Introduction

Although coastal environments are collectively characterized by change, the beach and nearshore zone is one of the most dynamic of these environments. The changes to which beaches are subjected may be seasonal or longer in duration; they may be as short as a single tidal cycle or even occur from one crashing wave to the next. Because of the beauty and romance of the beach environment, as well as its scientific interest, literally thousands of researchers have investigated the nature of beaches over the past two centuries. This environment has been studied more than any other of those discussed in this book. As a result, it is impossible to do more than cover the main points in this chapter. The reader who wishes greater depth on the subject is referred to numerous books on the subject of beaches (Hails and Carr, 1975; Komar 1976; Davis and Ethington, 1976; Leatherman, 1979; Davies, 1980; Greenwood and Davis, 1984).

Before proceeding to a discussion of the beach and nearshore zone, it is necessary to define these terms. A beach is here defined as the zone of unconsolidated sediment that extends from the uppermost limit of wave action to the low-tide mark. Commonly there is an abrupt change in slope and/or composition at the landward limit. This may be in the form of dunes, bluffs of glacial drift, bedrock, or in some cases a man-made structure. Beyond the beach in a seaward direction and extending across the bar and trough topography is the nearshore zone. In areas where the nearshore zone does not contain sand bars the seaward limit is placed at wave base. Although the beach and nearshore are intimately related, they are separated in this discussion because of the markedly different processes to which each is subjected.

R. A. Davis Jr. (ed.), *Coastal Sedimentary Environments*
© Springer-Verlag New York Inc. 1985
Distribution

There are no real geographically imposed limits on beach development. A beach will form virtually any place where the land and sea meet, where sediment is available, and where a site is available for sediment accumulation. Beaches are by far the most widely distributed of any of the coastal sedimentary environments. According to one study (Dolan et al., 1972), 33% of the North American shoreline is beach; of this, 23% is beach-barrier islands, 2% is associated with rock headlands, and 8% is of the pocket beach type. Beaches can be found on small lakes covering less than a square kilometer as well as on the marine coast. With the exception of tides and fetch there is little significant difference between beach sedimentation on lakes and that along the ocean.

Extensive beach development which, as indicated above, is typically associated with barrier island coasts is also related to plate tectonics. Inman and Nordstrom (1971) have classified coasts on the basis of tectonics into three major categories: (1) collision coasts, where plates converge (west coast of North and South America), (2) trailing edge coasts where a coast faces a spreading zone (east coast of North and South America), and (3) marginal sea coasts where a coast faces an island arc (east coast of Asia). Barrier islands, which contain extensive beaches, are distributed such that half are associated with trailing edge coasts and the remaining half are subequally divided between the other two categories (Glaeser, 1978).

Although beaches may occur in all climatic zones of the world, there are some obvious effects of certain severe climatic conditions. For example, in the very high latitudes there are only a few weeks when the water is ice-free and beaches are subjected to wave activity. As a result, the morphology and texture of such beaches are typically somewhat different from beaches in low latitudes. Another aspect of climate that may affect beach development is rainfall. In an area of bedrock coast and at least moderate precipitation, weathering and runoff would be expected to provide sufficient material for a well-developed beach. A similar area with an arid climate would depend almost solely on wave action to provide sediment from the bedrock coast in order to form a beach.

The best development of beaches is associated with low-lying coasts where great quantities of sediment are available. Both glacial drift and coastal plain areas provide ideal sources and locations for beach development. In addition, high relief and humid coastal areas, such as the west coast of the United States, also yield well-developed beaches. Even in areas of steep, rocky coasts, such as along Maine or Oregon, there are small pocket beaches in protected areas between bedrock prominences. In short, beaches occur on nearly all coasts of the world.