

Unfortunately there is no reliable record of the changes that have taken place in the bed of the lake beyond what can be gathered from the earliest settlers, which does not extend much beyond a quarter of a century of time, and cannot be said to throw any light upon the subject. Whatever also may have been gleaned from the Natives is extremely vague, and of no value as evidence by Mr. Bray's report, already alluded to.

It is very certain, however, that the silt and alluvium brought down by so many channels, and distributed at almost equal distances around the upper shores of the lake, has created a deep deposit of rich soil throughout the greater part of its area.

This accretion to the bed of the lake admits of being measured by ascertaining the amount of detritus held in suspension in a given quantity of its water in time of heavy freshets; and to show that this would be by no means inconsiderable, I may state it to be a well-established fact that there are few rivers of the drainage-capacity of the Selwyn that do not discharge into the sea many thousand tons of detritus annually. To compare great things with small, I may also further mention that, from observations made regularly for ten years—from 1862 to 1871, both inclusive—at one of the three great mouths of the Danube—the Kilia—it was ascertained by the Engineer to the European Commission for the improvement of that river that 426,000,000 tons of solid matter had been discharged into the Black Sea during that time—as the author states, equal to the excavation of three Suez Canals, or a mound 20ft. high covering fourteen square miles of surface.

I am therefore inclined to think that the natural process of raising the bed of the lake by the deposit of detritus brought down by the several rivers and creeks already named is more rapid than is generally supposed, and will be greatly accelerated by opening the mouth permanently at Taumutu, as nearly the same amount of detritus will then be deposited over little more than half the area than at present, although no doubt a considerable portion will escape seaward through the mouth, to be cast ashore along the shingle-bank or settle down in the ocean-bed.

The peculiar formation of the lakes, lagoons, and river estuaries along the coast of New Zealand is mainly due to the medium rise and fall of the ocean-tide, averaging about 6ft., which is not sufficient of itself to maintain a permanent channel between them and the ocean unless assisted by a constant superabundant land-flood or by the art of man.

Hence nothing of a similar description is met with on any other coast, that I am aware of, where the ordinary rise and fall of the ocean-tide reaches to even 9ft. or 10ft.

The southern portion of the Malabar coast bears the greatest analogy in its leading physical features to this coast that perhaps can be found, especially in reference to the estuaries of its mountain-torrents, terminating in numerous deep lagoons or backwaters for a distance of two hundred miles along its coast, with which I had so much to do a few years since, and which must be my excuse for alluding to the subject as an illustration in the present instance.

Although the tidal rise and fall of the ocean along the Malabar coast is only 3ft., as has just been stated, and one of the largest of the numerous lakes referred to—namely, that of Cochin—is only about the same area as Lake Ellesmere, yet, owing to the large volume of water it receives from several mountain-rivers, together with the flux and reflux of the sea, the mouth of the lake at Cochin remains permanently open, and a channel is maintained sufficiently deep to allow vessels drawing 18ft. to enter the lake, where they load and discharge their cargoes alongside a wharf in perfectly smooth water. The result is that no land is flooded above high water of sea-level surrounding the backwater of Cochin, whilst in all the others many thousand acres of otherwise valuable land is inundated during the greater part of the year, and it entails a large annual expenditure on the Government of the country in periodically opening the several bars to assist the escape of the flood-waters to the sea.

Wherever there is no perceptible rise and fall of tide, as for instance in the Mediterranean, the Black, and Caspian Seas, lagoons in the true sense of the term abound along their shores, and at the deltas of rivers, covering extensive areas, with only a few inches, or it may be a foot or two at most, in depth of water, and yet the submerged lands are beyond the means of reclamation—at all events as a remunerative work—for the simple reason that they are flooded by tideless seas.

The practice of reclaiming land, as carried on upon the shores of the British Isles, or upon other coasts where there is a considerable rise and fall of the ocean-tide, is diametrically opposite to what is required to be done either upon the shores of India or those of New Zealand, where the object is not to reclaim land from the sea, as in England or Holland, but from the periodical land-floods, whose natural outlet to the ocean is barred by the action of the waves breaking upon a sandy beach, as in India, or upon one of loose shingle of considerable depth and extent, as in New Zealand. These land-floods being thus locked up till their accumulated waters have inundated large tracts of land by rising to a level of several feet higher than the ocean, either periodically force a passage through the sand- or shingle-bank to the sea by their own weight and volume, or are assisted to do so from time to time by temporarily removing a portion of the obstruction which the sea has caused, or by works of art establishing a permanent channel.

In order, therefore, to prevent the periodical accumulation of river-floods forming into lakes and lagoons along the seaboard, as just described, the simple and only remedy is to establish a permanent channel between them and the ocean at a point which presents the most favourable site for the purpose.

To effect this desirable object at Taumutu at a reasonable cost and in a comparatively short time there can be no risk of failure whatever, provided the work herein proposed be well and faithfully executed.

With a rise and fall of 6ft. in the ocean-tide, coupled with the daily influx of the river-waters draining into the lake, it is estimated that about 5,000,000,000 of cubic feet of water will pass through the mouth from seaward into the lake, and 5,025,000,000 of cubic feet of water outwards to seaward twice in every twenty-four hours. With so powerful and constant a scouring agent there