THE LOCATION AND ORIENTATION OF COASTAL PARABOLIC SAND DUNES IN NEW ZEALAND

A thesis presented in partial fulfilment
of the requirements for the degree of
Master of Arts in Geography
at Massey University

Christine Ann Muckersie

1989

ABSTRACT

No previous research into either the spatial diversity of different coastal sand dune types, or the factors influencing the location and morphology of any particular dune type has been done in New Zealand. Vertical aerial photographs were used to locate Holocene dunefields around the New Zealand coastline. The locations of dunefields in general and the spatial diversity of dune types are able to be explained by identifying the conditions most suitable for sand dune development and examining the spatial variation in these conditions.

One particular dune type, parabolic, was examined in more detail in order to discover the relative importance of different variables to the development of that dune type. The relationship between wind climate and the location and morphology of coastal parabolic sand dunes was examined in detail. Wind data from coastal sites around New Zealand were used to compute sand transport vectors using two methods - one proposed by Landsberg (1956) and the other by Fryberger (1979) - and these were compared with dune orientations obtained from aerial photographs. Although Fryberger's method has never previously been applied to coastal sand dunes, the two methods were found to produce very similar results.

Spatial variation of other aspects of dune morphology, such as the shape of parabolic dunes, were also compared to wind climate characteristics. Such comparisons were permitted by applying further calculations proposed by Fryberger which allow the directional variablity of wind to be expressed in exact terms.

The results of these studies indicate that morphological characteristics of parabolic sand dunes, such as orientation, shape and size, are largely controlled by the strength and frequency of onshore winds and the directional variability of winds. Sand transport resultants computed using the Fryberger method were found to be closely aligned to dune orientations in most cases.

This study provides some insight into the processes and variables affecting spatial variation of coastal sand dune development in New Zealand but also highlights the need for more detailed geomorphic studies of coastal dunefields in New Zealand.

ACKNOWLEDGEMENTS

I would like to express my gratitude to my supervisor Dr Mike Shepherd for all his help, advice and support during the completion of this dissertation. Thanks are also due to Val and Mooreen of the Map Shop at DOSLI in Wellington for the patience and friendliness they displayed during the weeks I spent in their company. I am also grateful for the accomodation provided for me in Wellington by Bill Ogier (and flatmates) and by Tom and Joan Ashworth.

Steve Reid of the N.Z. Meteorological Service and the farmers in the vicinity of Porangahau are thanked for their efforts to provide information used in this thesis.

Of the many people who offered words of comfort and encouragement, special thanks must be made to Richard Heerdegen, Geoff Duller, Dr Patrick Hesp, Professor Andrew Goudie, Professor John Flenley and Greer Robertson-Brown. Thanks also to Rachel, Helen and Glynnis for help with various technical matters.

This thesis is dedicated to my father, Robert Muckersie.

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