PART IV

ALTERED COASTAL SYSTEMS

A. GENERAL

Introduction

Natural beach and inlet systems may be altered in several ways, including dredging and constructing channels at entrances, building structures along the shoreline and nourishing beaches. Each of these alterations and their potential impacts on the natural system will be described below.

Modifications of Channel Entrances

Modifications of natural channel entrances or construction of new entrances have been carried out primarily for purposes of navigation and secondarily to improve flushing and renewal of interior waters. Even those entrances that were constructed initially for water quality improvement have been modified later for navigational purposes. The reasons for navigational modifications include the aforementioned shallow and energetic ebb tidal shoal which under even moderate wave action may be treacherous or unsuitable for navigation. Even though some ebb shoals have relatively deep natural channels incised through them, these channels are generally circuitous and tend to migrate in an unpredictable manner, thus contributing to the navigation jeopardy. To improve these channels for navigation, many have been stabilized through construction of jetties which are usually long stone structures lining the channel and extending up to several kilometers into the sea. The term "jetty" derives from their intended function, i.e. to constrain the seaward flows causing excess sand to be jetted offshore by the ebb tidal currents. Jettied inlets can cause/institute changes to the downdrift shoreline by interfering with the longshore sediment transport and by modifying wave patterns. The greatest effect is the physical interference with the longshore sediment transport. If no sand is bypassed around the entrance, and if the jetties are impermeable, the updrift jetty will trap, on an annual basis, the net longshore sediment transport rate. Not surprisingly, the annual erosion on the downdrift beaches will occur at the same rate. If the jetties are leaky allowing sand to flow through them and transport reversals occur, the downdrift erosion can exceed the net longshore sediment transport. Also leaky