

SIR,—

Department of Lands, Wellington, 1st June, 1909.

I have the honour to submit herewith a report on the sand dunes of New Zealand, written by Dr. Cockayne in accordance with your instructions.

The subject of dune reclamation, as is well known, has occupied the earnest attention of experts for a long period of time and in many parts of the world, notably in France, Germany, and the United States, but in New Zealand comparatively little has been done to control the sand-infested areas and render them productive. When it is realised that over 300,000 acres of land in this Dominion are covered with moving sand, the importance of the question of reclamation becomes apparent.

The present report deals mainly with the scientific side of the subject, it being clear that a sound knowledge of general principles, as well as of the local conditions, is a necessary preliminary to any attempt to cope practically with the sand-drift evil. It is hoped that a subsequent report will follow dealing with the more specially economic aspects of the question—viz., the methods of afforestation, the kind of trees, shrubs, &c., to be used, and other matters of a similar nature.

I have, &c.,

WILLIAM C. KENSINGTON,

Under Secretary.

The Right Hon. Sir J. G. Ward, P.C., K.C.M.G., Minister of Lands.

I. INTRODUCTION.

(A.) GENERAL REMARKS.

WHEREVER there are loose deposits of sand liable to be moved by the wind, those mounds and ridges known as dunes are to be found. The most familiar are those of the coast-line, but the great deserts of the world show examples on a much vaster scale. Were such hills of sand stable and not liable to move, except for their peculiar physical and chemical qualities, they would not merit any special attention. But the material of which they are composed, so capable of easy transport to a longer or shorter distance according to the velocity of the wind, leads to their excessive instability, and makes a soil on which plants can only be established with extreme difficulty, and one moreover which, driven *en masse* by the prevailing wind, frequently overwhelms fertile lands, burying not merely the meadows but even forests and human dwellings.

So far as New Zealand is concerned, dunes are an extremely frequent character of the sea-coast. They also occur inland to some extent, as in the neighbourhood of certain of the rivers of the Southern Alps, on the volcanic plateau of the North Island, and especially near Lake Tekapo and in Central Otago.

It is the coastal dunes, however, which are of especial moment, as, in the first place, they form a natural defence to the land against the encroachment of the sea, and, in the second place, their movement inland is a national concern, since through their advance much valuable land has been ruined in the past, while yearly further destruction takes place, the evil at the same time becoming more difficult to suppress.

Such depredation, confined as it is to a limited and little-visited area, and appearing to be the affair merely of the few whom it affects, is apt to be overlooked, while the comparative slowness of its action tends to make its extreme importance for mischief underestimated. Nor is it generally known how large an area in New Zealand is occupied by these more or less moving sands and virtually a desert, but which, judging from the experiences of Europe, might be rendered not only harmless, but a source of wealth to the nation. Roughly speaking, there are in the North Island 290,000 acres and in the South Island 24,000 acres.* Figures such as these bring home at once the importance of the dune question. This has indeed to some extent been recognised by the passing of the Sand Drift Act of 1907, but which has not as yet been put into force. Also, a bonus is given to such lessees of Crown dune areas as plant them with certain specified plants, but this arrangement as now existing is not likely to lead to any useful results.

The Hon. R. McNab, then Minister of Lands, thoroughly recognising the importance of the question, decided that, as a preliminary to further advance, a scientific study of the dunes of the Dominion should be made, so that a more complete knowledge of their present condition could be gained and an examination of their capabilities made, while, as a result of such field work, suggestions could be offered as to their reclamation and future treatment. For this purpose my services were engaged by the Department of Lands and Survey, the work being begun in the middle of November, 1908.

* In the MS. report of the Lands Department certain of the smaller areas are not mentioned, and I have increased the acreage slightly, but probably hardly enough.