NORTHERN AUSTRALIA

The Arenas of Life and Ecosystems on Half a Continent

Edited by
DON PARKES

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DEPARTMENT OF GEOGRAPHY
UNIVERSITY OF NEWCASTLE, AUSTRALIA

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CONTENTS

PART C: INTENSIVE ECOSYSTEMS

FOREWORD

The tropical savannas of the world and their more arid extensions continue to challenge development, in the sense of the application of modern science and technology for increased and sustained production and improved living standards. The environmental constraints of these 'difficult' latitudes are widely-shared, but each region differs in its social, economic and historical circumstances, and in its geographical context.

There has long been a need for a geographical study of the interplay of environmental challenge and human endeavour in the vast arena of Northern Australia, and issues such as lands rights, mining impacts, national parks and political developments among the Aboriginal and European communities have recently emphasised that need. Professor Parkes deserves our gratitude for his initiative and persistence, and his success in bringing together effectively so many experienced collaborators from a range of disciplines to focus on the region of Northern Australia, its broad natural environments, its extensive pastoral and maritime land use, and its scatter of isolated mining and pastoral settlements. The authors are to be congratulated on the results, and the Northern Australia Development Council thanked for making the book possible.

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PREFACE

Northern Australia, as defined in this volume, extends north from -26° latitude south to about -9°30' south. It extends east and west along the southern limits of Australia's Northern Territory. The membrane of the waters of the Indian and Pacific Oceans and the Timor, Arafura and Coral Seas are also included. They provide a diverse marine environment for human activity and climatic influence. The area so encompassed occupies about half the area of the world's largest island.

The *arena* of northern Australia has been settled by people for about 50 000 years. But the past 200 years have witnessed the most profound changes in its use; changes which have altered the appearance of hundreds of thousands of square kilometres of territory, including land and water; and changes which have altered the ecological mechanisms that operate to bring living and non-living elements into relation with each other.

This book is organized into three parts. Part A, *Arena* presents the contextual setting for Parts B and C. It has seven chapters. They include a historical geographer's perspective on the ecological impact of 200 years of European settlement, a description of the use of satellite imagery, a description of climate, discussion of some of the interactions among natural subsystems as they impinge on human activities (especially in the extensive rangelands), a summary of the principal renewable and non-renewable energy resources located in and available to northern Australia, a description of population characteristics, distribution and ecological structure, and, finally, a short chapter which concentrates on the Aboriginal population in more detail than is found in the chapter on population as a whole.

Part B, *Extensive Ecosystems* discusses some of the human ecosystems which extend over a very large geographical territory. In these ecosystems the human population is small in absolute number and small relative to the population of other living things (other biota). Energy for these ecosystems is derived essentially from endogenous sources, but increasingly its use is controlled by humans. These are *human* ecosystems because of intended intervention in their mechanisms. They include the tropical marine ecosystems and their growing utilization for mariculture; and rangeland ecosytems dominated by cattle and the overlapping semi-arid grasslands, their productivity and ecological stability. Two chapters consider aspects of land management and administration. One of these chapters demonstrates the utility of Landsat imagery for monitoring and managing rangeland ecosystems and the other discusses land administration, leases and tenure systems from a social and economic viewpoint.

In the *Intensive Ecosystems* discussed in Part C, the human population is dominant in number. Unlike the extensive ecosystems, energy is imported into the territory or habitat. It is exogenous to the immediate area of habitation and movement. However, in the first chapter, where the nucleated rural settement is

considered in relation to the large cattle station, this numerical domination is less well defined, except in the precinct of the homestead and its associated structures. In the strictest sense the nucleated settlement on the large cattle station occupies a transitional position between the extensive and the intensive ecosystems. Attention then turns from the environmental impact of mining to aspects of human habitat in materially structured places, human settlement including settlement design, building efficiency and human behaviour in stressed climates, and to other ecological and attitudinal aspects of life in remote towns. The final chapter addresses the incidence of infectious disease in relation to human ecosystems and health in northern Australia, with most of the discussion centred on the Aboriginal population because, among other reasons, this demonstrates the increasing complexity of human interactions and changes to the environment wrought by intensifying urban processes and international movement.

The volume opens with the statement, "What man hath wrought", (Bauer Chapter 1, title). It concludes with an implicit question, "What hath man wrought?" (Stanley, Chapter 20).

As editor, and on behalf of the contributors, I hope that this volume will contribute in some small way at least to knowledge and interest in northern Australia. Less than a million people live on half a continent. Possibly less than a million of Australia's residents have visited northern Australia, but the gates to the arena are open and population is steadily increasing.

To all the contributors I extend my sincerest thanks. As a human geographer with a particular interest in the human ecology of settlement, I have learned much from their chapters.

For help in preparing this volume I wish to thank: Ken Jones and Rod Davies (Hamersley Iron Pty Ltd); the many residents of Paraburdoo who accepted me; Father Patrick Speed, Anglican Rector of Tennant Creek; the people of Tennant Creek; Chris and Netta Knott, of Warabri, now Ali Curuing; Geoff Taylor; Mrs Sharon Parry, who typed all but one of the 20 chapters; Laurie Henderson, cartographer to the Department of Geography at Newcastle University; and finally the Northern Australia Development Council which provided essential support towards the publication costs of the book. As editor I was free to include material as I saw fit. I hope that this volume matches up to the support which they so generously provided.

1

WHAT MAN HATH WROUGHT: GEOGRAPHY AND CHANGE IN NORTHERN AUSTRALIA

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"...hard on horses and men, hell on women and dogs."
Anonymous.

I. INTRODUCTION

The permanent non-aboriginal settlement of northern Australia, as designated in this volume, began in the first years of the 1840s. The present cultural landscape, therefore, is the result of less than 150 years of change wrought largely by Europeans.[1] Considering the nature of the land to which they came and the cultural heritage they brought to it, the extent of those changes is remarkable.

When European man came to northern Australia he entered a sparsely populated but by no means empty or pristine land. For millenia this vast and diverse part of the continent had been sporadically occupied by a people who managed to procure a living from the land as it stood, a feat no others have been able to emulate. In so doing they altered the ecosystems in varying ways and to an extent which is as yet not fully understood. It remained for the newcomers to ring the changes which have created both comfort and concern for today's inhabitants of the region.

This chapter aims at sketching in some of the major elements in the process of development, a frequently used term which most often seems to mean *changing the character of*

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a region so that it takes its place as a producing factor in an economy.

II. PROLOGUE

The first verifiable contacts were Dutch. Between 1606 and 1644 their navigators, through a combination of accident and design, sketched in most of the coast west of Cape York, but finding neither solace nor potential profit, they wisely left it alone. Their meetings with Aborigines were fleeting and unfriendly. Much more extensive were those of Macassans who, from the late 17th century to early in this, visited various parts of the north coast to collect beche-de-mer (McKnight, 1976). They left a legacy of tamarind trees at many of their beach campsites and, to paraphrase McKnight, their influence in some aspects of aboriginal life was quite extensive, but it did not transform the fundamental basis of their society (McKnight, 1971).

Between 1824 and 1838 the British Colonial Office established three settlements on Melville Island and the Cobourg Peninsula. Basically strategic with hopeful commercial undertones, no attempts were made to explore inland. All fell victim to distance, sickness, boredom and a bad press; the last, Port Essington, was abandoned in November 1849. Their principal bequests were a pronounced taint of failure and the water buffalo, which had been imported and released, thus setting the stage for a future major ecological problem. Their relations with the Aborigines were mixed and their lasting influence small.

Late in November 1837, Lieutenant George Grey and party were landed near Port George IV, on the far northwestern coast of Western Australia with the mission to travel south, overland, to the Swan River settlement (Perth), keeping a sharp eye out for good pastoral land. They floundered about on ravine-riven plateau country for most of the wet season, never got more than 100 km. from their starting point, and were very happy indeed to be picked up the following April (Grey, 1841). It was not an auspicious start for northern land exploration. Nevertheless, the curtain was rising on actual settlement in northern Australia, a play which had no script and a cast which had not even seen the stage.

And a vast stage it was, about 4,500,000 km^2 vast, fifteen times the size of England, Scotland and Wales. It was a land almost inconceivable to northwest Europeans. Topographically, plains predominated, and although truly high

ranges were absent, there were very large areas of rough, rugged terrain. By and large the soils were poorly structured for European crops, and there were few large, contiguous tracts of really good alluvial soils. Grey-green sclerophytic open woodland, desert shrub and/or grassland covered most of it, while fringes of mangrove and tropical rainforest clung to the more exposed and wetter eastern and northern margins. Herbivores were the dominant animal species, most of them scarcely believable marsupials; the dingo was the only carnivore to have an economic impact.

These biota and soils developed under climatic conditions which in themselves posed frustrating problems for the newcomers. Rainfall, its amount and seasonal and areal distributions, was from the first a major concern. Over 80% of the region receives insufficient rainfall to permit the growth of crops without irrigation; fully 50% is climatic desert. Over most of the 'North' summer rainfall is strongly predominant, although this trait decreases inland. On the northern continental margins rainfall is higher and its seasonality most pronounced, combining with high temperatures and humidity to cause discomfort, while the wetter conditions seriously hamper many activities during the summer months. Although good falls are assured, there is considerable variation in when the wet season begins and ends, making planning difficult, especially for cropping. The trite comment, "There is no such thing as a normal season" is a truism. Much of the east coast is backed by a comparatively narrow lowland behind which slopes rise abruptly, circumstances which, combined with proximity to a warm ocean and onshore winds, are responsible for a more even seasonal distribution and much higher annual totals.

(The climate of northern Australia is treated in more detail by Lee and Neal in chapter 3, and Auliciems and Dedear discuss aspects of thermal 'comfort', in the Darwin region, in chapter 17).

A corollary of climate is water, and water, its presence and permanence, was the major localizing factor for living sites and activities of all kinds. Lacking the materials and technology to store even quite modest quantities of potable water, (see Ollier chapter 14), those who ventured into the new lands were dependant on natural surface supplies and what could be obtained from wells dug by hand. The most common supply was the waterhole. In response to the seasonal nature of the rainfall, the flow of northern Australian streams and rivers varies greatly. Many cease to flow during the dry season and those in the interior may not flow for several years. Deeper parts of the beds retain water, and

while some of these waterholes were virtually permanent, most had a limited 'life' between replenishing flows.

From the European standpoint the human inhabitants proved to be a far less serious problem than did the physical environment. A hunting and gathering folk organized into closely knit kinship groupings, their movements over the landscape were mostly confined to unmarked but well recognized ranges with which they had a spiritual bond incomprehensible to, and largely unrecognized by, 19th century Europeans. Suspicious of outsiders, even their own kind, divided by language differences and lacking weapons which enabled them to compete fairly against the invaders, they were unable to mount concerted resistance to invasion. They relied on stealth and surprise, tactics which Europeans most often interpreted as treachery.

It was into this situation that European man, largely British, with his Victorian mores, morals and technology, enthusiastically projected himself. Culturally ill-prepared to deal with the environment and the huge distances over which he was forced to operate, and wishing to do things to and in this land which had never been done here before, he has spent a great deal of time, energy and money trying to bring his cultural heritage into some sort of accommodation with that environment. In the process he has changed both it and himself.

And so the changes - the development of northern Australia - began. It is doubtfull if their full extent can yet be assessed; certainly their ultimate results were unforseen by those who began them. From our pinnacle of over a century of hindsight it is easy to condemn those pioneers. Yet they were but following the technology and beliefs of their day to make a success of their undertakings, and in most cases this meant making a none-too-secure living from an unfamiliar, unfriendly and recalcitrant land. To them a thousand acres of ringbarked, dead but still standing timber gave a profound sense of accomplishment, and therein lies one of Australia's major dilemmas: *how to develop without destroying.*

III. THE FIRST ACT

Three pursuits - pastoralism, mining and agriculture[2] - attracted Europeans to these new lands. In most cases pastoralism came first, but not infrequently all three were prosecuted, or at least attempted, contemporaneously.

Certainly the desire for new land upon which to depasture sheep was responsible for the first permanent settlement north of 26°S, although the impetus came from farther south.

In spite of a New South Wales regulation forbidding settlement more than 50 miles from the outpost for incorrigibles at Moreton Bay (Brisbane), in mid-1840 the Leslie brothers formed the first stations on the Darling Downs. In February 1842 Governor Gipps, recognizing the inevitable, opened what is now southeastern Queensland to pastoral occupation, and for the next decade or two exploration and settlement became thoroughly mixed. Small, almost secretive, private parties went out looking for land, and it is quite possible that the first ones north of 26°S have not been recorded. An attempt to form a station near Tiaro (25°44'S, 152°35'E) in 1842 failed because of hostile Aborigines (Cilento & Lack, 1959), but not before wool had been shipped from a river landing in 1843 (Meston, 1895).

More traditional explorers were also in the field, and in 1845-46 Mitchell reported good pastoral country along the upper Warrego and Belyando Rivers, but his thunder was stolen by Leichhardt, whose private party completed northern Australia's first major overland exploration by going from the Darling Downs to Port Essington. Given up for dead, Leichhardt's sudden reappearance focussed attention on the 'North' as never before. Meanwhile, far to the west, poor Sturt struggled to the edge of the Simpson Desert in his search for an inland sea, but found only gibbers, sand and blazing sun.

An attempt (1847) to set up the new penal colony of Northern Australia at Port Curtis (Gladstone) failed miserably but shortly thereafter pastoralists, notably the Archer brothers, moved up the Burnett to take up stations in the Eidsvold district. They soon found it much easier to send their wool south by vessel from a landing on the river than to haul it by dray, and thus, in 1847, Maryborough came into being, the first permanent town north of 26°S. They also found their Burnett country unsuitable for sheep, and in 1850, acting belatedly on letters Leichhardt had written them in 1846 telling of good country along the Dawson, they were off land hunting again; first to the Callide valley and then, still unsatisfied, on north until, in 1853 they came upon the plains along the Fitzroy River and established (1855) the first station (Gracemere) north of the Tropic. Rockhampton followed the next year (McDonald, 1981).

The decade of the 1860s was when significant northern movement got under way. In 1859 Queensland became a colony in her own right and a burst of pastoral expansion, fueled

in part by Victorian gold, took occupation to Cape York, the Gulf and the Channel Country by the end of the decade. Towns to support the inland movement grew up, mushroom-like, along the coast: Bowen (1861), Mackay (1862), Townsville (1864), Burketown (1865) and Normanton (1868). Queensland was on the move.

On the other side of the continent there were no northward gestures until after Gregory's 1861 expedition to Nickol Bay reported good, although patchy, pastoral country, and in 1863 James Padbury's party landed sheep, bullocks and horses; the first town, Roebourne, soon followed. Later in the same year land was taken up in the Gascoyne district, to the south of the Pilbara (Battye, 1924).

In the Centre, Stuart finally crossed the continent, a feat which was used to consummate the biggest land grab in Australian history: in 1863 South Australia gained control of the Northern Territory and promptly embarked on a program of settlement from the north, based on expectations of tropical agriculture and horse raising. The first settlement, in 1864 and called Palmerston, was a fiasco, following which several years were spent in obtaining explorers' reports which were ignored. Finally, in desperation, Goyder was sent to found the first permanent town, another Palmerston (1869), now Darwin (Bauer, 1964).

Thus European man and his animals moved into the North to begin an onslaught on the natural resources which still continues. And now it is "time to talk of many things", of the effects on the landscape, the flora and fauna and, not least, of man himself.

IV. EFFECTS OF PASTORALISM

The depasturing of European livestock on lands and plants which had never before known a hoof brought changes, subtle at first but all too often cumulative. Initially they were small because the natural carrying capacity of the country was substantial, stocking densities were low and in the absence of fences the stock, particularly sheep which had to be shepherded, were moved frequently. Sheep were the preferred livestock, partly from tradition and partly because wool brought a good price per unit weight and could be stored without serious deterioration. There was also a widely held theory that both pasture and water supply would improve after a few seasons' grazing, especially with sheep; the opposite was, of course, nearer the mark, for the nibbling eating

habit of sheep meant very close cropping and pasture plants suffered accordingly. Some plants could not withstand trampling by hooved animals, while others were particularly palatable and were grazed so heavily that they disappeared from many areas. Annuals, which formed an important part of the pastures, were especially vulnerable because grazing prevented seed set.

Fire deserves special mention. In pre-European times fires, both natural and man-caused, were an integral part of the Australian ecology; many plant species developed special traits which ensured their survival. There can be no doubt that for millenia the Aborigines had been changing the flora by burning; the question of whether they actually 'managed' country by using fire is still arguable. So, too, is that of whether European man was more or less pyromaniacal, but in any event, the burning continued. The practice of burning pasture lands to eliminate dry, unpalatable growth and to induce a green shoot came from Europe and was greatly reinforced by colonial experience, especially in open woodland with a grass understorey. Frequent, uncontrolled and extensive burning encouraged some species, most of them of limited grazing value.

Open woodland was widespread and since most of it carried an understorey of herbage, stock were run under the trees. At first the trees were relatively undisturbed except as bush timber was needed for yards, fences and buildings. Removal of the shade cast by trees encouraged herbaceous plants, and because there was no market for the wood and labour was scarce, trees were simply ringbarked and left standing. Since care was rarely taken to leave trees on the steeper slopes and in drainage paths, soil erosion and gullying resulted. As stock numbers increased overgrazing was common. Indeed, given the long, dry (winter) season and droughts it was inevitable, with the result that the incidence of sheetwash, soil erosion and gullying increased. River frontages where permanent water was available were the most seriously affected. For example, by the mid-1950s hundreds of square kilometres along the Ord River frontages in northwestern Western Australia were completely denuded of all herbage, shrubs and most trees. The vast open grassland downs of central Queensland and the Barkly Tableland of the Northern Territory were less seriously affected.

New plants, most of them exotics adapted to disturbed conditions, established themselves, particularly on overgrazed areas or after drought. The classic example was prickly pear (*Opuntia* spp.), but rubber vine (*Cryptostegia grandiflora*) and noogoora burr (*Xanthium pungens*) have infested thousands

of kilometres of stream frontages, especially in Queensland, crowding out and replacing nutritious pasture plants. Similarly in the Top End of the Northern Territory hyptis (*Hyptis suaveolens*) has become a serious plant pest.

Some native species behaved in much the same way. As early as the 1870s sheep could no longer be run successfully on large parts of north Queensland's eastern watershed because overgrazing and burning had favoured the spread of spear grass (*Heteropogon contortus*), the sharp seeds of which carry a devilish corkscrew tail or barb which literally twists the seeds through wool, hide and flesh. Native tussock grasses, for example some of the *Stipa* spp., generally of low grazing value, have followed overgrazing, burning and drought.

Not all of the plant introductions have been disadvantageous. Prominent among those which have proved to be useful is Townsville lucerne or stylo (*Stylothanses humilis*). This tropical legume from South America was an accidental introduction which proved to have considerable value as a pasture plant, and although it failed to live up to the high expectations its advocates entertained for it, that very failure led to a wide and partly successful search for other species which might be used to improve northern Australian pastures.

The *surface water supply* was also seriously affected by changes in the vegetative cover which increased both the quantity and intensity of runoff. The sediment load carried by streams and rivers increased to the point of overloading and deposition took place, particularly in the waterholes, greatly reducing their useful life. Lifestock coming to waterholes aided and abetted the silting process by breaking down and loosening the material of the banks, and at the next rain the loose material washed into the waterholes.

Animal life also saw some changes. While the rabbit never became a serious problem in northern Australia, the dingo did. Early accounts rarely mention the dingo as more than a nuisance, but with the advent of livestock, especially sheep, and the additional water supplies which gradually came with it, the dingo increased in numbers and became a factor of some economic importance. There is similar, although not as strong, evidence for the deleterious impact of birds, notably hawks.

V. EFFECTS OF MINING

The search for and extraction of minerals has been a major pursuit since the earliest days of settlement in northern Australia; indeed, in many instances it was the first. The industry has been responsible for bringing people and amenities to remote areas which otherwise would have remained under pastoral tenure or would not have been developed, and in the process the natural landscape has been altered.

It is necessary to distinguish between the fossicker and the miner, although the one often merged with the other. Traditionally the *fossicker* was a man who preferred to work alone or in small groups. Fossickers made a significant contribution to the exploration of northern Australia for which they rarely got, or wanted, recognition. The effects they had on the country were minor, although if successful they attracted the *miner*, who operated on quite a different level and with quite different results. Even so, I feel the miner, particularly those of earlier days, has received rather more than his share of censure for what he has done to alter the northern landscape and ecology.

The principle reason for this is that his activities are highly localized, intensive and obvious. Another reason, and one for which he can sometimes be fairly censured, is that when finished in an area he often leaves an unsightly and sometimes dangerous mess which persists for a long time. Over the past decade or two, however, increased awareness of environmental matters has led to stricter legislation aimed at controlling the worst excesses of the past. Most mining operations in northern Australia have, in themselves, affected very small areas, usually less than half a square kilometre. The area disturbed and the degree of that disturbance depended, then as now, on the mineral exploited, the techniques employed and the period over which it was worked. (Ollier discusses the impact of mining, at the present time, in Chapter 14.)

Without exception *gold* was the first metal sought and worked, and almost always the first methods used were the various forms of alluvial mining, which disturbed only small areas. While entire stream beds and adjacent areas might be overturned and the streams themselves interfered with, few alluvial fields lasted more than a year and the effects of the actual mining operations were not great. Far greater changes were wrought in the places where the miners lived, but while population densities were sometimes high, again the areas involved were small and the period of occupation short.

As soon as *reef mining* began, however, changes multiplied. Wood and timber were needed for power and mine supports, and some districts were denuded of trees for miles around. Piles of rock tailings accumulated outside shafts, while the finer tailings from stamp mills clogged streams or formed sterile piles. Reef mining lasted longer, involved more labour and put heavy demands on the natural resources. Furthermore, almost every mining town had its mob of goats, often outnumbering the human inhabitants, and they were vastly more damaging to vegetation than sheep. Following the introduction (in the early 1890s) of the cyanide process for extracting gold from crushed ore, contamination of streams, already apparent, increased. A great deal of very obvious environmental damage was certainly done in the immediate vicinity of the mines and towns, but aside from stream pollution the effects did not extend far. However, when ores of the *base metals*, such as lead, zinc and copper, began to be worked the demands on some natural resources became greater; more space was required, as was more water and, with the coming of the smelters which such ores required, air pollution was added to that of the streams. Rather paradoxically, demands on the local timber supply may have diminished, since such operations used fossil fuels, and bush timber was unsuitable for either underground or surface requirements.

There were other, more positive, aspects to the mining industry. Roads, railways and other communication lines were built to mining strikes through country which could not have supported them otherwise; services such as schools, mail and medical facilities followed, and these benefitted all those living within their range. On the whole it seems likely that the positive contributions made by mining to the quality of life in the North at least equalled its effects on the natural environment.

VI. EFFECTS OF AGRICULTURE

Perhaps it is as well for the physical environment that European style agriculture has not become truly widespread in northern Australia, because its potential for major ecological change is far greater than that of either pastoralism or mining. It demands the removal of the native vegetation and turning of the topsoil over large areas. Detailed analysis of such wholesale change is beyond the scope of this writing and only brief mention of the historical course of events and major changes will be made.