FRONTPIECE. Oblique aerial photograph of the two photographic study areas. Main divide of southern Ruahine Range runs from centre left to top right. No. 1 catchment is in the foreground. The top half of the large slump in the Raparapawai catchment and the many other erosion scars are clearly seen. Date of photography is March 19 1975.

Photo: N.A. Trustrum

DETERMINATION OF PROCEDURES TO ESTABLISH PRIORITIES FOR EROSION CONTROL AS DETERMINED IN THE SOUTHERN RUAHINE RANGES, NEW ZEALAND.

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of the requirements for the degree of
Masterate in Agricultural Science in
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Peter Robert Stephens.

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A B S T R A C T.

The aim of this study was to investigate several methods of potential usefulness in identifying some of the factors causing erosion in two catchments 'typical' of the southern Ruahine Ranges.

The condition of the southern Ruahine Ranges, in the headwaters of the Manawatu River catchment, is deteriorating. The state of equilibrium which has periodically existed between rock, soil, slope, vegetation, and climate has recently been upset, and the area is now in a state of decline. Unless remedial action is taken promptly, farm land will go out of production, public water supplies could be ruined, communications by rail, road, and telephone severely hindered, and the benefits of both the Pohangina-Oroua and Lower Manawatu Flood Control and Drainage Schemes could be lost. This study attempts to establish a basis from which positive steps to rectify the situation can be implemented.

Methodology involved the use of aerial photography and on-the-ground observations and measurements. Colour and colour infrared film types were compared with standard black-and-white panchromatic film to establish which was the most suitable to use in determining priorities for erosion control. Sequential panchromatic aerial photographs were taken in 1946, 1961, 1966, and 1974. In this mountainous area, aerial photographs are essential tools for determining the extent of eroded surfaces and erosion types.

Between 1946 and 1974 there has been a 120 percent increase in area of eroded slopes in the study area. The worst erosion in 1946, at which time herbivorous mammals had had little effect on vegetation, and in 1974, occurred in the 700 to 900 m altitudinal zone. This zone has the highest fault density in the study area, which consists of densely faulted and mélange-like rocks. This area has also undergone the most dramatic vegetation changes since 1946. Herbivorous mammals are considered to be only partly responsible for such changes. As a corollary, the highest percent increase in erosion has occurred in the altitudinal zone with the most intact vegetative canopy.

A positive relationship between the frequency of medium-sized earthquakes and increase of eroded areas has been tentatively

established. Further, most erosion has occurred during and following intense rainstorms. These two factors are considered to be the main ones causing erosion in the area.

Once factors causing erosion had been established, colour, colour infrared, and panchromatic film types were compared. Photographs used in this comparison were taken periodically throughout 1975 using a 35 mm camera. An assessment was made of the capabilities of each film type to show the following features: alignments, eroded surfaces, erosion types, vegetation types and condition, rock types, pug zones, seepage areas, and drainage pattern. Colour infrared was found to be the most suitable to use when determining priorities for erosion control.

A number of salient procedures that should be undertaken to determine priorities for erosion control are outlined. These include aquisition of all sequential photographs, photography using colour infrared, or preferably, using colour infrared and panchromatic film, a sound knowledge of ground conditions, and collation of relevant erosion, geological, botanical, and animal ecological data. A system that enables priority for erosion control of subcatchments to be established, using a rating value for factors causing erosion, is outlined.

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TABLE OF CONTENTS.

LIST OF FIGURES

LIST OF TABLES