

The phenomenon of shingle and sand continually travelling in a certain direction on beaches is by no means peculiar to New Zealand; it has been observed in many countries, and abundant evidence has been shown to prove it. The evidence is equally conclusive which proves that all material of the sea-beaches of this coast of the South Island constantly travels towards the north, as a consequence of the prevailing southerly direction of the waves and winds. The occasional occurrence of east or north-easterly winds has very little influence in stopping this travel of the beaches towards the north. Great projecting headlands, such as the Dunedin and Banks Peninsulas, are equally powerless to stop this travel of the beaches; the only effect they have is to obstruct the advance of the heavier material until it is ground into fine sand, in which condition it travels round the headlands in deep water, carried along by the powerful shore currents which are set up by the prevailing direction of the waves in the miles of beach to the southward of the headlands, and prevented from settling and shoaling the water by the commotion of the waves along the steep rocky shores of the peninsulas. As soon as the headland is passed, the sand is washed ashore to form great deposits, until it has adjusted the beach to a suitable inclination to the prevailing winds and waves, when the sand again travels forward, leaving the form of the beach permanent, notwithstanding that its material within reach of the waves is constantly moving onwards. The sand travelling round Dunedin Peninsula is necessarily very fine, otherwise it could not travel the distance, and through such deep waters. It appears at the entrance to Port Chalmers, and there flows into the harbour and out again with the tides; but part of it is left to form shoals inside and the bar outside, which are always shifting and travelling. In like manner, the shingle of the Rangitata, Ashburton, and Rakaiā Rivers travels towards Banks Peninsula, but is reduced to the size of peas by the time it reaches Lake Forsyth. Here the steep, rocky shores of the peninsula project nearly in the direction of the prevailing waves; the shingle and heavier sand is therefore beaten back, and subjected to the grinding action of the waves until it is reduced to the finest sand, in which condition it is easily carried by the shore currents round the entire length of the peninsula, being kept "alive" by the violence of the waves against the rocky coast until it reaches Sumner, where it has formed very extensive deposits and sandhills as far as the mouth of the Waimakariri. This beach is now adjusted to the prevailing direction of the waves and shore currents, and the sand which continually travels round Banks Peninsula moves onwards along this beach, or is blown ashore to form sandhills. The travelling sand does not fill up such openings as Port Chalmers, Akaroa, and Lyttelton, because the sand is very fine, and the strong currents in and out of these harbours are sufficient to free them from deposit.

In attempting to draw an analogy between these natural effects, and the features presented by the Timaru breakwater, it at once suggests itself that the obstacle of the breakwater is not nearly large enough as regards the supply of travelling shingle with which it has to contend, and that the phenomena observed at such great headlands will not be reproduced by the Timaru harbour works however far they may be extended, but, on the contrary, the works will be buried by the shingle in the course of a few years.

But meantime the beach to the north is being stripped of its covering of shingle, the spit which encloses the Washdyke lagoon is slowly being eaten away. The sea has already breached it in many places, and is washing the remaining sand and shingle into the lagoon, and in time it will be washed on to the western shore of the lagoon, which will then be the sea beach: the beach for miles north of this lagoon is also entirely stripped, so that the soft clay is exposed to the action of the waves, and is being rapidly worn away and formed into a cliff by the part from high to low water being scoured away. This damage may extend as far north as the Rangitata, as the Opihi brings very little shingle to protect the beach, and the extent of damage to the shore cannot be foreseen.

We were informed that there was a feeling with some of the members of the Harbour Board, and with the public, that if the south breakwater were extended from its present end, and in the direction of the straight out kant, it would give sufficient protection from the encroaching shingle, and afford an opportunity to enlarge the harbour in the future. Mr. O'Connor's report shows that on economic grounds it would not be advisable to thus extend the breakwater, and he has shown reasons against attempting to retain the shingle to the south of the work for fear of shoaling the water in the offing. We think, in addition to these considerations, that there is little practical use in looking forward to a future extension of the harbour for the following reasons: The water in the offing is too shallow to permit of Timaru becoming a safe place of call for very large steamers; there is only 27ft. of water at 3,000ft. out, and a ship was recently lost by grounding on her anchor in the roadstead; whenever the sea is rough it breaks nearly a mile from shore, and at such times a large steamer would not dare to approach the harbour, but must wait on the weather and the tide.

It seems to us that to extend the breakwater with the object of getting into water deep enough to obviate the above objections would be a gigantic work, but if the object aimed at were merely to ensure a future enlargement of the harbour to accommodate a growing traffic, it does not appear to us that there are any grounds for this projected enlargement.

When the present harbour is fully made use of by extending the wharfrage, as shown in the plan herewith, it will be capable of holding six large steamers and four sailing ships, or coasting steamers, and it will have an annual tonnage capacity of 807,000 tons. The tonnage at present is 140,000, so that the harbour as it is can accommodate five times the present tonnage. The tonnage of Lyttelton is about 650,000, so that the present harbour of Timaru is capable of doing more shipping business than is now done by Lyttelton. We think, therefore, that there is ample capacity in the harbour of Timaru for any increase of business that can be reasonably foreseen.

From the above considerations, we are of the same opinion, as Mr. O'Connor has expressed in his alternative No. 2, that means should at once be taken to clear away the same amount of shingle that is calculated to accumulate yearly, and that this should if possible be done by suction-dredge, which from the evidence of Mr. Wellman is much the cheapest way of disposing of it.