

STUDIES IN  
PHYSICAL GEOGRAPHY

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# Geomorphological Processes

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E. Derbyshire, K. J. Gregory  
and J. R. Hails

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# Preface

This book originated from a proposal by one author (J. R. H.) who was subsequently joined by a second (E. D.) and then by a third (K. J. G.). It has taken longer to produce than we expected because of the complications imposed by the distances which the authors have succeeded in putting between themselves during the past three years. The basic objective was to produce a short book which would introduce geomorphological processes to students in the first or second year of their higher education courses. We believed that there was a need for such a book reviewing a range of geomorphological processes which would offer a prelude to the symphonies which are available in books devoted to specific processes and their effects, many of which are signposted in the lists of further reading at the end of each chapter. We are aware that the range of suitable preludes is wide, but we have endeavoured to compose one which expresses at least some of the recent achievements in the study of geomorphological processes. Emphasis is placed on the nature of processes and upon their controls but the effects of processes in creating landforms are not reviewed in any detail. In addition to the selected references at the end of each chapter, we have collected a bibliography of works cited at the end of the book but this is not intended to be as exhaustive as the references collated in more advanced works.

To continue the musical analogy, the first movement must be a sound understanding of landscape processes and mechanics and this book is designed to represent this stage. The second movement can subsequently elaborate several themes including the influence of man and the theoretical principles underlying the operation of individual processes, whereas the third movement may be concerned with the chronology of landscapes in the past and with applications of knowledge gained as a basis for understanding future tendencies of processes. Grateful acknowledgement is due to the cartographic units in the Universities of Keele, Exeter, Southampton and Adelaide. It is a pleasure to acknowledge the assistance given by Mrs R. Flint, Mrs P. Cornes and Mrs S. Howell, and to record our thanks to three families, and especially to Maryon, Chris and Josie, for continuing their stalwart toleration during the production of this book.

January 1979

Ed. Derbyshire  
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# 1

## Introduction

Geomorphology, as the scientific study of landforms and land form change, was founded more than a century ago. The word literally means the study of the form of the earth. It has frequently been acknowledged however, that a complete understanding of geomorphological processes is necessary for advancement of our understanding of landforms. Although the necessity for the study of processes has often been stated throughout the history of the science (Chorley, Dunn and Beckinsale 1964, 1973), the record of achievement of the subject shows that until 1960 there was little substantive investigation of processes by geomorphologists. Instead, geomorphology concentrated upon the investigation of landforms and only when the needs arose to estimate the nature of landform change in areas that had not been surveyed in detail, and to predict the future course of change, did a greater concern for the study of processes become more generally accepted.

Since 1960 there have been a number of approaches to, and trends within, geomorphology. These can be characterized as a geomorphological bandwaggon parade: J. N. Jennings asked the question, 'any millenniums today lady?' in an address in which he envisaged a series of impacts or bandwaggons, shown as approaches to the study of geomorphology. The existence of diverse approaches has also been recognized by Butzer (1973) who concluded that pluralism was inevitable and other authors have recognized alternative conceptual approaches. Chorley (1971) found an analogy for physical geography in the tight-rope walker confronted by two tightropes. One tightrope was largely

Table 1.1  
SOME APPROACHES IN GEOMORPHOLOGY WITHIN PHYSICAL GEOGRAPHY

*Fashions in geomorphology have included (Jennings, 1973):*

Denudation chronology	elucidation of stages of evolution; particularly the study of stage in the Davisian trilogy of 'structure, processs and stage'.
Climatic geomorphology	Recognition of morphogenetic systems which acquire a particular character and evolve in their own way under combinations of exogenic processes varying particularly with climate.
Morphometry	Use of quantitative techniques to define and to describe the nature of landforms and their spatial pattern.
General systems approach	Use of concepts adopted from thermodynamics to focus upon process-form relationships.
Process study	Quantification of present processes and understanding process in physical or chemical terms.
Structural geomorphology	Acknowledgement of the influence of rock type and rock disposition.