

WATER TABLE

There is a definite relationship between the beach *water table* and the stability of the beach. High water tables accelerate foreshore erosion, while low water tables retard erosion and promote accretion.

The interaction between the waves and the beach is regulated by the position and *pressure head* of the beach water table, which, in turn, is normally a function of wave input tidal level and permeability of the sand body.

When the beach water table is low beneath the foreshore (sand is dry), water from the uprush of a wave will infiltrate into the foreshore, trapping sediment transported up the beach face. Just before the termination of the uprush, the velocity of the water drops below the critical *Reynolds* value, and the flow becomes laminar, with sand further dropping out of suspension. With lower volume flow in the backrush, the flow will remain laminar for a greater distance down the beach face, leaving more of the sediment carried up in the uprush (Grant, 1948).

As the tidal wave passes through the beach, there is a rise and fall of the beach water table. There is a lag of about 1-3 hours between cresting of the water table in the beach and cresting of the tide (Harrison et al., 1971). After the tide begins to ebb, the beach water table is still relatively high. This high water table gives rise to an outflow of water at the toe of the beach (resulting in *rill marks* if the foreshore is exposed). As the water flows out of the beach, sediment is lifted and transported down the beachface. Zones of erosion and deposition migrate up and down the foreshore in response to the relative positions of the water table (Duncan, 1964).

Any factor that generates a rise in the water table beneath a beach will be in effect increasing the erodability of the beach. Factors that tend to raise the water table include: disposal of storm drainage onto a beach (natural or man-made), the existence of an *aquaclude* beneath the beach, which can perch the beach water table; or the presence of bulkheads or sub-surface barriers in the back beach that prevent the temporary flow of groundwater inland when storm sea level exceeds normal water table levels.

PETER S. ROSEN

References

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- Cross-references: *Beach Firmness; Beach Processes; Beach Profiles; Ghyben-Herzberg Ratio; Hydrogeology of Coasts; Minor Beach Features; Reynolds Number; Rill Marks; Tides*. Vol. IVA: *Groundwater*.

Citation:

Rosen, P. S., 1982. Water Table, p. 854, in Schwartz, M. L. (ed.), Encyclopedia of Beaches and Coastal Environments: Hutchinson-Ross Publishers, Stroudsburg, PA, 940 p.