the covering and uncovering of these resources may cause adverse effects. By contrast, the more-or-less continuous bypassing mode tends to mimic the natural processes and thus minimizes any resulting disturbances.

Some modified inlets will continue to bypass small quantities of sand naturally whereas others will represent a complete obstruction. In many cases the distinguishing feature is whether or not and to what depth the channel is dredged. If the channel is not dredged, the presence of the jetties will alter the sand transport patterns usually resulting in an increase in volume of the ebb tidal shoal and a deflection offshore and downdrift of the ebb shoal and associated "sand bridge" or sand bypassing bar. Thus, the bypassing efficiency by natural forces will be decreased markedly.

Beach Nourishment Projects and Their Evolution

Beach nourishment comprises the addition of relatively large quantities of beach quality sand. Generally, the length of time that sand remains in the area placed is considered as a measure of the physical performance of a beach nourishment project. The discussion on performance will be presented for two situations: (1) a project on a long uninterrupted beach, and (2) a project immediately downdrift of a littoral barrier.

Case (1) Project on a Long Uninterrupted Beach - In this case the longevity of a beach nourishment project is defined as the length of time that a specified percentage of the added material remains in the area placed. The longevity can be shown to be proportional to the square of the length, ℓ, of a project, inversely proportional to the breaking wave height H_b, raised to the 5/2 power and related to the sediment size. The half life, t_{50}, of an initially rectangular beach planform composed of medium sized sand can be shown to be

$$t_{50} = 0.17 \frac{\ell^2}{(H_b)^{5/2}} \qquad (1)$$

in which t_{50} represents the time in years required for 50% of the sand to be transported out of the region placed, ℓ is the project length in kilometers and H_b is the effective wave height in meters. Figure 21 presents an example of the evolution of an initially rectangular planform. Initially the sharp corners are