# 11. COASTAL ECOSYSTEMS

## 11.1 INTRODUCTION

As sea level continues to rise, perhaps at an anthropogenically accelerated rate, existing coastal ecosystems will become submerged and saline water will move inland. Furthermore, tidal amplitude and wave energy may increase due to submergence of protective nearshore reefs and sandbars and other effects (see sections 4 and 5). Water level, water motion, and salinity are principal determinants of the type, nature, and function of coastal ecological systems. Therefore, changes caused by rising sea level could cause dramatic changes in coastal ecosystems.

Coastal ecosystems include open water systems, submerged benthic (bottom) systems, and intertidal systems. Open water systems consist of plankton (suspended organisms transported by the current), neuston (organisms dwelling in or near the surface film), and nekton (actively swimming organisms). Benthic systems include seagrass ecosystems and ecosystems of unvegetated sediments. Mud and sandflats that are periodically exposed, and marshes and mangroves are common intertidal systems. Each of these coastal systems is valued for its contribution of food and cover to the production of a diversity of living coastal resources (Haines, 1979; Peterson, 1981; Zieman, 1982; Odum et al., 1982; Boesch and Turner, 1984; Seaman, 1985). It is likely that a mix of coastal habitats is more important to these resources than any one system alone.

Ecological production (i.e. primary production) in coastal zones is equal to or greater than that obtained with the best mechanized agriculture, yet without the subsidies of plows and chemicals (Odum, 1971). Coastal zones have been said to have natural energy subsidies that together with sunlight account for this very high level of production, namely, the water movement caused by tides, winds, and freshwater discharge (Schelske and Odum, 1961; Odum, 1980).

## 11.2 ECOSYSTEM RESPONSE

As sea level rises, open water and submerged benthic communities may not be as productive as they are today in relatively clearwater coastal zones. Increases in tidal range and wave energy may cause an increase in turbidity from suspended sediments. Increased turbidity will reduce the growth rate of