

Lismore, a city on the north coast of New South Wales, c1980. Tourist brochures such as this are an important source of historical information.

CHAPTER 10

PHYSICAL GEOGRAPHY

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PHYSICAL GEOGRAPHY is concerned with the study of the earth's surface, its natural characteristics and the reasons for change. It deals with landforms and their origins (geomorphology), with climate and its effects upon the earth, and with the ecology of the earth's living creatures (zoogeography). Physical geography also seeks to identify and explain the terrestrial conditions necessary for human survival. The study of history is, consequently, deeply linked with certain aspects of the study of physical geography.

Geography was established as an independent discipline at the University of Sydney in 1920. It remained a minor discipline there until the 1950s and it was not until 1959 that the University of Melbourne followed with the creation of a chair in geography. As the Australian universities expanded in the 1960s, geography grew quickly; it boomed during the 1970s. During the subsequent decade almost every tertiary institution offered courses in geography and promoted advanced studies in this rich field.

However, the subject's late arrival on the academic scene created a tradition in which significant contributions to geographical studies were made, until the 1960s, by other disciplines closely related but fundamentally directed at different goals. Much of our knowledge of soils, for example, comes from the CSIRO, the geographers preferring to examine soils as a means of identifying geomorphic units. Similarly, much of the research into Australia's climate has been undertaken by government meteorologists and agencies. The geographers' contribution to our knowledge of the natural environment has been strongest in the study of landforms.

The earliest geographical descriptions of Australia were recorded by the explorers who commented on the physical landscape, climate, flora and fauna of the country they traversed. Their observations were motivated not only by scientific curiosity but also by an awareness of the country's potential for European landuse. The explorers and, later, the surveyors pieced together the basic outline of the continent's physical geography: its river systems, mountain ranges, plains and deserts.

The first physical geographies of the continent were descriptive and factual: explanation rarely reached beyond a rudimentary level. The early entries in the *Encyclopaedia Britannica*, particularly that of T.A. Coghlan in the 11th edition of 1910, are good examples. This approach was continued for many years in the yearbooks issued by the commonwealth and state governments.

A significant change in approach came with the appointment in 1920 of Thomas Griffith Taylor to the first Australian chair in geography at the University of Sydney. His early work,

published at the beginning of the century, already marked Taylor as a leading scientist and from 1910 to 1920 he held the post of physiographer at the Commonwealth Weather Service. His influence on Australian geography was profound and permanent, and his pioneering work dominated the first half of this century.

Taylor was the first geographer to apply successfully the concept of physical or 'natural' regions to the Australian continent. Using structural (physical) and climatic characteristics, he had identified his first set of regions by 1911. He refined them over the following years until, by the 1940s, he had identified twenty natural regions in Australia. Taylor's regions, though somewhat modified by his disciples and successors, were so pervasive that they are still used in geography textbooks and have become part of every Australian's version of the continent. For example, most people today would be familiar with the Great Artesian Basin, the Southern Australian Highlands and the Murray–Darling Rivers region—all regions identified by Taylor.

Taylor's contributions to other aspects of physical geography were equally significant, though at times controversial. He was the first to argue forcefully that climatic conditions severely limited potential landuse and settlement in Australia—a view that was disputed until the 1950s. Taylor was a prolific writer on his profession and influenced the public view about the role and goals of geography. He founded the journal *The Australian geographer* and helped to introduce the systematic study of the subject in secondary schools. Taylor was not the only geographer active during this period. E.S. Hills, for example, produced in 1940 his *Physiography of Victoria* which was a forerunner to the growth in geomorphology that followed in the 1950s.

A number of British geographers came to Australia in the 1950s, bringing with them new approaches and new interests and stimulating both growth in the discipline and changes in methodology. The geographers of the 1930s and 1940s were criticised for giving undue weight to the environment as a determinant of landscapes and human activity. The geographers of the 1950s and 1960s turned to local rather than regional studies to assess more effectively the dynamic nature of geomorphological processes. The regional approach began to decline in importance although it did not vanish altogether, as is shown in Gentilli's work (1972) on climatic regions. The majority of studies, however, moved away from static, holistic regions to the analysis of single phenomena and processes.

CLIMATE

A century or more of gathering statistics, led to long-term studies of the Australian climate becoming more authoritative. The works of J. Gentilli (1971) and of E.T. Linacre and J. Hobbs (1977), using different approaches to the subject, are among the best. During the decade there was also a shift of interest from long-term, national trends to short-term patterns and local effects. Studies of floods and droughts appeared with assessments of their impact (Lovett, 1973), urban climates were studied, and the impact of climate on human comfort and performance was analysed. Natural hazards became a major research area (Heathcote and Thom, 1979).

BIOGEOGRAPHY

Biogeography, which began as an attempt to draw together physical and human geography, remains a vigorous, if minor, part of the discipline. It examines ecosystems and the distribution of plant and animal communities, and is well illustrated by the comprehensive and important survey, *Ecological biogeography of Australia*, edited by A. Keast (The Hague, Dr W. Junk, 1981, 3 vols). Some research has been undertaken in the field of historical biogeography—the reconstruction of past vegetation regimes and their effect on prehistoric life.

GEOMORPHOLOGY

It is in the field of geomorphology—the study of landforms—that physical geographers have been most active and, one suspects, most comfortable from a methodological point of view. With the benefit of hindsight it can be claimed that much of the early research was undertaken in areas of minimal importance to Australian physical geography. Glaciation is perhaps the best

example: trained in cold climate geomorphology, the British geographers applied these principles to Australia, even though there were few suitable areas for such study. However, the late 1960s and 1970s saw a move towards a more indigenous methodology aimed at interpreting Australian problems.

A detailed analysis of the research undertaken since the 1960s is beyond the scope of this essay but it is worth identifying briefly the major areas, and the works cited in the bibliography below will give interested readers an idea of its diversity.

In terrestrial geomorphology, denudation, ancient areal surfaces, deep and subsurface weathering and fluvial geomorphology (the study of rivers, capture, discharge and channel characteristics, drainage networks and so on) have, not surprisingly, been dominant. The geomorphologists have also played a major role in reassessing the age of the continent. Major contributors to terrestrial geomorphology include Jennings and Mabbut (1967); J.N. Jennings with his work on glacial and periglacial landforms, coasts, lakes, dunes and limestone foundations in *Karst* (ANUP, 1971); J.A. Mabbut with his *Desert landforms*, (ANUP, 1977); and Dury on fluvial geomorphology in *Rivers and river terraces*, (London, Macmillan, 1970).

In coastal geomorphology, research has concentrated on beach and sand dune studies—such as depositional shoreline changes, erosion, wave and wind features and coastal lagoons—and shore platforms. Coastal geomorphologists have also taken an active role in the debate over past sea levels in Australia. Major contributors to this field include Bird (1964), Davies and Williams (1977) and Hopley (1982).

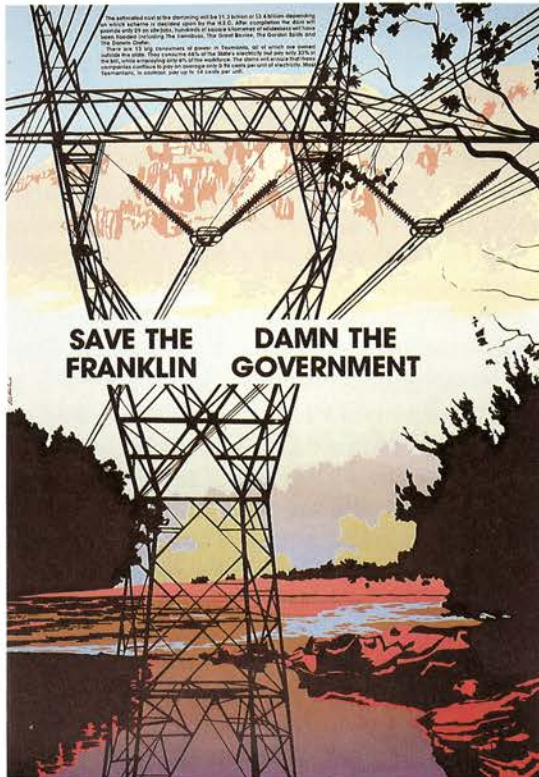
It would be incorrect to suggest that research in physical geography falls neatly into the three subsections listed above. There has been an increasing interest in the environment, both natural and built, which weaves together the threads of climate, soils, biogeography and geomorphology and is well illustrated in the CSIRO publication (1960) which first appeared in 1949. Landscapes have also occupied the attention of geographers, and the influence of humans on what were once regarded as 'natural' landscapes has received greater emphasis in recent years, as seen in the works of Heathcote (1975), Scott (1977), Hanley and Cooper (1982). There has been a growing concern with the application of the results of research in physical geography.

The bibliography that follows emphasises the monograph literature. However, as in most natural sciences, research and interim conclusions in physical geography appear mainly in the journal literature which can be accessed through the works listed and the indexes to Australian periodicals. Those interested in a general overview will find the first nine chapters of Jeans (1977) invaluable. Those with an interest in the development of geography are referred to O.H.K. Spate and J.N. Jennings, 'Australian geography 1951–1971', *Australian geographical studies* 10, October 1972, 113–40, and D.N. Jeans and J.L. Davies, 'Australian geography 1972–1981', *Australian geographical studies* 22, April 1984, 3–35.



Owen Stanley, Southerly buster, 1847, in his Voyage of HMS *Rattlesnake*. Stanley's watercolour was painted while on a survey of the New South Wales coastline. He commanded the *Rattlesnake*, which subsequently surveyed the northeast coastline and Torres Strait. The observation requirements of a number of sciences were met by these kinds of surveys. Graphic techniques for recording natural phenomena had been developed since the late eighteenth century and were taught to naval officers.

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R. Clutterbuck, *Save the Franklin, damn the government*, 1982. Poster, colour screenprint on paper, 72.9 × 48.3 cm. Gift of Roger Butler, 1985. AUSTRALIAN NATIONAL GALLERY

BIRD, E.C.F. *Coastal landforms: an introduction to coastal geomorphology with Australian examples*. ANUP, 1964. 193 p, illus, maps.

An introduction to coastal geomorphological activity drawing extensively on Australian examples.

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION. *The Australian environment* (rev edn). Melbourne, CSIRO, 1960. 151 p, illus, maps. An account, first published in 1949, of Australian climate, soils, vegetation and rural industries.

DAVIES, J.L. AND WILLIAMS, M.A.J. eds, *Landform evolution in Australasia*. ANUP, 1977. 376 p, illus, maps.

A successor to the book by Jennings and Mabbutt (1967); adds information for New Zealand, partly revises, updates and complements the earlier work.

GENTILLI, J. *Australian climate patterns*. Melbourne, Nelson, 1972. 285 p, maps.

Analytical description of Australian climates on a regional basis.

GENTILLI, J. *Climates of Australia and New Zealand*. Amsterdam, Elsevier, 1971. 404 p, illus, maps (World survey of climatology, vol 13).

History of climatic investigations and factors, with tables. A scholarly contribution to the field.

HANLEY, W. AND COOPER, M. eds, *Man and the Australian environment: current issues and viewpoints*. Sydney, McGraw-Hill, 1982. 362 p, illus, maps.

A good introduction to the physical and built environment, using the concept in its broadest sense.

HEATHCOTE, R.L. *Australia*. London, Longman, 1975. 246 p, illus.

Australian landscapes and their evolution, including the land resources and ecosystems.

HEATHCOTE, R.L. AND THOM, B.G. eds, *Natural hazards in Australia: proceedings of a symposium . . .* Canberra, Australian Academy of Science, 1979. 531 p, illus, maps.

A collection of papers dealing with natural hazards from floods and cyclones to droughts and bushfires.

HILLS, E.S. *The physiography of Victoria: an introduction to geomorphology*. Melbourne, Whitcombe & Tombs, 1940. 292 p, illus, maps.

An early work on Australian geomorphology using Victorian examples. Systematic in approach; a useful guide to many field sites.

HOPLEY, D. *The geomorphology of the Great Barrier Reef: quaternary development of coral reefs*. Brisbane, Wiley, 1982. 453 p, illus, maps.

A synthesis of modern geomorphological work in the world's greatest coral reef system.

JEANS, D.N. ed, *Australia: a geography*. SUP, 1977. 571 p, illus, maps.

A summary of geographical knowledge of Australia in the mid-1970s. The contributions are organised around systematic topics.

JENNINGS, J.N. AND MABBUTT, J.A. eds, *Landform studies from Australia and New Guinea*. ANUP, 1967. 434 p, illus, maps. A collection of essays on Australian geomorphology.

LASERON, C.F. *The face of Australia: the shaping of a continent* (3rd edn). A & R, 1972. 200 p, illus, maps.

A popular but scholarly account of the evolution of the Australian geomorphological landscape. This edition revised by J.N. Jennings. First published in 1953.

LINACRE, E.T. AND HOBBS, J. *The Australian climatic environment*. Brisbane, Wiley, 1977. 354 p, illus, maps.

Text for school and university use describing general climatic processes and Australian regional climates.

LOVETT, J.V. ed, *The environmental, economic and social significance of drought*. A & R, 1973. 318 p, illus, maps.

The measurement and perception of drought in Australia, its ecological and economic impact and an assessment of relief measures.

SCOTT, H.I. *The development of landform studies in Australia*. Sydney, Bellbird, 1977. 282 p, illus, maps.

A disciplinary history relating past work to contacts with visiting scientists, the development of the mining industry and the emergence of a scientific community in Australia.

TAYLOR, T.G. *Australia: a study of warm environments and their effect on British settlement*. London, Methuen, 1940. 455 p, illus, maps.

An environmentalist geography arguing that settlement planning is controlled by environmental constraints. Seventh edition published in 1961.

TAYLOR, T.G. *Geography of Australia*. Oxford, Clarendon Press, 1914. 176 p.

An early publication by a distinguished geographer, still relevant today. Excellent analysis of geographical patterns, both human and physical.

TWIDALE, C.R. *Geomorphology, with special reference to Australia*. Melbourne, Nelson, 1968. 406 p, illus, maps.

A survey of landforms, the influence of structure and processes using Australian examples. A good introduction to the discipline. Good use of aerial photographs.