Chapter 10  Other Barrier Systems of the World

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The distribution of barrier island systems throughout the world is neither random nor uniform. Like most all geologic systems, the distribution of barrier islands is typically related to global tectonics. These islands tend to be present on trailing edge coasts where a good supply of sediment is available. The east coast of the United States is probably the best example. There are also some barriers developed on leading edge coasts due to specific conditions. Examples include the west coast of the United States (see Chap. 4), where short attached barriers are common between headlands, and the southern coast of Alaska (Chap. 9), where abundant glacial sediment is reworked into barriers.

This chapter will consider a wide variety of locations, morphologies and ages of barriers throughout the world. They occur in areas of very low wave energy up to quite energetic conditions. Tides vary in their range from much less than a meter to about 3 m. These conditions, along with the geologic setting of the coast and inner shelf, and the sediment supply, provide the global diversity that is present. Age also ranges widely; from only a few decades to several thousand years.

Introduction

The important work of Inman and Nordstrom (1971) has provided a rationale for the nature of all coastal geologic systems based on plate tectonics. In their classification, two primary settings provide the conditions that are conducive for barrier island formation; the trailing edge coast and the marginal sea coast. Approximately 76% of the barriers are on such coasts (Glaeser 1978). These tend to have the combination of relatively gentle inner shelf gradient, low wave energy and high sediment availability. In some regions, such as the China Sea, the fluvial input is so large that it overwhelms the coast and barriers are absent or very limited. Although leading edge coasts, or collision coasts as they are sometimes called, include 24% of the barriers, most of these are short and attached to headlands such as the west coast of the United States.

Further data on the tectonic controls on coastal type and on the global distribution of barrier islands can be found in the excellent papers by Inman and Nordstrom (1971) and Glaeser (1978). The remainder of this chapter will be devoted to providing a brief overview of various barrier reaches around the world.

The organization of the remainder of this chapter will be based upon the morphodynamics of the individual barrier reaches being considered. The three main categories of coastal types are wave-dominated, mixed-energy, and tide-dominated. Barrier island systems do not occur in the latter category so only the first two will be considered here. The order of discussion is secondarily based upon the age of the barriers beginning with the youngest.

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dominated barriers occur in the Baltic Sea, the Arctic Sea, the Atlantic coast of Europe and South America, and Australia.

**Baltic Sea (Denmark)**

A small and young, wave-dominated barrier island system is located about 30 km south of Copenhagen on the Baltic Coast of Denmark (Fig. 10.1). The setting here is one of low energy (Nielsen 1984) due to limited fetch and gentle nearshore gradient. Mean annual wave height tends to be about 0.2–0.3 m with waves of near a meter associated with the passage of cold fronts during winter. Wave period of 5 seconds or more is quite rare. Tidal range is about 10 cm so this can be considered as a nontidal coast (Nielsen and Nielsen 1978).

![Sequential maps of the development of barrier islands near Koge Bugt on the Danish Baltic coast. (Courtesy N. Nielsen)](image)

The barrier system extends for about 10 km and includes two inlets with attached barriers at each end (Fig. 10.1). The barriers are 100–300 m wide with extensive vegetated washover fans. Foredunes are up to 5 m above mean sea level and are stabilized by vegetation (Fig. 10.2). Scarping of the dunes is present as the result of storms but washover has not occurred during the past few decades. The inlets are shallow and relatively unstable. The low amount of littoral drift has prevented significant migration, however. Flood tidal deltas are rather large and stagnant, indicating little regular sediment mobility.

The stratigraphy of this barrier system is unknown. Because the historical development of the