

in the smallest quantities, and their absence would present a serious obstacle to plant establishment were not some other source available. In practice this is supplied by the dead remains of pre-existing plants, which become embedded in these soils and serve as manure for future generations. The tides and currents form an elaborate agency for the collection and distribution of this manure, which consists of seaweeds, and of the leaves, twigs, &c., of the plants of the salt marshes, which, together with other organic flotsam and jetsam, are swept up in enormous quantities, and left on the drift line high up on the beach. As the beach consists largely of mobile matter, an adequate mingling of organic drift and beach materials is ensured by the same agency. The mud flats regularly overrun by the tides are occupied by special mud algæ, which become bedded in and form the basis on which is raised the salt marsh proper, whilst sand dunes, which at their inception rest on tidal beaches or marshes, derive their initial humus in the same way. Once a vegetation starts on any of these formations it becomes self-supporting, utilizing the materials of the vegetations that have gone before. This stored plant food or humus is of just as much importance for the support of a vegetation on these mobile maritime soils as is the humus of the forest floor inland. The matter will be dealt with in its special aspects in the chapters which follow. It is referred to here on account of its fundamental significance in connection with any attempt to cultivate plants for particular purposes on maritime soils.

The Mechanical Value of Plants.—Before concluding this very general sketch of some of the main characteristics of plant growth, and the bearing of the salient factors of the shore upon the establishment of a vegetation, a brief introductory statement is required of those special qualities of plants which lend themselves to the purposes of the maritime engineer. Apart from harbour construction, the services of maritime engineers are required for the achievement of two principal ends:

- (1) The preservation of existing land surfaces from encroachment by the sea;
- (2) The extension of land surfaces by reclamation.