

INTRODUCTION

The coastal zone - that region of a country where the marine and terrestrial environments are in direct contact - is of great significance to an island state. Islands have coastlines which are disproportionately large compared to their dry land area and human activities tend to be concentrated there because so much of the economy is based on, or related to, man's use of the sea. The great dependency on the coastal zone is exemplified by the tourism industry of many Caribbean or Pacific islands, where the favourable combination of sun, sand and sea forms the mainstay of the economy. In these tropical islands some of the most productive natural communities occur in the coastal zone, such as coral reefs, seagrass beds and mangrove swamps. Major fisheries production is supported also in nearshore environments, particularly in oceanic islands with narrow shelf areas dropping off rapidly into deep, often poorly productive, waters. Marine resource production is relatively high in coastal areas also because of the island mass effect (Sander & Steven, 1973); in which oligotrophic coastal water is enriched by nutrient input from island runoff and, in some cases, localised upwellings. This factor is much more apparent with high islands than with low, coral-based islands, cays and atolls. Many of the volcanic islands in the Caribbean have steep central highlands and narrow coastal plains so that the coastal zone is rapidly and directly influenced by surface runoff with its associated nutrients.

Most major cities in island states are located in the coastal zone where they developed from ports. Bays and lagoons, which provided safe anchorage, became centres of shipping activity, loading and warehousing, dry docking and repair. Supporting industry came to be concentrated in the coastal zone, with a continuing demand for more sea frontage through reclamation and landfill. Traditionally also, the sea coast has been a dumping site for sewage (Barnes, 1973), factory effluents and solid waste. With increasing industrialisation of many island states serious pollution problems have resulted, as the amount of these wastes increases and the composition becomes more complex. Marine pollution is essentially a coastal zone problem, in which toxic substances, oxygen depletion and eutrophication upset the natural balance and productivity of coastal communities, while recreation and shoreline residential areas suffer from unpleasant odours or unsightly garbage.

All these factors contribute to varied, and frequently intense, human impact on the coastal zone. Many governments are introducing measures to control the

resulting resource degradation, pollution and conflict between coastal resource users, but their efforts are hindered often by the special characteristics of this zone and the complexities of its management (Towle, 1971; McEachern & Towle, 1972).

Tropical island coastal zones are characterised by a great variety of physical and biological systems in close proximity and interaction. Frequently there are no obvious boundaries between adjacent systems, so that materials and organisms move freely from one to the other, as with the coral reef-seagrass-mangrove association (Ogden & Gladfelter, 1983). Processes in one area of the coast affect other areas rapidly, because of the presence of active transport systems in the form of tidal flows, sea breezes, river discharges and coastal currents. The coastal zone is essentially the interface between land, sea and air, and although we understand a great deal about the land on which we live, elemental interactions with the sea and air are relatively poorly researched. Furthermore, this zone receives the main effects of unpredictable, occasional events like hurricanes, storm surges and flooding and is the site of the continuous processes of erosion and redistribution of land-derived materials. For most islands the coastal zone is probably the most complex and dynamic area of the country.

Institutional responsibility for regulation of coastal activities, resource use and problem solving is characteristically diffuse. A variety of governmental agencies will be concerned with shipping, fishing, mineral extraction, tourism, real estate development, waste disposal, and conservation, even in small island states. Few countries will possess high level personnel trained specifically in coastal management or an infrastructure that permits integrated coastal resources planning and development. This problem has been recognised by several international agencies. For example, an Expert Group established by the Commonwealth Science Council under the chairmanship of Sir John Kendrew identified the need for training in Coastal Zone Management for island states of the Commonwealth (Commonwealth Science Council, 1984). Two programmes were initiated in 1985, a South Pacific Coastal Zone Programme and a project on Coastal Zone Management of the Lesser Antilles Region (Commonwealth Science Council, 1985). Both emphasised the need for education and training for coastal resource managers.

Although there is a large body of data and some clearly defined concepts available for understanding coastal zone problems, there is virtually no published material for **practical** training in relevant field and laboratory techniques. Computer searches conducted in libraries of the Coastal Management Unit, University of Michigan, and the University of the West Indies, Jamaica, failed to

locate any suitable materials of a purely practical nature. This is unfortunate, because the greatest problem appears to be the difficulty that scientists, planners and developers have communicating to one another their different perspectives of coastal resource management. Much of this difficulty stems from a lack of appreciation of the objectives and methodologies used by experts in other disciplines, and could be overcome to a great extent by exposure to each other's practical skills. The Commonwealth Science Council in sponsoring this workbook offers a series of exercises which illustrate a range of environmental, ecological and institutional aspects of the coastal zone management process for tropical islanders. The exercises are intended for use during advanced training courses and are designed to give practicing and prospective coastal managers "hands-on" experience of a range of essential techniques.