Zealand. 1986. *Coastal Wetlands*. Written primarily for secondary school students, this book focuses on the importance of coastal wetland ecosystems, including mangroves, and the threats facing them. Designed for an international audience.

Available from: Nature Conservation Council, P.O. Box 12-200, Wellington, New Zealand.

University of Southern California Sea Grant Program. 1983. *Wet and Wild: A Multidisciplinary Marine Education Teacher Guide (Humedo y salvaje)*. The series includes six units designed for grades K-6: 1. *The Physical Ocean*; 2. *Ocean Management*; 3. *Research*; 4. *The Biological Ocean*; 5. *The Economic Sea*; 6. *Marine Ecology*.

Available from: USC Sea Grant Program, University of Southern California, University Park, Los Angeles, CA 90089 USA. ENG/SPA.

World Wildlife Fund. 1986. *Coral Reefs, Materials and Activities for Teaching Middle Grades (Arrecifes coralinos, materiales y actividades para la enseñanza en el nivel secundario)*. This teacher's packet was designed for secondary-level instruction in Caribbean countries. The packet contains a coral reef poster (bilingual and in color), a coloring book (bilingual), a 12-slide set, a board game, and a teacher's manual. Topics covered include reef formation, the coral reef community and food webs, and reef conservation. This is one of the few kits of its kind developed for tropical developing countries. Highly recommended.

Available from: World Wildlife Fund-US, 1250 24th St., N.W., Washington, DC 20037 USA. ENG/SPA.

Species

Greer, J. (Ed.). 1979. *The American Oyster (A Marine Science Education Workbook)*. Maryland Sea Grant College Program. The American oyster, the state of Maryland's most valuable seafood, serves as the subject of this science workbook aimed at middle school/junior high school students. The unit contains a teacher's narrative, a student activities section, and a resource section.

Available from: Cornell Maritime Press, P.O. Box 456, Centreville, MD 21617 USA, and Maryland Sea Grant College Program, 1223 H.J. Patterson Hall, University of Maryland, College Park, MD 20742 USA.

National Aquarium in Baltimore. 1985. *School Program Booklets (Whales, Grades 6-9; Sharks, Grades 1-3; Coral Reefs, Grades 7-12)*. Aimed at elementary and secondary grades, this series of booklets is designed to help students prepare for their visit to the aquarium as well as interpret their experience. Each booklet includes a guide to the animals, describing their behavior and habitat, and suggests activities such as word games.

Available from: Education Department, National Aquarium in Baltimore, Pier 3, 501 East Pratt St., Baltimore, MD 21202 USA.

Sea Turtle Rescue Fund. 1981. *Sea Turtles (Las tortugas marinas)*. Center for Environmental Education and Rare Animal Relief Effort (RARE). This teacher's packet contains a poster of sea turtles of the world, a coloring book, instructions for class activities, separate activity sheets (quizzes,

mazes), and an identification guide to sea turtles. The packet was designed for elementary and secondary levels in the Caribbean.

Available from: Center for Marine Conservation, 1725 DeSales St., N.W., Suite 500, Washington, DC 20036 USA. ENG/SPA.

Whale Research Group. 1984. *Getting Along: Fish, Whales, and Fishermen*. Breakwater Books Ltd. Designed for elementary schools in Newfoundland, Canada, this unit uses the special relationships between fishermen and whales to introduce the concepts of marine ecology and marine resource management. The material is organized around eight lessons, beginning with oceanography and marine biology and concluding with resource management and conflict resolution. The unit includes a student workbook and teacher's guide.

Available from: Breakwater Books Ltd., 277 Duckworth St., St. John's, Newfoundland, A1C 1G9 Canada.

Others/Specialized

Bortone, S.A. 1986. *Fisheries Biology for Everyone*. Florida Sea Grant College Program. This illustrated primer in fisheries biology and management brings to life all aspects of the subject. It introduces basic principles of fisheries management, fish life history, and the concept of stock assessment. The manual uses humorous text and drawings to present the non-sense perspective of fishermen. It can be used for adult or technical outreach programs and for secondary-level instruction.

Available from: Florida Sea Grant College Program, University of Florida, Bldg. 803, Gainesville, FL 32611 USA.

Channel Islands National Marine Sanctuary and the Santa Barbara Museum of Natural History. 1988. *The Sea Center: An Educational Guide*. National Oceanic and Atmospheric Administration. This bilingual brochure is designed to be a teaching aid in marine ecology for students in grades 4-6. The text quizzes the young reader on marine animals of the Eastern Pacific and on marine ecology and archeology. Questions are complemented by clear, full-page illustrations that make the brochure double as a coloring book. This is an excellent example of a low-cost but effective curriculum aid.

Available from: Channel Islands National Marine Sanctuary, 735 State St., Santa Barbara, CA 93101 USA. ENG/SPA.

International Center for Ocean Development. 1987. *World Fisheries*. This is a full-color wall map showing the distribution, type, and economic importance of marine fisheries worldwide. The packet was designed to help students develop a broader international perspective of resource management and to understand the differences between developed and develop-

ing economies. The map can be used as a visual teaching aid and for exhibits. The accompanying notes include suggested topics for lesson plans.

Available from: International Center for Ocean Development, 5670 Spring Garden Rd., Halifax, Nova Scotia, B3J 1H6 Canada. FREE.

Kohn, B. 1987. *The Beachcomber's Book*. Puffin Books. This book for children describes the many different objects found on a beach, how to preserve them for a collection, and how to use them in handicrafts and in cooking. Includes a short guide to common seashells of the Atlantic and Pacific coasts. Illustrated with black-and-white drawings. Good sourcebook for teachers or guides organizing shore walks.

Available from: Penguin Books, 625 Madison Ave., New York, NY 10022 USA.

Medina, Augusto (Ed.). *Investigating the Great Lakes Environment. Unit 2. Great Lakes Fishing in Transition*. Michigan Sea Grant Program. This is the second of three planned interdisciplinary curriculum units for middle-school students. This unit explores the Great Lakes through an in-depth study of its fishery. Students investigate the social and environmental consequences of historical changes in the fishery. They are asked to consider what they can do as individuals and as members of institutions to encourage sustainable use of the resource. The unit includes ten activities organized around issues such as toxic pollution, sea lamprey infestation, declining fisheries, marine economics, and native American fishing rights. The unit is accompanied by two filmstrips and a final test. This publication is highly recommended as a curriculum aid focusing on a coastal economic activity.

Available from: Michigan Sea Grant Program, University of Michigan, 2200 Bonisteel Blvd., Ann Arbor, MI 48109 USA.

Monterey Bay Aquarium. 1986. *Monterey Bay Aquarium Education Program*. Separate information sheets describe activities for grades K-2, 3-5, 6-8, 9-12. Themes include tide pool discovery, exploring rocky shores, undersea forests, sharks, shorelines. Each fact sheet includes background information for teachers, suggestions for class discussions and experiments, and a glossary.

Available from: Monterey Bay Aquarium, Education Department, 886 Cannery Row, Monterey, CA 93940 USA.

University of Georgia Marine Extension Service. 1987. *Gray's Reef National Marine Sanctuary: An Educational Handbook*. National Oceanic and Atmospheric Administration. This 34-page booklet introduces the basic aspects of oceanography and marine biology using Gray's Reef National Marine Sanctuary (an Atlantic live bottom reef) as an example.

Available from: University of Georgia Marine Extension Service, P.O. Box 13687, Savannah, GA 31416 USA.

6. Audio-Visual Materials

Audio-visual (A/V) techniques can be an important component of a public education program for CRM. Documentary films and slide presentations bring issues to life, helping audiences perceive and understand the immediacy of coastal problems. Professional film and slide productions are most effective in conveying spectacular coastal scenery and can inspire almost any audience. Through A/V programs, people are given an opportunity to see coastal areas and features they may have never seen before.

Ecological processes and changes in coastal conditions are often easier to illustrate using animation, historical film footage, and aerial photographs. Films and slide programs can include interviews with local residents and community leaders and can help communicate the human dimension of CRM.

A/V techniques can be used in different settings for CRM, including:

- public meetings and conferences;
- small group training and working sessions;
- shows and special events such as community fairs;
- exhibits at museums, aquaria, and visitor centers; and
- mass media.

Films and slide programs on CRM are also used by government agencies as part of their outreach program. They can be made available to local schools, community groups, and libraries for special showings.

The production of A/V materials for a CRM program requires access to specialized equipment and skills. Production costs are usually high in comparison to printed materials. The effectiveness of A/V programs also depends largely on whether there are sufficient opportunities for presenting the material (i.e., can the film be shown at a community event? public

meetings? in schools? at conferences?). The decision to produce an A/V program for CRM should rest on a careful evaluation of all these feasibility factors.

In selecting techniques for a public education program, readers should review the advantages and limitations of A/V programs as presented in Table 3.

Selected Materials

This section reviews selected educational films (16 mm and videocassettes), filmstrips, and slide sets that introduce one or several aspects of CRM. The listing includes 20 entries grouped under the following categories: GENERAL COASTAL THEMES, COASTAL AND MARINE HABITATS, OTHER THEMES. Many of the films and videocassettes are available for a fee upon request.

Since the production of new A/V programs is so expensive, CRM managers are likely to consider acquiring existing programs made available by international organizations. For this reason, the following listing emphasizes educational films that have broad relevance and could apply to any tropical country (see in particular WNET/THIRTEEN and the Nature Conservancy). Also included in the listing are slide programs that could be adapted to local circumstances by adding slides (at a relatively low cost) and by modifying the script (see International Center for Conservation Education and University of Southern California Sea Grant).

General Coastal Themes

International Center for Conservation Education. *Life at the Water's Edge*. Slidepack and audio cassette. This unit, which includes 80 frames, is part of a World Wildlife Fund International Campaign Presentation. The program examines the vital role of wetlands in coastal and freshwater ecosystems. Worldwide trends and existing threats from pollution, dams, and drainage are discussed.

Available from: International Center for Conservation Education, Greenfield House, Guiting Power, Cheltenham, Glos, GL54 5TZ United Kingdom.

Schuman, S. 1980. *Cobbler's Cove: A Coastal Planning Simulation Game*. New York Sea Grant Program. The packet includes 53 color slides, script, and activity book. A slide presentation is used to introduce a simulation game about an imaginary coastal community that must decide on the development of a marina or the preservation of coastal habitats.

Available from: Audio-Visual Resource Center, 8 Research Park, Cornell University, Ithaca, NY 14850 USA.

TABLE 3. ADVANTAGES AND LIMITATIONS OF A/V MATERIALS

What are the ADVANTAGES of using A/V techniques for a CRM public education program?

Films and videocassettes

Films are effective in holding audience attention and conveying complex messages.

Films are effective in stimulating audience interest in unfamiliar subjects.

Multiple copies of videos can be relatively inexpensive.

Slide programs

Professional-quality slide programs can capture audience attention almost as effectively as film productions and are less complex to produce.

Slide programs are relatively inexpensive and easily adaptable to local circumstances.

What are the LIMITATIONS of using A/V techniques for a CRM public education program?

Films and videocassettes

The initial production costs of films and video programs are usually prohibitive and require special funding.

The physical setup for A/V programs may be expensive, particularly for facilities of large capacity.

Projection, handling, and maintenance of equipment require specialized training.

Commercial films have accustomed audiences to technical excellence. Production of top-quality films requires the use of professional people whose services are expensive.

Slide programs

Projection requires special room facilities.

The program concept and execution of slide presentations and filmstrips (both audio and visual) must be of high quality. Professional technicians are usually needed for the photography, graphics, and narration.

United Nations Environment Programme. 1980. *Home to the Sea*. 16 mm film. 27 mins. The presentation explains the ecological and economic importance of the world's coastal and ocean areas, and describes UN programs for the sustainable use of coasts and oceans.

Available from: UNEP, United Nations Plaza, New York, NY 10017 USA.

University of Maryland Sea Grant College Program. 1985. *A Question of Balance*. VHS videocassette. 25 mins. (\$30.00.) Examines the application of multiple use policies in the Chesapeake Bay. For use alone or with *Decision Making: The Chesapeake Bay* (see page 32).

Available from: Maryland Sea Grant College Program, 1224 H.J. Patterson Hall, University of Maryland, College Park, MD 20742 USA.

University of Southern California Sea Grant Program. 1982. Dimensions of the Sea: Marine Education Slides with Narratives. Slide shows designed for grades K-graduate level. The program includes five different units as follows: 1. *The Physical Ocean* (13 slides); 2. *Ocean Management* (15 slides); 3. *Ocean Research* (15 slides); 4. *The Biological Ocean* (22 slides); 5. *The Economic Sea* (27 slides); 6. *Marine Ecology* (44 slides). Each slide set is accompanied by a written narrative (available in either English or Spanish) which can be adapted by teachers to the appropriate grade level.

Available from: USC Sea Grant Program, Marine Education Program, University of Southern California, University Park, Los Angeles, CA 90089 USA. ENG/SPA.

Coastal and Marine Habitats

Great Barrier Reef Marine Park Authority. 1985. *Coral Reefs: A Review of Some Audiovisual Resources*. This is a booklet intended to assist teachers in selecting audiovisual kits and programs that could be used to introduce their students to the Great Barrier Reef. A brief synopsis of each program is given.

Available from: Great Barrier Reef Marine Park Authority, Education and Interpretation, P.O. Box 1379, Townsville, Queensland, 4810 Australia. FREE.

Great Barrier Reef Marine Park Authority. 1987. *Encounters with the Reef*. This videocassette explains how the most extensive reef formation on earth was built and continues to grow along 2200 km of the Queensland coastline in Australia.

Available from: Great Barrier Reef Marine Park Authority, Education and Interpretation, P.O. Box 1379, Townsville, Queensland, 4810 Australia.

IUCN Commission on Ecology. *Understanding Mangrove Ecosystems*. International Center for Conservation Education. Slide packet, soundtrack, and booklet. This 60-slide program explains what mangroves are, their worldwide distribution, and their economic importance for sustainable develop-

ment. The program introduces a simple typology of mangroves, using both photographs and cross-sections. Several slides illustrate the sources of threats to mangroves. The information is aimed at tropical forestry institutions and natural resource managers worldwide.

Available from: International Center for Conservation Education, Greenfield House, Guiting Power, Cheltenham, Glos, GL54 5TZ United Kingdom.

IUCN Commission on Ecology. *Managing Mangrove Areas*. International Center for Conservation Education. Slide packet, soundtrack, and booklet. Designed to complement *Understanding Mangrove Ecosystems*, this program describes products harvested from mangroves and how these harvests can be maintained through careful planning and management. The information is aimed at tropical forestry institutions and resource managers worldwide.

Available from: International Center for Conservation Education, Greenfield House, Guiting Power, Cheltenham, Glos, GL54 5TZ United Kingdom.

Marine Conservation Society. *Coral Reef Life in the Red Sea*. International Center for Conservation Education. Slide packet and soundtrack. This program is an introduction to the spectacular world of tropical coral reefs. The emphasis is on the fish, invertebrates, and corals that constitute the reef communities of the Red Sea.

Available from: International Center for Conservation Education, Greenfield House, Guiting Power, Cheltenham, Glos, GL54 5TZ United Kingdom.

National Geographic Society Educational Services. n.d. *Coral Reef*. 16 mm film. 23 mins. This film introduces the ecology of coral reefs using examples from the Western Pacific, Australia, and Florida.

Available from: National Geographic Society Educational Services, Department 84, Washington, DC 20036 USA.

University of Southern California Sea Grant Program. 1982. *Dimensions of the Sea: Marine Education Slides with Narratives*. Slide shows designed for grade K-graduate level. The program includes five different sets (see under GENERAL COASTAL THEMES, page). *Unit 6. Marine Ecology* (44 slides) introduces intertidal habitats, mangroves, coral reefs, and urban waterfronts. The slide set is accompanied by a written narrative which can be adapted by teachers to the appropriate grade level.

Available from: USC Sea Grant Program, Marine Education Program, University of Southern California, University Park, Los Angeles, CA 90089 USA. ENG/SPA.

World Wildlife Fund—Malaysia. *Sabah's Underwater Paradise*. International Center for Conservation Education. Slide packet and soundtrack. This 60-frame program tells the story of one of Malaysia's recently designated marine parks. Aspects of reef ecology are clearly explained as well as the

dependence of local villagers and fishermen on a healthy, productive reef.

Available from: International Center for Conservation Education, Greenfield House, Guiting Power, Cheltenham, Glos, GL54 5TZ United Kingdom.

WNET/THIRTEEN and The Nature Conservancy. 1988. *The Coral Triangle*. WNET Nature Series. Written and directed by L. Carey and produced for the Public Broadcasting Station's Nature Series, this film introduces the social and economic values of coral reefs in Southeast Asia (Philippines, Indonesia, and Malaysia). Film content offers an excellent overview of the linkages between reef destruction, fisheries productivity, food production needs, and coastal development. The one-hour videocassette examines the various sources of disturbance to the area's reefs. It includes outstanding footage and factual information on reef fisheries techniques including reef blasting and muro-ami.

Available from: WNET/THIRTEEN, 356 West 58th St., New York, NY 10019 USA.

Other Themes

Great Barrier Reef Marine Park Authority. 1987. *The Crown of Thorns Story*. Video documentary tells the story of the crown of thorns on the Great Barrier Reef. It traces the history of infestations and what is known about the starfish, with special emphasis on the research currently underway.

Available from: Great Barrier Reef Marine Park Authority, P.O. Box 1379, Townsville, Queensland, 4810 Australia.

National Oceanic and Atmospheric Administration, New York Sea Grant, and New Jersey Marine Sciences Consortium. 1984. *The Great Garbage Chase*. Color filmstrip with cassette tape and teacher's guide. This set shows how beaches are in danger of becoming less enjoyable and of diminished value and suggests ways children can help reduce pollution. Designed for grades 3-6.

Available from: New York Sea Grant Extension Program, Fernow Hall, Cornell University, Ithaca, NY 14853-3001 USA.

Oregon Sea Grant College Program. 1984. *Farmers of the Sea*. 16 mm film. 56 mins. This film traces the development of aquaculture on four continents and in three oceans.

Available from: Oregon Sea Grant College Program, Oregon State University, Corvallis, OR 97331 USA.

United Nations Environment Programme. 1980. *Mare Nostrum*. 16 mm film. 27 mins. The film describes the international problems of pollution in the Mediterranean Sea and introduces the UNEP program, international agreements, and techniques used to begin cleanup.

Available from: United Nations Environment Programme, United Nations Plaza, New York, NY 10017 USA.

7. Educational Posters

Educational posters are an effective technique for generating curiosity and interest in CRM issues. They have a high visual appeal and can be posted in almost any location, including high traffic areas such as airports, train stations, government office and hotel lobbies, museums, and school bulletin boards.

Posters must be attractive to be effective. They should have an attention-getting lead-in statement, followed by a simple message presented in an easily understood but imaginative way. For most CRM managers, the objective has been to motivate the general public to find out more about coastal areas.

While posters can be expensive to produce, costs can be reduced by getting local artists and photographers to contribute the artwork. The most effective posters for CRM programs include some explanatory notes printed directly on the poster or its back side.

Selected Materials

ASEAN/USAID CRMP. *Mangroves Must Live*. ICLARM. The poster shows a typical mangrove of Southeast Asia in a colorful cross-section. An accompanying key identifies the mangrove plants and animals depicted on the poster. A short text explains the benefits derived from mangroves.

Available from: ICLARM, MCC P.O. Box 1501, Makati, Metro Manila, Philippines.

Duever, L. 1987. *Coral Reefs*. Coastal Plains Institute. This full-color poster explains the important features and ecological processes found in a Caribbean coral reef. The reef habitat and animals are described using lively drawings and factual information carefully tied to the illustrations.

Available from: Tropical Nature Services, Route 1, Box 860, Mincanopy, FL 32667 USA.

Guam Coastal Management Program. *Planning and Land Use Laws Can Make a Difference*. This poster illustrates how planning and land-use laws can positively affect the quality of development on Guam. The poster depicts two coastal communities: the top half of the poster shows an unplanned community, while the bottom half shows a community that is the result of coastal planning.

Available from: Guam Coastal Management Program, Government of Guam, Agana, Guam 96910 USA.

Great Barrier Reef Marine Park Authority. 1985. *Dugongs*. Reef Heritage Series. This educational poster features original artwork by an Australian artist. The accompanying text explains the dugong's habitat requirements and the need for conserving healthy populations.

Available from: Great Barrier Reef Marine Park Authority, P.O. Box 1379, Townsville, Queensland, 4810 Australia.

National Audubon Society. *Coral Reef—Sunken Treasure*. This poster displays a typical Caribbean reef and has a key to the 45 animals and plants depicted.

Available from: National Audubon Society, Route 4, Box 171, Sharon, CT 06069 USA.

National Marine Fisheries Service. *Sea Turtles of the World*. This is a full-color educational poster of sea turtle species found worldwide.

Available from: National Marine Fisheries Service, Office of Protected Resources and Habitat Programs, NOAA, 1825 Connecticut Ave., N.W., Washington, DC 20235 USA.

Office of the National Environment Board. 1988. *The Colorful World Beneath an Ocean*. ASEAN/USAID Coastal Resources Management Project. This color poster contains a wealth of information on the ecological and recreational value of coral reefs. It also offers a code of conduct for tourists and divers.

Available from: Office of the National Environment Board, 60/1 Soi Pracha Sampan, Rama VI Rd., Bangkok 10400, Thailand.

Orr, K.S. 1985. *A Strange and Wonderful Garden: The Caribbean Coral Reefs*. World Wildlife Fund. This full-color poster presents a typical coral reef scene with reef fauna. An explanatory note explains how people can help protect coral reefs.

Available from: World Wildlife Fund-US, 1250 24th St., N.W., Washington, DC 20037 USA. ENG/SPA.

8. Reading Materials and Activities for Children

This section presents reading materials and activity books for young children (4–12 years). These materials can be used by children on their own and are not necessarily part of a school curriculum.

Some of these books were designed specifically for a CRM program, and are included here as a possible reference list for local schools, libraries, and museums planning to offer a special coastal program for children.

Because the text and illustrations of children's books are clear and simple, you may wish to refer to some of these publications for ideas on setting up CRM exhibits. Several books contain suggestions for projects that children can do at home or at school. These suggestions could also be used to organize a coastal festival or a CRM kiosk at a community fair. The books listed under the COASTAL AND MARINE HABITATS category are highly recommended for that purpose.

One advantage in directing CRM educational activities to children is that it is easier to shape environmental values and behavior early in life. Also, communicating information and values to children can be a way of raising awareness among parents and the community at large.

Selected Materials

The listing of children's materials is organized as follows. Under the GENERAL COASTAL THEMES category, we have included books that introduce children to all aspects of the coast (physiography, ecology, history, uses, pollution). These books offer a good introduction to coastal areas and their multiple uses.

The COASTAL AND MARINE HABITATS category includes juvenile literature on coral reefs, estuaries, and marshes.

Under the SPECIES category, we have included activity books and juvenile literature on sea turtles, tidepool animals, fish, and marine mammals.

General Coastal Themes

Center for Environmental Education. 1985. *The Ocean—Consider the Connections*. Designed for school-age children, this activity book is a varied and entertaining collection of puzzles, games, experiments, and worksheets with an ocean theme. The activities introduce topics such as oceanography and coastal processes, marine species, food chains, coastal and marine ecosystems, and ocean uses. The book includes illustrated worksheets that can be reproduced for use in the classroom. A glossary is included.

Available from: Center for Marine Conservation, 1725 DeSales St., N.W., Suite 500, Washington, DC 20036 USA.

Tyler, J. 1976. *The Usborne Book of the Seas*. EDC Publishing. This is a colorful children's guide to the physical features and uses of coastal and ocean areas. Illustrated with cartoon drawings, the book covers a wide range of topics from shoreline processes, currents and tides, harbors and shipping, fishing, offshore industrial development, and diving. Includes a glossary.

Available from: EDC Publishing, 10302 East 55th Place, Tulsa, OK 74146 USA.

University of Hawaii Sea Grant College Program. 1982. *Ocean Activity Workbook*. This 31-page activity book introduces young readers to the geography, coastal history, and traditional folklore of the Pacific. Included are puzzles and word games on shoreline conservation, recreation, and food webs.

Available from: University of Hawaii Sea Grant College Program, Publications Office, 1000 Pope Rd., MSB 200, Honolulu, HI 96822 USA.

Coastal and Marine Habitats

Althea. 1985. *Undersea Homes*. Cambridge University Press. Juvenile literature. This is a simple booklet-style primer on marine biology illustrated in color.

Available from: Cambridge University Press, 32 East 57th St., New York, NY 10022 USA.

Galbreath, Alice, and Jean H. Sibbald. 1986. *Ocean World Library* (6 Vols.). Dillon Press, Inc. The titles in this series of hardcover books on six ocean-related topics are: *The Gulf Stream*, *The Continental Shelf*, *The Great Barrier Reef*, *Sea Babies*, *Homes in the Sea*, and *Hawaii*. The subject matter is aimed at grades 4 and up. *The Great Barrier Reef* volume is recommended as juvenile literature on coral reefs. It describes the largest reef in the world, its ori-

gins, life on the reef, history and use, and problems on the reef such as crown-of-thorn infestation. Includes a glossary.

Available from: Dillon Press, Inc., 242 Portland Ave. South, Minneapolis, MN 55415 USA.

Johnson, S.A. 1984. *Coral Reefs*. Lerner Publications Company. Lerner Natural Science Book. Text, illustrations, and color photographs in this secondary-level science book introduce the reader to the different types of coral reefs found worldwide, origins of reefs, reef ecology, and marine biology. Includes a glossary. Highly recommended.

Available from: Lerner Publications Company, 241 First Ave. North, Minneapolis, MN 55401 USA.

Malnig, A. 1985. *Where the Waves Break (Life at the Edge of the Sea)*. Carolrhoda Books, Inc. Carolrhoda Nature Watch Book. Juvenile literature. This is an illustrated reader on tidepool ecology with good quality color photographs of seashore creatures.

Available from: Carolrhoda Books, Inc., 241 First Ave. North, Minneapolis, MN 55401 USA.

New England Aquarium. 1986. *Dive to the Coral Reefs*. Crown Publishers, Inc. Juvenile literature. A basic reader describing the formation of coral reefs and reef biology, it is illustrated with excellent underwater photographs.

Available from: Crown Publishers, Inc., 225 Park Ave. South, New York, NY 10003 USA; or Education Department, National Aquarium in Baltimore, Pier 3, 501 East Pratt St., Baltimore, MD 21202 USA.

Porter, K. 1986. *Life in the Water*. Schoolhouse Press, Inc. In this science book on coastal and marine ecology for the middle grades, topics include marine fauna, behavioral adaptations, coastal and marine habitats, coral reefs. Excellent color photographs and drawings. Highly recommended.

Available from: Schoolhouse Press, Inc., 4700 Rockside Rd., Independence, OH 44131 USA.

Sabin, F. 1985. *Ecosystems and Food Chains*. Smithsonian Museum of Natural History. Juvenile literature. This simple booklet-style primer on ecosystems is illustrated with lively cartoon drawings.

Available from: Smithsonian Museum of Natural History (Bookstore), Washington, DC 20560 USA.

Sabin, F. 1985. *Swamps and Marshes*. Smithsonian Museum of Natural History. This illustrated children's reader introduces salt marsh and mangrove habitats and processes.

Available from: Smithsonian Museum of Natural History (Bookstore), Washington, DC 20560 USA.

Species

Branan, L.N. 1987. *Sea Turtles*. Florida Department of Natural Resources. This attractive, low-cost leaflet introduces children to Florida's sea turtles. It includes a story and an activity map which children can use to identify and understand the various threats to sea turtles in coastal waters.

Available from: Florida Department of Natural Resources, Division of Marine Resources, Marjory Stoneman Douglas Bldg., 3900 Commonwealth Blvd., Tallahassee, FL 32303 USA. FREE.

Charles Darwin Research Station. 1983. *La tortuga marina*. This is an illustrated children's book on the life history of sea turtles in the Galapagos. It can also be used as a coloring book.

Available from: Charles Darwin Research Station, Isla Santa Cruz, Galapagos, Ecuador. SPA.

Rius, Maria, and J.M. Parramon. 1987. *Life in the Sea (La vida en el mar)*. Barron's Educational Series, Inc. Juvenile literature. This is a colorful story-book aimed at preschool children and includes simple factual information about animals that live underwater.

Available from: Barron's Educational Series, Inc., 250 Wireless Blvd., Hauppauge, NY 11788 USA. ENG/SPA.

University of Southern California Sea Grant Program. 1982. *Mini-Information Booklets*. There are three booklets in the series, all bilingual, with each booklet containing approximately 50 short articles about marine animals and their characteristics and behavior. 1. *Tidepool Animals (Los animales que viven in las pozas de la marea)*; 2. *Sharks and Other Sea Creatures (Los tiburones y otros animales marinos)*; 3. *Fantastic Marine Animals (Fantasticos animales marinos)*.

Available from: University of Southern California, USC Sea Grant Program, Marine Education Program, University Park, Los Angeles, CA 90089 USA. ENG/SPA.

Wildlife Education Ltd. 1985. *Zoobooks 2 (Seals, Sea Lions and Walruses, Sharks, Whales, Turtles, Polar Bears, Penguins)*. This series of booklets designed for grades 4 and up introduces the life history, habitat requirements, and importance of marine wildlife with the use of clear and detailed text and full-color illustrations.

Available from: Zoobooks, P.O. 28870, San Diego, CA 92128 USA.

9. Special Events and Mass Media

Since one of the primary objectives of this guide is to serve as a source-book, emphasis has been on printed materials. However, printed materials are only one of the options available to the CRM manager seeking to develop an effective education program.

Besides audio-visual materials (see Section 6), special events and mass media can be used to further CRM objectives. As in the case of printed materials, these techniques offer unique advantages and limitations. Results cannot always be accurately predicted, but education experts generally agree that:

mass media are more effective when coordinated and combined: for example, video presentations followed by guided discussions are a particularly strong combination. When combined with a third medium, printed material, the effectiveness is even greater. Today the expert practitioner no longer asks: "Which medium is best?" but rather "How can a given medium be made more effective or best combined with another?" *The way a chosen medium is used is more important than the choice itself.* (CONNECT, vol. XIII, no. 1, 1988; emphasis in original)

What do we mean by special events in CRM? Here are a few examples:

- festivals, science fairs, and special exhibitions organized around a coastal theme (e.g., Ocean Day) where community activities, exhibits, and art contests are designed to raise community awareness;
- special activities offered at a traditional community fair (held during a traditional holiday, for example);
- community projects such as a beach cleanup (short term), volunteer coastal inventory (longer term), the construction of a visitor center, or restoration of a coastal heritage landmark;

- wildlife and underwater photography contests;
- weekend and special day programs held at natural history museums and aquaria where children and adults learn to build their own aquarium or learn traditional coastal skills;
- an awareness-raising or fund-raising activity such as a race in support of CRM objectives; and
- lecture or seminar series.

Special events are effective in capturing the attention of a public that may not be aware of a CRM issue. Events have a powerful social value, often reinforcing community pride. They are also a means of demonstrating through participation that local residents can help resolve an issue.

The long-term benefits of special events depend not only on the coastal theme or activity chosen but also on how people are involved in the planning, the carrying out, and the follow-up of the event. Some events encourage public participation more than others. Some events produce immediate and highly visible results but offer little opportunity for long-term follow-up.

TABLE 4. ADVANTAGES AND LIMITATIONS OF MASS MEDIA

What are the ADVANTAGES of using mass media techniques for a CRM public education program?

Simple messages can be disseminated to large numbers of people, regionally or nationwide.

Media coverage often serves as an indicator of the political and social importance of an issue and is effective in getting the attention of leaders and decision makers.

What are the LIMITATIONS of using mass media techniques for a CRM public education program?

Messages communicated through mass media are not under the control of the manager (with the exception of public service announcements); aspects of the program that will receive media attention cannot be predicted.

Factual coverage will require working closely with media representatives.

Media campaigns do not involve the participation of the community.

Experience suggests that there are ways to maximize the immediate and long-term benefits of special events such as:

- calling on the creativity of local organizations, businesses, local leaders, and residents early on in the planning stages for suggestions and ideas on all aspects of the special event (coastal theme, location, logistics, etc.);
- finding out early on how organizations, the media, and others would like to participate;
- offering a variety of roles and involvement within the community, both short and long term;
- getting the media involved (local and national);
- seeking official endorsements to increase visibility and prestige;
- making plans for visible community benefits resulting from the event that will persist afterwards. An information kiosk, a wayside sign, or a restored community facility are visible results that can serve as a long-term reminder of the event's message;
- planning for follow-up;
- teaching something practical; and
- offering a unique or unusual experience (a tour of a Navy or research vessel, a fisheries laboratory, or a local museum; a coastal walk at low tide).

As suggested above, special events are often planned in concert with mass media campaigns (radio, press, or television). There are many ways that mass media can be used to communicate CRM messages:

- public service announcements and advertisements;
- special radio, television, or press coverage (i.e., a planned interview, planned press coverage of a CRM meeting, or the release of a CRM document);
- press conferences;
- regular press or radio series; and
- special articles in periodicals.

10. Education Planning Guides

Listed in this section are manuals and papers specially designed for resource managers and educators planning to initiate an environmental education program in their community. Most provide a step-by-step description of the education planning process (see Section 2 of this guidebook). Many offer helpful tips on how to select appropriate techniques or involve local organizations in the production of education materials.

Selected Materials

Berkmuller, K. 1981. *Guidelines and Techniques for Environmental Interpretation*. Netherlands Foundation for International Protection and International Union for Conservation of Nature and Natural Resources. This manual explains the design and execution of miscellaneous techniques for environmental education. Techniques discussed are: nature trails, signs, displays, and audio-visual programs. Examples and guidelines are adapted to developing countries.

Available from: IUCN, Avenue du Mont-Blanc, CH-1196 Gland, Switzerland.

Caduto, M.J. 1985. *A Guide on Environmental Values Education*. UNESCO-UNEP International Environmental Education Program, Environmental Education Series 13. This manual offers a systematic approach to environmental values education. Part 1 explains the theoretical background, while Part 2 discusses the practical aspects of such a program. The manual includes several examples and guidelines applicable to developing countries.

Available from: UNESCO, Division of Science, Technical and Environmental Education, 7 Place de Fontenoy, 75700 Paris, France.

Hudson, B. 1984. "User and Public Education" in R. Kenchington and B. Hudson, *Coral Reef Management Handbook*. UNESCO. This article reviews the basic information needed prior to developing a user education program for tropical coastal areas.

Available from: UNESCO, Division of Science, Technical and Environmental Education, 7 Place de Fontenoy, 75700 Paris, France.

International Union for Conservation of Nature and Natural Resources. 1986. *Education, Training, Awareness*. Vol. 17. This special issue of the IUCN Bulletin reports on numerous environmental programs in developing countries.

Available from: IUCN, Avenue du Mont-Blanc, CH-1196 Gland, Switzerland.

Lieberman, G. 1984. *Step by Step: How Conservation Education Works*. In *Focus*, Vol. 6(4). World Wildlife Fund. This article describes a practical and tested approach used by WWF to establish conservation education programs in developing countries.

Available from: World Wildlife Fund-US, 1250 24th St., N.W., Washington, DC 20037 USA.

Wood, D.S., and D.W. Wood. 1986. *How to Plan a Conservation Education Program*. International Institute for Environment and Development and U.S. Fish and Wildlife Service. This excellent manual is designed to help natural resource management and non-government organizations in developing countries prepare conservation education programs that are uniquely their own and specific to their situations. The manual describes an approach step by step, using examples to illustrate under what circumstances a particular technique may work best.

Available from: Center for International Development and Environment, World Resources Institute, 1709 New York Ave., N.W., Washington, DC 20006 USA. ENG/SPA

11. Newsletters

The newsletters listed below cover a broad range of topics relating to coastal and marine resource management. They often include reviews and announcements of recently released CRM education materials and can serve as a good resource for managers worldwide.

BIOCENOSIS: *Revista de Educacion Ambiental*. Published quarterly by the *Fundacion de Parques Nacionales* and the *Universidad Estatal a Distancia*. This excellent Spanish newsletter focuses on environmental education in Latin America. It includes regular features on children's materials, endangered species, biodiversity, marine resources, and protected areas.

Available from: Editor, BIOCENOSIS, Programa de Educacion Ambiental, Universidad Estatal a Distancia, Apdo. 474-2050, San Pedro de Montes de Oca, Costa Rica. SPA.

BIOLOGICAL CONSERVATION NEWSLETTER. Published monthly by the Smithsonian Museum of Natural History. The emphasis is on biological diversity, tropical forests, protected species and protected areas. Includes an excellent listing of recently published articles.

Available from: Jane Villa-Lobos, c/o Biological Conservation Newsletter, Smithsonian Institution, Department of Botany, NHB 166, Washington, DC 20560 USA. FREE.

CAMPNET (Newsletter of the Coastal Area Management and Planning Network). Published quarterly by The University of Rhode Island's Coastal Resources Center in cooperation with the South Carolina Sea Grant Consortium. The focus is on current developments in policy and management of coastal resources worldwide.

Available from: The Editor, Coastal Resources Center, URI/GSO, South Ferry Road, Narragansett, RI 02882 USA. FREE.

CARIBBEAN CONSERVATION NEWS. Published quarterly by the Caribbean Conservation Association (CCA). It reports the activities of the CCA and its member organizations. Features articles on topics and issues of interest to Caribbean conversationists.

Available from: The Editor, Caribbean Conservation News, Caribbean Conservation Association, Savannah Lodge, The Garrison, St. Michael, Barbados.

CEPNEWS. Published quarterly (in English, Spanish, and French) by the Regional Co-ordinating Unit of the Caribbean Environment Programme. CEPNEWS is an informal news bulletin describing current environmental programs, activities, and events in the Caribbean.

Available from: Editor, CEPNEWS, Caribbean Environment Programme, UNEP Regional Co-ordinating Unit, 14-20 Port Royal St., Kingston, Jamaica. FREE.

CONNECT (UNESCO-UNEP Environmental Education Newsletter). CONNECT is published quarterly by UNESCO. It reports regularly on international environmental education conferences and UN-funded environmental education projects.

Available from: The Editor, CONNECT, 7 Place de Fontenoy, 75700 Paris, France. FREE.

EBB AND FLOW. An environmental education newsletter published by the Great Barrier Reef Marine Park Authority. This newsletter provides teachers with curriculum materials and suggestions for activities demonstrating principles of coral reef ecology.

Available from: Great Barrier Reef Marine Park Authority, P.O. Box 1379, Townsville, Queensland, 4810 Australia. FREE.

FLORA, FAUNA Y AREAS SILVESTRES. This bulletin is published three times a year in Spanish by the FAO regional office for Latin America and the Caribbean. It includes articles, technical reports, news items, and research notes relating to protected areas and wildlife in Latin America.

Available from: FAO Regional Office for Latin America/Caribbean, Avenida Santa Maria 6700, Casilla 10095, Santiago, Chile.

ICMRD NEWSLETTER. Published periodically by the International Center for Marine Resource Development. The focus is on marine resource development.

Available from: ICMRD Headquarters, 126 Woodward Hall, The University of Rhode Island, Kingston, RI 02881 USA. FREE.

IMS NEWSLETTER. Published quarterly by UNESCO's Division of Marine Sciences in cooperation with the Food and Agriculture Organization, the International Maritime Organization, and the World Meteorological Organization. Chinese, English, French, Russian, and Spanish editions.

Includes technical articles, project updates, and announcements of training opportunities in marine and coastal sciences. Reports periodically on the UNESCO COMAR Program.

Available from: The Editor, IMS Newsletter, Division of Marine Sciences, UNESCO, 7 Place de Fontenoy, 75700 Paris, France. FREE.

THE MARINE CONNECTION. Published quarterly by the U.S. Man and the Biosphere Program. The newsletter is distributed primarily as a service to the International Marine Protected Area Network. It is intended as an informal presentation of current events relating to marine protected areas worldwide.

Available from: The Marine Connection, U.S. Man and the Biosphere Program, OES/ENR/MAB, Department of State, Washington, DC 20520 USA. FREE.

NEOTROPICAL WETLANDS NEWSLETTER. This semiannual newsletter is published by the IWRB/ICBP Neotropical Wetlands Research Group. It provides information on wetlands in the neotropics, with special emphasis on research, management, training, and public education strategies.

Available from: Peter R. Bacon, Zoology Department, University of the West Indies (Mona), Kingston 7, Jamaica. FREE.

NETWORK NEWS (Caribbean Technical Cooperation Network in Artisanal Fisheries and Aquaculture). Published periodically by FAO's Regional Office for Latin America and the Caribbean to provide news of projects and training opportunities in artisanal fisheries and aquaculture in the subregion.

Available from: Bisessar Chakalall, Regional Fisheries Officer, FAO Office, P.O. Box 822, Port-of-Spain, Trinidad and Tobago. FREE.

NEXUS. This magazine is published biannually by the Atlantic Center for the Environment. The main focus is on environmental education and on promoting public involvement in resolving resource issues in the North Atlantic region of the United States and Canada.

Available from: Brent A. Mitchell, Editor, Atlantic Center for the Environment, QLF Program Headquarters, 39 South Main St., Ipswich, MA 01938-2341 USA.

REEFLECTIONS. Reeflections is published by the Great Barrier Reef Marine Park Authority on a quarterly basis. It provides updates and informative articles on coral reef management, marine park planning, and marine education in the Great Barrier Reef.

Available from: The Editor, Reeflections, Great Barrier Reef Marine Park Authority, P.O. Box 1379, Townsville, Queensland, 4810 Australia. FREE.

THE SIREN. Published quarterly, this newsletter is intended as an informal presentation of news from the Oceans and Coastal Areas Programme of the United Nations Environment Programme.

Available from: The Siren, Programme Activity Centre for Oceans and Coastal Areas, UNEP, P.O. Box 30552, Nairobi, Kenya. FREE.

TROPICAL COASTAL AREA MANAGEMENT. Published periodically by the ASEAN/USAID Coastal Resources Management Project implemented by ICLARM. The primary objective is to provide a forum for researchers, planners, managers, and other professionals with interests in tropical coastal resources management to communicate with one another and to inform them of relevant developments and activities within and outside the region.

Available from: The Editor, Tropical Coastal Area Management, ICLARM, Bloomingdale Bldg., 3rd Floor, Salcedo Street, Legaspi Village, Makati, Metro Manila, Philippines. FREE.

UNEP News. Published six times a year by the Information Service of the United Nations Environment Programme.

Available from: UNEP News, Information Service, P.O. Box 30552, Nairobi, Kenya. FREE.

NOTES

Coastal Resources Management

A Guide to Public Education Programs and Materials

Michèle H. Lemay
Lynne Zeitlin Hale

This guide provides a convenient list of the best materials on coastal resources, where to obtain them, and which ones are available free. It explains how to get started in developing a program for increasing public understanding of the importance and complexity of our coasts, with quick reference tables comparing the advantages of different types or resource materials.

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