RESOLVING RESOURCE USE CONFLICTS IN COASTAL ZONES

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Summary

Many countries now recognize the coastal zone as a distinct region with resources that require special attention. The coastal zone comprises the area on both sides of the shoreline where land and sea interact. This is a place of natural dynamism where huge amounts of energy are released and a great abundance of life is nurtured. The habitats of coastal zones are so different from their terrestrial counterparts as to require different and special forms of conservation.

The coastal zone is a major attraction to many sectors—ocean commerce, tourism, home seekers, the military, and a variety of industries. Dense populations are attracted to the shorelands. In the coastal sea, great environmental modification is caused by land conversion and by water pollution from urban, industrial, commercial, and agricultural development.

Activities on land can strongly affect the sea. Impacts on coastal ecosystems from terrestrial activity include not only industrial and agricultural pollution but also siltation from eroding slopes; the filling of tidal waters to provide sites for industry, housing, recreation, airports, and farmland; dredging to create, deepen, and improve harbors; quarrying; and excessive cutting of mangroves for fuel. The impacts of these actions

include reducing biological diversity, natural resource abundance (food and fiber), quality of life, community security (from sea storms), and tourism revenues.

Conversely, the sea strongly affects the land and intertidal areas—for example, beach erosion, pollution from tankers (bilge washings), and property destruction from cyclonic storm surges, flooding, and wave action. The risks from natural disasters such as cyclones are increasing due to population growth and unmanaged development along densely populated coastlines.

Unified coastal zone management is a *system* for resource management, development control, and conflict resolution in the coastal zone. A coastal zone management program integrates the concerns of the relevant economic sectors and societal interests. It anticipates resource impacts and offers solutions. The primary aim of coastal zone management is to provide for sustainable use of the resources of the coastal commons.

A major benefit of the unified coastal zone management approach (integrated, multiple-use oriented) over the traditional sectoral (single-use) approach is that it provides a framework for resolution of conflicts over who gets to exploit which coastal resources and how and when. The most effective method is often mediation through administrative or public hearings using facilitated dialog, and thus communities and local and central government agencies are represented in the negotiations.

1. Introduction

In coastal areas of the world, high population densities linked with urban economic growth, expanding tourism, and industrialization pose major threats to coastal and marine natural resources. Impacts from uncontrolled development have depleted resources, reduced biodiversity, made shorelands vulnerable to sea storms, and destabilized coastal communities. Growing amounts of gaseous, liquid, and solid waste also jeopardize the future of marine, coastal, and wetland ecosystems, as well as threaten the well-being of many species. The need to remedy such problems was recognized in Agenda 21 of the Earth Summit (the 1992 United Nations Conference on Environment and Development in Brazil).

In most parts of the world, renewable coastal resource uses are economically limited. Over time, the economic demand for a given resource will commonly exceed the supply, be it arable land, fresh water, wood, or fish. Sustainable use management, achieved by conservation practices, ensures that renewable resources are not jeopardized but remain available to this and to future generations. For coastal areas, special management formats are required for sustainability. Such management maintains natural productivity and enhances the long-term economic potential of renewable natural resources. Holding development to a sustainable-use level must be recognized as an absolute necessity to sustain progress in health, food security, housing, energy, and other critical human needs.

To cope with the complexity of managing coastal areas for sustainability, many countries have worked out special strategies for conservation of resources and control of development. These strategies rely on innovative forms of planning, resource

management, and conflict resolution known as “unified” or “integrated” coastal zone management (CZM) programs to address conflicting uses. Experience in these countries shows that such programs add to the economic and social prosperity of coastal communities.

Sustained fisheries productivity, increased tourism revenues, sustained mangrove forestry, and protection from sea storms are among the practical benefits of coastal zone planning and management. An effective CZM program can also be a major force for maintaining coastal biodiversity, for resolving conflicting demands over the use of coastal resources, and for guaranteeing the long-term economic sustainability of the coastal resource base.

2. Conflicting Uses

The coastal zone is a major attraction in many sectors—ocean commerce, tourism, home seekers, the military, and a variety of industries. Dense populations are attracted to the shorelands. In the coastal sea, great environmental modification is caused by land conversion, sea dredging, and water pollution from urban, industrial, commercial, and agricultural development. In more offshore waters, oil exploitation, ocean dumping, minerals mining, and excessive fish harvesting are potential threats.

Activities on land can greatly affect the sea. Coastal zones are a “sink” for pollution from the land side. Impacts on coastal ecosystems from terrestrial activity include not only industrial and agricultural pollution but also siltation from eroded uplands; the filling of tidal waters to provide sites for industry, housing, recreation, airports, and farmland; dredging to create, deepen, and improve harbors; quarrying; and excessive cutting of mangroves for fuel. These impacts reduce biological diversity, natural resource abundance (food and fiber), quality of life, community security (from sea storms), and tourism revenues (Figure 1).

Aside from outright fish kills and other dramatic effects such as human disease, pollution causes pervasive and continuous degradation that is evidenced by the gradual disappearance of fish or shellfish or a general decline in the natural carrying capacity of the system. Coastal seas are particularly susceptible to pollution conveyed by streams and rivers, including agri-chemical runoff.

Conversely, the sea greatly affects the land and intertidal areas—for example, beach erosion, pollution from tanker bilge washings, and property destruction from cyclonic storm surges, flooding, and wave action.

One of the unfortunate consequences of coastal growth and development has been the depletion of many species of fauna and flora that have medical, educational, historical, recreational, and scientific value. Species protection is needed for reasons of both conservation ethics and economic self-interest. Because much of species depletion is due to habitat loss, it is important to conserve habitats that support endangered and threatened species, including the preservation of especially productive or scenic natural resources as protected marine reserves or national parks, for example (Salm and Clark, 2000).

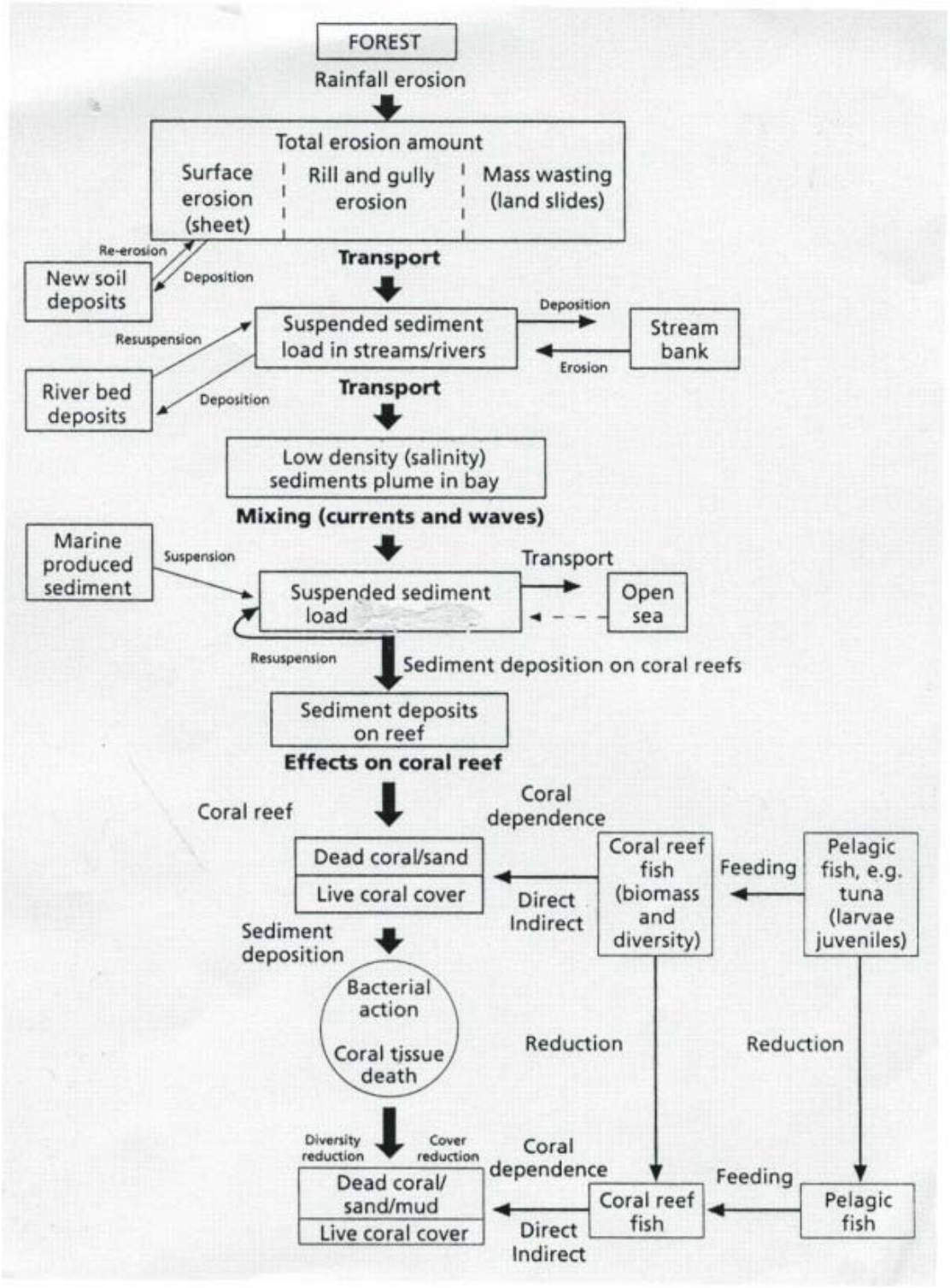

Figure 1. Impact chain showing the effects of slope erosion on tropical seas
Source: Modified from G. Hodgson and J. Dixon, *Logging versus Fisheries and Tourism in Palawan* (Honolulu: East-West Center, 1988).

Overall, depletion of coastal resources is the result of ignorance, careless development, and overexploitation by the private sector, public agencies, and coastal communities.

The depletion is aggravated by development with short-term profit horizons and by the absence of defined user rights. The water's edge is a place where competition and conflict among resources users is great and where governments are slow to develop special policies and programs for conservation.

3. Dimensions

The coastal zone is a distinct region with resources that require special attention. The water side of the coastal zone is a place of natural dynamism where huge amounts of energy are released and a great abundance of life is nurtured. The habitats of coastal zones are so different from their terrestrial counterparts as to require different and special forms of conservation. Also, the species involved are quite different (e.g. oysters, octopus, porpoises, whales, sea fishes, sea turtles, dugongs, etc.).

Yet there is no universal geography to define the coastal zone. It may be drawn wide or narrow to meet program goals. The boundaries to be used for defining the coastal zone must derive from the goals and purposes of each particular program. Of course, all integrated CZM programs are expected to include both land and water within their statutory boundaries. A *minimum zone* would include all the intertidal area, shallow fringing waters (including coral reefs), and all coastal lands that are subject to the effects of sea storms. A *maximum zone* might include all territorial waters of the country, the intertidal area, and a strip of shoreland several kilometers wide.

4. Natural Hazards

The risks from natural disasters such as cyclones are increasing due to population growth and unmanaged development along densely populated coastlines. Coastal communities become more susceptible to natural hazards such as floods, cyclones, land subsidence, or tsunamis when settlement is encouraged in dangerously low-lying areas. Susceptibility also increases when land clearing and construction remove or degrade protective landforms: removing beach sand, bulldozing dunes, degrading coral reefs, or destroying mangrove swamps all diminish the degree of natural storm protection the coast affords.

Eroding shorelines are a problem only to those who live and build too close to the shoreline. However, because erosion is predictable, it can be countered by holding structures back from the shoreline. Thus, erosion management is mostly a *land use* matter. Corrective measures must consider the present rising level of the sea; as sea level rises, the shoreline is forced inland, making erosion events more serious. CZM programs advocate land-use approaches to the erosion problem, such as setback lines for building, rather than construction of bulkheads, seawalls, or groins.

Along much of the world's shorelines, the sea level is rising at a significant rate—in some places, more than 30 cm over the past 100 years. Sea level is affected by global warming, which is caused by the release of carbon dioxide (and other gases) into the atmosphere and by heating (and expansion) of the ocean water mass, along with meltdown and disintegration of the Antarctic and Greenland ice caps. Sea level rise is associated with serious recession along thousands of kilometers of shoreline. Low-lying

communities have to choose whether to retreat or entrench, by building dikes, for example. Retreat, the most practicable approach, can be accomplished using building setback standards for threatened areas and perhaps with constraints against rebuilding if a structure is demolished or seriously damaged.

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Biographical Sketch

John R. Clark graduated from the University of Washington in 1949 and joined the Federal Fisheries Laboratory in Woods Hole. He was Assistant Director of the Sandy Hook Marine Laboratory, Director of the Narragansett Marine Laboratory, and Senior Associate with The Conservation Foundation in Washington, D.C. Here he was influential in the formation of national coastal environmental policy in the 1970s, particularly in the U.S. Coastal Zone Management and Clean Waters programs. He then joined the International Office of the U.S. National Park Service where he conducted research, planning, and training projects in coastal and marine environments. Retired from government in 1987, he is a freelance consultant and is affiliated with the Mote Marine Laboratory. He has authored 25 books and 175 research papers and reports. He taught graduate students in three universities and is currently listed in *Who's Who in America*, has won several professional awards, and worked in 35 countries. He can be contacted by e-mail at JOHCLARK@compuserve.com.