

under the alternation of the wind-waves. On the English Channel, the prevailing wind exposure being from the west and south-west, eastward littoral drift is the normal condition. In a few instances, however, due to recoil under the lee of salient points, wave action and the currents are locally reversed. Thus at Newhaven, before the breakwater to the west of the harbour was built, the uniform movement of the beach was from west to east, but for a distance of some three miles to the east of Newhaven the shore forces now swing round in the opposite direction, driving the beach, and more especially the sand, from east to west.

In the North Sea the severest wind conditions are those from the north-east, gales from the south-west being off-shore. The coastal phenomena of the English Channel are there repeated, as from the quarter of greatest exposure.

The building of groynes has been, broadly speaking, a matter of trial and error. The expedient is coeval with foreshore defence. Groynes laid out to all sorts of angles, and of every variation of design, occur along the English coast-line; in fact, some lengths of shore-line are almost museums of devices of this type. The established standard practice of twenty or thirty years ago was to lay out groynes at right angles to the shore-line. As, however, the direction of a groyne and the coincident stroke of wind-waves are collateral, it is obvious that no uniform rule adequately applies to a coast-line which may be infinitely varied in trend. Theoretically, if the stroke of the maximum wind-waves on a groyne impinges at an angle of 45 degrees, this would be the ideal condition. Groynage is, however, governed by so many local considerations that no broad universal rule can be established. The factor which proves good design in groynage is the equality of accumulation to windward and leeward of the structure. Wherever a foreshore consists of a series of steps, shingle being banked up to a great height on one side of its groynes, alternating with bare patches of foreshore, it is safe to say that the trend of the groynes is badly designed. Where a line of groynes is deflected to form an acute re-entrant angle with the windward stroke of the waves, a condition of danger is created, as the run of the sea is thus