

East Kimberley Impact Assessment Project

CONSERVATION PRIORITIES IN NORTH-WESTERN AUSTRALIA

Richard J-P. Davies*

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A Joint Project Of The:

Centre for Resource and Environmental Studies
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University of Western Australia

Academy of the Social Sciences in Australia

The aims of the project are as follows:

1. To compile a comprehensive profile of the contemporary social environment of the East Kimberley region utilising both existing information sources and limited fieldwork.
2. Develop and utilise appropriate methodological approaches to social impact assessment within a multi-disciplinary framework.
3. Assess the social impact of major public and private developments of the East Kimberley region's resources (physical, mineral and environmental) on resident Aboriginal communities. Attempt to identify problems/issues which, while possibly dormant at present, are likely to have implications that will affect communities at some stage in the future.
4. Establish a framework to allow the dissemination of research results to Aboriginal communities so as to enable them to develop their own strategies for dealing with social impact issues.
5. To identify in consultation with Governments and regional interests issues and problems which may be susceptible to further research.

Views expressed in the Project's publications are the views of the authors, and are not necessarily shared by the sponsoring organisations.

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Map by L.E. Padgham.

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EXPLANATORY NOTE



This paper is an abridged version of a report on the Kimberley and the Top End of the Northern Territory prepared for the Australian Conservation Foundation in September 1985.

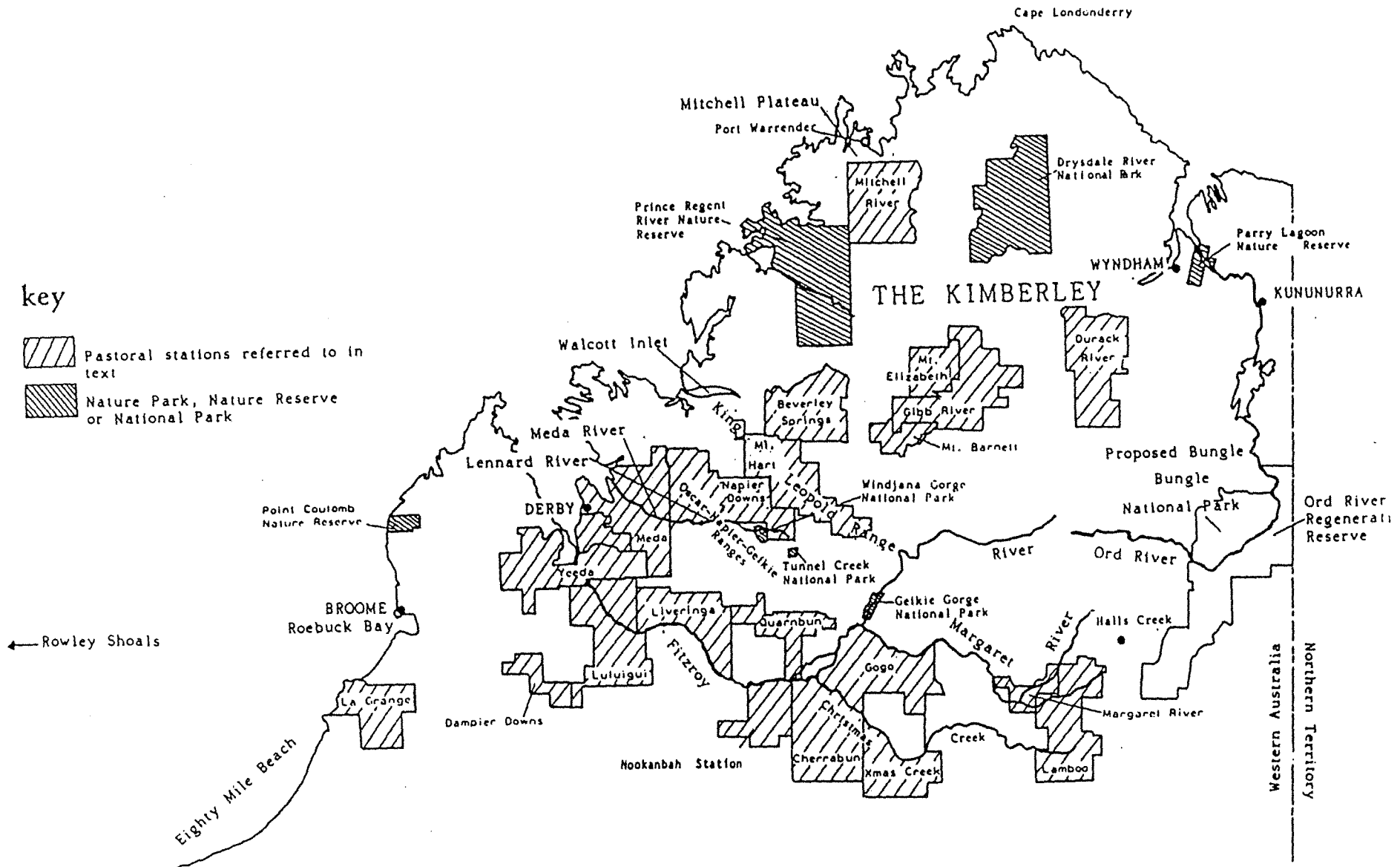
It is published by the East Kimberley Impact Assessment Project as a contribution to information available on the Kimberley region.

ABSTRACT

This paper is taken from a report on the Kimberley and the Top End of the Northern Territory prepared for the Australian Conservation Foundation. The excerpt published here relates to the East and West Kimberley regions of Western Australia. A series of recommendations for action is included in each section. The paper gives details of the condition of pastoral lands in the region, discussing in particular the effects of overgrazing on the pastures and native flora and fauna. Methods of managing pastoral land to prevent further degradation and encourage regeneration, and of effectively monitoring and policing land use are also discussed. Section B looks at areas in the region which have been set aside or proposed as reserves and at other areas which could usefully be made into reserves. The paper examines the significance of these areas, and the management practices and legislative action needed to protect them.

key

-  Pastoral stations referred to in text
-  Nature Park, Nature Reserve or National Park



Map of Kimberley showing locations mentioned in the Report

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A. THE PASTORAL INDUSTRY

RECOMMENDATIONS

1. That only pastoral leases that can be run in an *environmentally sound manner without extensive government support* be allowed to continue operating. Should no pastoral leases be able to meet these requirements then consideration must be given to abolition of the industry in North Western Australia.
2. That *perpetual leases* in the pastoral zone *not be granted*.
3. Where degradation has occurred or is occurring under a *current pastoralist*, that pastoralist be *required to pay* for revegetation work. Only where degradation is a result of a previous pastoralists' mismanagement should government funds be used.
4. That *management plans* be drawn up by the WA Department of Agriculture as soon as possible for *all* cattle stations with either significant areas of degradation or land susceptible to degradation. These management plans should include advice on fencing and watering point placement, maximum stocking rates for various paddocks, strategies for spelling areas subject to heavy grazing pressure and the placement and use of photopoints and exclosures. The implementation of these management plans by pastoralists should be *compulsory and enforced*.
5. That the WA Department of Agriculture set up ongoing *quantitative rangeland monitoring programmes* (which include the use of photopoints and exclosures) for use on all stations.
6. That the WA Department of Lands and Survey employ *more Pastoral Inspectors* at least some of whom are *experienced rangeland ecologists* and use the above mentioned quantitative monitoring programme in their assessment procedures.
7. That *more rangeland ecologists* be employed by the WA Department of Agriculture to set up the above mentioned rangeland monitoring system and to draw up the management plans.
8. That the above mentioned management plans and monitoring data be publicly available.
9. That the WA Land Act be amended to require the inclusion of a *wildlife expert, a qualified rangeland ecologist and a representative of the voluntary conservation movement* in the WA Pastoral Board.
10. That the *minimum stocking rate* provisions in the WA Land Act be repealed.
11. That the *WA Fitzroy River Frontage Regeneration Programme* be extended to also cover pastoral leases in the Ord River catchment.

12. That the Emmanuel and Australian Livestock and Cattle Company leases presently held by the WA Government and the Ord River Regeneration Reserve be withheld from release until they are *adequately revegetated and fenced* in a manner which will allow adequate rangeland management. Even then strict controls and thorough monitoring should be implemented.
13. That more research be undertaken into the effect of various *grazing pressures on indigenous fauna*.
14. That field research be undertaken into *plant species threatened* due to grazing.
15. That more research be undertaken into *regeneration methods* especially those involving the use of seeds harvested from adjacent healthy native pastures.
16. That a survey be conducted of the *present rangeland condition* of the *Ord River catchment* outside of the Ord River Regeneration Reserve. This should locate areas of degradation especially those requiring mechanical treatment.

PRESENT RANGELAND CONDITIONS

Even though over 22 million hectares of the Kimberley are under pastoral lease (Jennings, 1985) not all of this area is intensively grazed. For example, pastoral leases in the North Kimberley, the Broome Pindan and the Southern Halls Creek area, which make up 29% of the total area under lease only hold 9% of the total Kimberley cattle numbers (Jennings, 1985). This is largely due to the low digestibility, protein content and calorific value of pastures in these areas (Pers. comm. D. Wilcox, 1985) which have resulted in low cattle breeding rates. For example, less than one percent of the North Kimberley consists of pastures which are considered to be of high grazing value (Jennings, 1985). In comparison, 11% of the West Kimberley Districts is of high grazing value (Jennings, 1985). The most productive lands in these areas are the Fitzroy River, Ord River, Margaret River, Meda River, Lennard River and Christmas Creek catchments and it is no coincidence that these are the areas of the Kimberley which are the most degraded (Payne *et al*, 1979). This degradation can be divided into two categories: pasture degradation and soil degradation. Pasture degradation refers to the replacement of more palatable species by the less palatable, the replacement of perennial grasses by annual grasses, the simplification of floristics and, if severe, the removal of all vegetation cover. Soil degradation results from the removal of this protective vegetation cover and from the physical impact of hooves coupled with rain or wind. The two most common forms of erosion in the Kimberley are gullying and scalding where topsoil is removed leaving large areas of hard B horizon which are impervious to water penetration.

A survey (Payne *et al*, 1979) into the condition of an area consisting of the majority of the catchments of the Fitzroy, Lennard, Meda and Mary Rivers found that only 20% remained in good range condition. These were mainly areas which were inaccessible to stock and consisted mainly of relatively unpalatable *Spinifex* pasture. 'The worst areas of degradation and erosion [were] on the most valuable pasture lands. These areas are

readily accessible [to stock], close to permanent water supply and support attractive pasture' (Payne *et al*, 1979). Over 40% or 35,600 square kilometres of the study area had pastures in poor or very poor condition. Over half of the area had some form of soil erosion while 10% was severely eroded. Even though much of this damage occurred during the earlier part of this century, research published in 1981 (Rangeland Management Branch, 1981) indicated that the 'country [had] not improved over the [previous] eight years and [had] deteriorated even further in places'.

In the Eastern Kimberley 'when plans were formulated to dam the Ord River, the silt level of the river [was] estimated at 22 million tons per annum' (WA Department of Agriculture, 1984b). This was found to be largely due to the degraded state of the Ord River catchment and, as a result, the 10,000 square kilometre Ord River Regeneration Reserve was proclaimed. It was found at the time that 8.1% or 3,710 square kilometres of the whole Ord catchment was subject to varying degrees of erosion (Jennings, 1985). A survey by the Department of Agriculture in 1982 indicated that 27% or 2,700 square kilometres of the Ord River Regeneration Reserve was still in poor condition while only 28% was in good rangeland condition (Jennings, 1985). Approximately 40 square kilometres was still severely degraded after nearly two decades of control measures by the Agriculture Department (Jennings, 1985).

Although less severe and less widespread, degradation has also occurred in the less productive regions of the Kimberley. A 1977-1978 survey of the Dampier Peninsula found that 'the effects of heavy grazing by cattle, combined with annual burning, [were] modifying both the floristics and structure of plant formations in all parts of the Peninsula visited'. It also found that 'trampling damage was especially apparent in the species-rich communities along water courses, in ephemeral swamplands, and in the sub-coastal, semi-deciduous vine forests: sites where cattle congregate' (McKenzie, 1983).

It has been estimated that degradation due to overgrazing has reduced the carrying capacity of the Kimberley by two fifths (Division of Resource Management, 1984) and has resulted in some stations, which would otherwise be viable, becoming non viable (Payne *et al*, 1979).

The cause of such large areas of degradation is largely due to the lack of control which Kimberley pastoralists have over their stock resulting in the inability to spell areas of heavy usage. 'With little fencing and few artificial waters, stock have consistently overgrazed the river frontages and alluvial flats' (Jennings, 1985). Also, in the past, when good seasonal rainfalls have coincided with very poor cattle prices, as happened between 1974 and 1978, pastoralists have allowed large buildups in cattle numbers (Jennings, 1985) resulting in overgrazing.

A 1982 Western Australian Department of Agriculture report (Hacker, 1982) stresses that these pressures are still operating. This report states that 'fluctuations in the level of annual turnoff associated with variations in the profitability of the export market could now permit the cattle population [in the Kimberley] to rise to a point where a secondary long term cycle of pasture degradation could be initiated. If present management practices are maintained, the result would be a permanent contraction in the size and profitability of the industry'.

Whilst poor management and the ability of certain parts of the Kimberley to sustain high cattle breeding rates have been major factors in allowing major land degradation to occur, other factors are also important. One factor is the susceptibility of particular land-forms to erosion due to the inherent instability of their soil profiles. The length and degree of slope is also important. It is due to these factors, along with overgrazing, that the entire Amy Land System in the Western Kimberley is in bad range condition (Payne *et al*, 1979). The climate of the Kimberley has also been a major contributing factor. The long dry season coupled with overgrazing of the vegetation cover followed by the torrential downpours of the early wet season have resulted in rapid erosion. However, it must be stressed that prior to cattle grazing these other factors were not sufficient to cause the extensive severe erosion that exists today.

EFFECT OF OVERGRAZING ON INDIGENOUS BIOTA

Fauna

Over the entire Kimberley little research has been done on the effect of cattle grazing on native fauna. Several species of birds and mammals however, are recorded as having drastically declined in abundance and range due to overgrazing. Smith and Johnstone (1977) have shown that although early bird collectors recorded the Purple-crowned Wren and Buff-sided Robin as common along the Ord and Fitzroy drainage systems at the beginning of the century, today they are rare. They attribute this decline in numbers and area of distribution to the destruction of riverine habitat caused by the activities of the pastoral industry. Similarly it is suggested that the decline of the Partridge Pigeon is at least partially due to cattle grazing (Blakers *et al*, 1984).

In the Ord Basin, Kitchener (1978) documented a marked difference between the suite of mammals occurring as skeletal material in Aboriginal sites considered contemporary with first European settlement and the extant mammal fauna of the Ord River area. He suggests that this is due to grazing and burning effects. Recent surveys (McKenzie, 1981; 1983) in the south-west Kimberley and on Dampier Peninsula indicate that a similar situation exists in these regions. The Boodie, Wambenger, Golden-backed Tree-Rat and Tunney's Rat have not been recorded from these regions since the end of last century. The Golden Bandicoot was last recorded from the south-west Kimberley in 1898 and has 'declined in numbers and is now either very rare or extinct on the Dampier Peninsula' (McKenzie, 1983). Likewise the reduced range of the now rare Bilby is probably partially due to cattle grazing (Strahan, 1983).

Due to the present and past lack of research in this field it is recommended that a high priority be placed on research into the effect of various grazing pressures on indigenous fauna in the Kimberley. The findings of such research should be used to determine recommended stocking rates.

The lack of research into the flora of the Kimberley is indicated by the fact that no comprehensive account of the flora of this region has been published to date. The little research that has been undertaken into the effect of grazing on native plant species has been predominantly concerned with the effect on dominant grass species.

Although no field research has been undertaken in the Kimberley into endangered plant species, five species are recorded as being both very rarely collected and only collected from regions where degradation due to overgrazing is widespread. *Desmodium flagellare*, *Echinochloa solidifolia*, and *Nesaea repens* have only been collected twice and three times respectively (Van Leeuwen, 1984). It is likely, therefore, that these species are endangered due to grazing pressures.

An important but poorly utilized source of information on the effects of the pastoral industry on indigenous flora is the knowledge of Aboriginal elders. For example, the Aboriginal people of the Bungle Bungle region of the Kimberley have observed a significant decline in the abundance in many of their traditional food plants (Rose, 1986). 'It is thought that these resources have been destroyed by the European introduced animals (cattle, donkeys and camels) which are prolific in the Bungle Bungle area' (Rose, 1986).

Due to the lack of research to date it is essential that field research be urgently undertaken to determine which species are threatened by grazing in the Kimberley. Research should initially concentrate on areas which have suffered the greatest impact from grazing.

THE ECONOMICS OF PASTORAL LAND DEGRADATION

Despite the large areas of degradation caused by the Kimberley pastoral industry, this industry produces only 17% of Western Australia's cattle (Jennings, 1979) and contributes only 0.2% to Western Australia's total rural income (Jennings, 1979). Only 1400 people are directly associated with the Kimberley pastoral industry (Jennings, 1985) and in 1977 all the Kimberley pastoral leases paid a total of only \$116,804 in rent (Jennings, 1979). Furthermore, 50% of the Kimberley pastoral area is leased by only 14 companies, half the cattle are owned by nine companies and nearly 50% of cattle turned off comes from eight companies (Jennings, 1985). These figures demonstrate that the average Australian benefits little from the Kimberley pastoral industry.

On the other hand, the cost of actively revegetating severely degraded country is very high, namely \$9/ha (Pers. comm. A. Williams, 1984). Since 130,000 ha of the Kimberley requires mechanical treatment (Jennings, 1985), the total cost of revegetating the Kimberley is \$1.2 million. This, however, assumes that initial treatments are 100% successful, which is frequently not the case, and doesn't include the cost of fencing off degraded areas. Added to this is the environmental cost. Even if a severely degraded area is regenerated, frequently the previous indigenous species diversity is drastically reduced.

Land degradation in the Kimberley has also had a direct impact on the pastoral industry. It is estimated that, for the West Kimberley frontage country alone, degradation has reduced the carrying capacity 'from 60,000 cattle units to 26,000 cattle units which is equivalent in present day terms to a loss of \$1 million annually' (Rangeland Management Branch, 1981).

It is concluded from the above figures that *only pastoral leases that can be run in an environmentally sound manner without extensive government support should be allowed to continue operating. 'In an environmentally*

sound manner' is defined here as meaning in a manner which does not result in the significant decline of any indigenous species, even locally, and which doesn't significantly reduce vegetation cover or cause escalated erosion.

It is frequently argued that lack of finance has been the root cause for pastoral degradation in the Kimberley. However, even though the West Kimberley contains the most widespread degradation in the region, it also produced 62% of the total turn off of the whole Kimberley over the last 3 years (Jennings, 1985). This suggests that lack of finance is frequently not the cause. The Kimberley Pastoral Industry Inquiry (Jennings, 1985) sums up the situation by saying 'in the past the pastoral industry has generated surplus funds for a significant number of businesses, yet many pastoralists have not appreciated the need to invest more in cattle control facilities'. 'A lack of investment in the past has significantly contributed to a reduction in the carrying capacity of the West Kimberley frontage land'. *It is therefore recommended that where degradation has occurred or is occurring under a current pastoralist, that pastoralist should be required to pay for revegetation work. Only where degradation is a result of a previous pastoralist's mismanagement should government funds be used.*

MONITORING AND POLICING OF RANGELAND CONDITIONS

The Land Act and the Department of Lands and Surveys

In the Kimberley the monitoring and policing of the conditions of pastoral leases is primarily the task of the Pastoral Board and the District Pastoral Inspectors of the WA Department of Lands and Surveys

The Pastoral Board

The Land Act 1933-1982 stipulates that the Pastoral Board has the power to:

- (1) prohibit a lessee from increasing the number of stock;
- (2) require a lessee to reduce stock numbers; and
- (3) require a lessee to provide and maintain suitable fencing for the prevention or control of grazing on any area which has been adversely affected by excessive numbers of stock.

Furthermore, the Act stipulates that the Board is able to forfeit a lease if the lessee:

- (1) permits the lease to deteriorate to such an extent as to necessitate a lengthy period of protection from grazing;
- (2) utilises the lease in a manner which is likely to result in such deterioration.

Despite these powers and the widespread degradation previously described, no leases in the Kimberley have ever been forfeited for these reasons. (Leases in the area which is now the Ord River Regeneration Reserve were resumed but compensation was paid.)

A reason frequently offered for this is that most leases with degradation are now held by lessees who acquired the land after the degradation had taken place. However, a 1981 report by the Western Australia Department of Agriculture's Rangeland Management Branch (Rangeland Management Branch, 1981) concluded, following research, that the 'degraded country along the Fitzroy River [had] not improved over the [previous] eight years and [had] deteriorated even further in some places'. Similarly Hacker (1982) predicted that 'if present management practices are maintained, the result would be a permanent contraction in the size and profitability of the industry' due to 'cattle populations [rising] to a point where a secondary long term cycle of pasture degradation could be initiated'. Hacker (1982) estimated that in 1982 the total stock numbers in the Kimberley were 21% over the estimated safe carrying capacity. These reports indicate that land degradation due to mismanagement is still occurring in the Kimberley. They also support the claim in the 1984 report of the Resource Task Force on Land Resource Management in WA that the regulation of stocking rates by the Pastoral Board 'has not been effective in the past'.

The Western Australian government has recently purchased, for \$8 million, four leases in the Kimberley (viz. Gogo, Meda, Christmas Creek and Cherrabun Stations). All of these leases have widespread erosion and degradation (Payne *et al*, 1979) caused by previous overstocking and inadequate management by the Emmanuels who have leased the stations ever since they were first released 104 years ago. The fact that the properties were bought rather than forfeited indicates a reluctance by the Pastoral Board to use their powers under the Land Act to enforce sound rangeland management practices. *This indicates the need for 'the Pastoral Board [to] be restructured to include membership representing the interests of conservation'* as recommended by the 1984 report of the Task Force on Land Resource Management in Western Australia. It is important that this member be *non government and acceptable to the voluntary conservation movement*.

Since the pastoral industry has had a major impact on indigenous species of plants and animals, *it is essential that a wildlife expert also be included on the Pastoral Board*. The Department of Agriculture has made recommendations to pastoralists on the control of the Agile Wallaby in the Kimberley (Payne *et al*, 1974) and on the burning of *Triodia* grassland, an important habitat for many mammal and reptile species. This also highlights the need for such an inclusion. *Also, at least one member of the Board should be a qualified, rangeland ecologist*.

At present, however, the Land Act only stipulates that the Pastoral Board must consist of an independent chairman, the Director of Agriculture and three other persons including two pastoralists or ex-pastoralists.

District Pastoral Inspectors

To monitor the condition of the whole Kimberley pastoral industry there is presently only one District Pastoral Inspector based in Broome. The Inspector is an ex-cattle station manager and has had no formal training in rangeland ecology. This Pastoral Inspector is expected to inspect the condition of country and the state of vegetation. However, the vast area he has to cover, the fact that he does not have regular and frequent access to an aircraft and the fact that he has other time-consuming tasks (eg the inspecting of the condition of improvements)

results in him having insufficient time to adequately record changes in range conditions. To date no exclosures or photopoints have been set up by this Pastoral Inspector and no quantitative descriptions have been recorded (Pers. comm. C.A. Russell, 1985). However, without such data it is impossible to detect changes in pasture condition before major damage has occurred. Furthermore, the Kimberley Pastoral Industry Inquiry (Jennings, 1985) criticised the rangeland survey information kept by the Pastoral Board for its lack of vital data such as rainfall records and total cattle numbers. 'Conclusions were being drawn without vital performance criterion' (Jennings, 1985). Also 'pastoralists [have] reported little feedback of the results of Pastoral Inspector's official visits to indicate whether their situations were considered good or bad' (Jennings, 1985).

There is an obvious need for more Pastoral Inspectors at least some of who are experienced rangeland ecologists. The need for this expertise arises from the necessity for these Pastoral Inspectors to participate in a universal quantitative rangeland monitoring system which should be incorporated into the present assessment procedure. Also it is important that the data gained from such a system be interpreted by a rangeland ecologist. Where degradation is occurring alternative management strategies similarly need to be worked out by a rangeland ecologist working in consultation with the pastoralist. It is imperative that the adherence to these management strategies be enforced. It is also important that all monitoring data and conclusions be openly available to the public.

The Land Act 1933-1982 (WA)

Two unsatisfactory provisions of the Land Act are those pertaining to minimum stocking rates and penalties.

Section 103(3a) of the Act stipulates that a pastoral lease is liable to forfeiture if the land is not stocked with such numbers of stock 'as the Board ... considers to be a number sufficient for stocking and keeping stocked that land'. Since 52% of the Kimberley stations are unviable as pastoral concerns (Jennings, 1985) and since the level of tourism in the Kimberley is growing by ten percent each year, the government should be encouraging the destocking of these unviable stations and instead encouraging the use of such stations as environmentally sensitive commercial tourist concerns to take pressure off existing parks. Also several Aboriginal communities have acquired leases to allow them to live on and have control over their traditional lands. The desire to use this land for traditional uses rather than solely for monetary gain should be respected by the government. Legislation enforcing minimum stocking levels are counter productive to these goals and discourage the 'spelling' of land and thus should be withdrawn.

A deficiency in the Land Act is the lack of provisions for the fining of lessees who manage their leases in a manner which results in degradation. At present Section 103(5) only allows for forfeiture, a penalty which is only appropriate for 'last resort' situations and one which the government is reluctant to use.

The Western Australian Department of Agriculture

Development of monitoring techniques for the tropical grasslands that support the Kimberley beef industry has pushed towards standardization of methods by the production of a user's manual [by the Division of Resource Management]. Methods combine site photography with measures of basal cover and species frequency wherever appropriate. Some 250 monitoring sites (of which 112 are fully quantified) [were] established [between 1979 and 1983]. Coverage of another three Stations [was] planned for 1984 (Division of Resource Management, 1984).

It is intended that this information will be used:

- (a) by pastoralists to assist them with the management of the land under their control;
- (b) to provide government agencies and the community with information concerning changes in the rangeland resources of the State and;
- (c) by Rangeland Management Officers of the Department of Agriculture to gain a better understanding of the processes influencing range trends (Hacker, undated).

To date this project is still at the developmental stage (Pers. comm. D. Pratchet, 1985) and there is much need for research into 'grazing tolerances of major species and their management requirements for re-establishment and survival' (Hacker, 1982).

Another input by the Division of Rangeland Management has been the preparation of Station Management Plans (Klepacki, 1984). However, due to staff limitations, to date few have been produced in the Kimberley (eg only four in the East Kimberley (Pers. comm. D. Pratchet, 1985)). Two major limitations with the present project are that management plans are only produced when requested by pastoralists and that when produced, pastoralists are under no obligation to abide by them. But, 'to date, even some of the financially successful pastoralists have not developed sufficient cattle control facilities or practices to ensure that the degradation process is reversed' (Jennings, 1985).

This continuing mismanagement of pastoral leases in the Kimberley indicates the need for the drawing up of publicly available management plans for all stations with either significant areas of degradation or land susceptible to degradation. This is consistent with what was required of the Argyle Diamond Mine which is affecting a much smaller surface area than the pastoral industry has already degraded. This operation had to agree to take extensive soil erosion control measures as outlined in a publicly available management plan. It is, therefore, reasonable that the recommendations of these management plans should be obligatory and enforced. The objective of these plans should be the utilization of pastoral leases in a sustainable, environmentally sound manner.

These management plans need to stipulate which areas are to be fenced off to allow regeneration. These areas should include 6,924 square kilometres of severely degraded land in the Western Kimberley which a 1979

WA Agriculture Department report (Payne *et al*, 1979) stated should have been withdrawn from use three years ago. Also included should be details of fencing and watering point placements, maximum stocking rates for various paddocks, and strategies for spelling areas subject to heavy grazing pressure. The placement of photopoints and exclosures, and instructions for their use should also be covered. The finding of the Kimberley Pastoral Industry Inquiry that 'many pastoralists do not accept that they have a serious degradation problem just because the composition of the pasture has been stated to have changed' (Jennings, 1985) indicates the need for such tight controls.

A major initial consideration in these management plans should be the economics of running each station in a manner which prevents further pasture decline and guarantees regeneration of degraded areas. *Those leases which are degradation prone and which would be unviable under sound rangeland management should be immediately withdrawn from use.*

The Soil and Land Conservation Act 1945-1982 gives the Agriculture Department power to serve soil conservation notices regulating pastoral practices where existing practices are resulting in or likely to result in land degradation. The Act also allows for fines of up to \$2,000 if the Agriculture Department's directions are ignored. *It is essential that the Agriculture Department enforces the management plans by using these penalties.*

In order that the formulation of Management plans can proceed at a faster rate than at present and that adequate policing can occur, *it is essential that further rangeland ecologists and rangeland inspectors be employed by the Department of Agriculture.*

LAND TENURE

In the Kimberley region, pastoralists have been recently applying much pressure for increased security of tenure.

At the time of writing, a review into pastoral land tenure was being held in Western Australia. The government had stated that it intended introducing legislative changes by the 31st October, 1985.

The primary reason given by pastoralists for the need for such changes is that the ability of pastoralists to obtain credit to finance improvements is limited by the reluctance of lending institutions to take a limited term lease as collateral. However, a summary of the views of WA Department of Agriculture rangeland management officers clearly stated that while perpetual or continuing leases avoid some of the potential problems associated with terminating leases, they offer negligible improvement in security over the existing arrangement. 'The community does not seem to realise that the provision of credit relates more to capacity to repay than to any other factor' the paper concludes (Conservation Council of WA, 1985). A similar stance was taken by the Western Division Select Committee of the NSW Legislative Council which stated 'we are not convinced that the form of tenure hinders a lessee's ability to borrow from lending institutions'. Finally, the Vickery Report on the 'Administration, Management and Tenure of South Australia's Pastoral Lands' found that 'decisions to lend are primarily based on ability to repay, not tenure'.

Another argument given is that the possibility of non-renewal provides a disincentive for investment in improvements on pastoral properties. This argument is also invalid since the Land Act of WA allows for compensation to be paid for any improvements on resumed land or land for which a lease is not renewed.

There are, however, very good reasons against the granting of perpetual or continuing leases over the pastoral zone. As was previously mentioned, many of the present pastoral leases in the North-West of Australia are unviable and the average Australian benefits little from this industry in the North-West as a whole. On the other hand, the Kimberley tourist industry is growing rapidly. For this reason, the inadequacy of the present reserve system (see Section B) and the desirability of granting land rights to as many Aborigines as possible, alternative land uses for many present pastoral leases is an option which must be left open.

Any attempt to extend the period of time of tenure will automatically reduce the possibility of official direction to use the land's resources and would, in a sense, suggest that existing uses are optimal for the foreseeable future (R.L. Heathcote, Reader in Geography, collated submission, SA Pastoral Lands Report).

In Western Australia the only penalty in the Land Act against allowing land degradation to occur on pastoral land is forfeiture. The granting of more secure tenure would presumably nullify such provisions removing the only 'teeth' which the legislation presently has to prevent degradation.

For these reasons no further perpetual leases in the Kimberley should be created.

REGENERATION WORK AND RESEARCH UNDERTAKEN BY GOVERNMENT DEPARTMENTS

The Fitzroy River Frontage Regeneration Project

The only government arm to have undertaken regeneration work and research in the Kimberley has been the Division of Resource Management of the Department of Agriculture.

Following a public meeting in 1983 the Shire of Derby/West Kimberley was gazetted as a Soil Conservation District under the Soil Conservation Act 1980. In this area the Fitzroy River Frontage Regeneration Project is being co-ordinated and partially funded by the Department of Agriculture. This project involves the fencing off and the strip cultivation and seeding of badly eroded areas using Barley Mitchell grass and several exotic species. To participate in this project pastoralists must sign a contract agreeing to keep the treated areas stock free for two years, to negotiate controlled stocking for the following eight years and maintain fences around the areas. To date \$33,000 has been made available from the Commonwealth Soil Conservation budget to pay for fencing while the Department of Agriculture plans to spend \$110,000 per annum on manpower, machinery and seed (Pers. comm. A. Williams, 1985). Due to problems associated with the hardness of soil on scalds only 1,800 ha have been cultivated and seeded since the inception of the project in 1983. In

that time 10,000 ha has been destocked and 22 km of fencing erected (Pers. comm. A. Williams, 1985). However, it was estimated that 900 square kilometres of the West Kimberleys requires mechanical treatment (Jennings, 1985), and that 6,920 square km of that area required destocking (Payne *et al.*, 1979). *This demonstrates the need for more funds for regeneration work and research, and the need for greater involvement of pastoralists in funding fencing under the management plan scheme proposed in this report.* The problems and costs associated with this regeneration project further highlights the need to prevent any further degradation occurring. *There is also a need for further research into the harvesting and use of seeds from healthy native pastures rather than the use of exotic species.*

The Ord River Regeneration Reserve

In the East Kimberley, pastoral leases in the worst degraded areas in the Ord catchment were resumed in 1969 as a 'Water Catchment Reserve' under Section 9 of the Land Act, 1939.

The initial regeneration programme involved destocking, strip contour cultivation and the reseeded of the most degraded areas. Extensive fencing programmes were implemented to control stock movement and hence grazing pressures. Destocking was facilitated by the Ord River Dam Catchment Areas (Straying Cattle) Act gazetted in 1967 and amended in 1969 which vested ownership of all cattle within the Regeneration Area in the Crown. Following mustering, these areas could then be reseeded with minimal interference from stock. The introduced species *Aerva javanica* (Kapok bush), *Cenchrus setiger* (Birdwood grass) and *C. ciliaris* (Buffel grass) were seeded in intermittent strips using a variety of tractor mounted implements (Western Australian Department of Agriculture, 1984b).

In the early 1970s paddocks were erected around the present homestead and experimental cattle introduced into this area. This programme of fencing and experimentation has rapidly accelerated in recent years and now encompasses some 60,000 ha (Western Australian Department of Agriculture, 1984b).

A further 37,000 ha has been fenced on the Fox River Regeneration Research Station (Western Australian Department of Agriculture, 1984a). The most recent programme involves the total fencing and destocking of the Ord River frontage within the Ord River Regeneration Reserve (Pers. comm. G. Gardener, 1985).

This programme has been successful in returning the vegetation cover to a large proportion of the Regeneration Area. The techniques and the species used have proved to be successful on the calcareous soils of the Negri Group in the Nelson Land System and the alluvial soils of the river frontages. These soil types form extensive areas still in need of treatment on that portion of the Regeneration Area [within the proposed Bungle Bungle National Park]. The technique has achieved little success, however, on the extensive scalds on the clays of the Antrim outwash plains and the Elder footslopes land units which also form degraded areas north of the Ord River (Bungle Bungle Working Group, 1984).

Even though \$7 million has been spent over two decades on destocking, improvements and revegetation, 40 square kilometres of the Ord River Regeneration reserve is still severely degraded or eroded (Jennings, 1985). Also, on the Turner Plain alone, 125 square kilometres are still considered unsuitable for grazing due to erosion (Western Australian Department of Agriculture, 1984b). Despite this the Western Australian Government was until recently advocating the leasing of the area to the Sarawak Government which wanted to turn off 5,000 head of cattle/year from the area. This would have required the maintenance of a herd of 20,000 head (Pers. comm. G. Gardener, 1985) requiring either a five-fold increase in stock numbers in developed areas (Western Australian Department of Agriculture (1984a,b) or the use of inadequately developed areas. It would have also required the termination of long term grazing trials at the Ord River Research Station.

Largely due to opposition from within the Department of Agriculture, the Premier has now backed down from his original proposal and has stated that only the Fox River Station section of the reserve will be considered. However, a 1984 Department of Agriculture report on the Fox River Station states that 'the calcareous soils and some frontage country are still in need of attention'. 'Further cultivation and spreading of seed' is needed. Also 'some areas must still be lightly stocked and carefully monitored to ensure that improvement continues' (Western Australian Department of Agriculture (1984a). *It is essential that none of the Ord River Regeneration Reserve be leased out until completely revegetated and fenced in a manner which will allow adequate rangeland management.*

De Salis (1982) suggests that a range of species, including native species, should be investigated to find viable alternatives for use in as yet unvegetated areas. He mentions specifically the native grass genera *Triodia*, *Heteropogon*, *Chrysopogon* and *Aristida* but also shrubs such as *Acacia* and *Grevillea* species and trees such as *Eucalyptus* and *Terminalia*. *The use of indigenous species for revegetation should be actively supported.*

Even though the Ord River Regeneration Reserve contains some of the worst areas of degradation on the Ord catchment it contains less than a quarter of the total Ord catchment and excludes large areas of severe degradation. *There is a need for a published survey highlighting the condition of pastoral leases within this area and the extension of the Fitzroy River Frontage Regeneration Project to also cover this area.*

The Emmanuel and Australian Land and Cattle Company Leases

As previously mentioned, four badly degraded Kimberley Stations leased by the Emmanuels have been recently bought by the Western Australian Government. Also, the Australian Land and Cattle Company is to have four badly degraded stations, which they lease, forfeited for non maintenance of improvements (Pers. comm. C. Russell, 1985). The WA Department of Agriculture intends spending \$12 million over the next two years on developing these leases and subdividing them into smaller leases. These developments will include the drilling of new bores and the fencing off of river frontages (Pers. comm. N. Klepacki, 1985). *As with the Ord River Regeneration Reserve it is essential that these properties*

only be released once adequate regeneration work has been undertaken and sufficient fencing has been constructed to allow for the destocking of degraded areas and the spelling of areas susceptible to overgrazing. It is essential even then that the management of these areas be strictly controlled and monitored by the Department of Agriculture.

The Brucellosis - Tuberculosis Eradication Campaign

Even though it is sometimes claimed that the BTEC programme will result in sufficient fencing for adequate rangeland management in the Kimberley, this is not the case. Where infected herds exist, the BTEC programme only requires that there be adequate fencing to enable cattle to be readily rounded up twice a year for testing. Such fencing is not sufficient to enable the spelling of paddocks as is required for good rangeland management (Pers. comm. S. Tunbridge, 1985).

B. CONSERVATION RESERVES

RECOMMENDATIONS

1. That reserves proposed by the Environmental Protection Authority (EPA, 1980) and the Bungle Bungle Working Group (BBWG, 1984) for the Kimberley be immediately dedicated.
2. That the National Park at Mitchell Plateau proposed in E.P.A. (1980) be extended to include:
 - (a) a significant area of plateau vegetation connecting the two presently proposed areas; and
 - (b) Airfield Swamp or another similarly large and diverse plateau swamp;
3. That the Bungle Bungle National Park proposed in BBWG (1983) be extended south of the previously proposed boundary and should include the least degraded, non revegetated areas of all landforms occurring south of the Ord River within the Ord River Regeneration Reserve.
4. That the National Parks and Marine Parks in the Kimberley *not* proposed in the above publications be dedicated as follows:
 - (1) a marine and terrestrial coastal reserve between Broome and Karratha;
 - (2) a National Park representative of the Phanerozoic South-West Kimberley;
 - (3) several National Parks containing areas which are representative of the Oscar-Napier-Geikie Ranges;
 - (4) a Marine Park at the Rowley Shoals.

5. That the boundaries of Geikie Gorge, Windjana Gorge and Tunnel Creek National Parks be extended to allow for effective fencing and to enable adequate management.
6. That management plans be formulated and implemented urgently for all conservation reserves in the Kimberley. These plans should be:
 - (1) publicly available and subject to public input;
 - (2) subject to parliamentary approval;
 - (3) legally binding on the administering Government Department;
7. That there be a large increase in the number of rangers in all conservation reserves in the Kimberley.
8. That there be a large increase in expenditure on the management of all conservation reserves and proposed conservation reserves in the Kimberley.
9. That there be immediate active management, by resident rangers, of the proposed Mitchell Plateau National Park including:
 - (1) the setting up of fire plots for monitoring purposes; and
 - (2) the implementation of fire control and tourist control measures.
10. That indigenous species be used in the revegetation of degraded areas in the proposed Bungle Bungle National Park.
11. That there be immediate active management of the proposed Marine Reserve at Rowley Shoals.
12. That feral animals and introduced plant species in all conservation reserves be eradicated as a matter of urgency.
13. That there be urgent implementation, in all conservation reserves, of fire regimes which result in maximum species diversity except for areas containing rare or threatened species which require special fire treatment.
14. That developments be excluded from Kimberley conservation reserves with the exception of walking tracks, limited roads for management purposes, interpretive and scientific facilities, ranger residences, toilets and picnic areas.
15. That wilderness areas be zoned covering the majority of all large reserves.
16. That these wilderness areas include representative areas of all land units, plant communities and animal habitats which occur within these reserves.

17. That motor vehicle access be restricted to:
 - (1) small percentages of the total areas of conservation reserves;
 - (2) areas in conservation reserves which do not contain threatened species and which are not environmentally sensitive.
18. That all unsuitably placed tracks be closed or re-routed.
19. That tourist promotion and development be confined to parks and parts of parks which are able to withstand high visitor use without degradation.
20. That tourist promotion and development of conservation reserves be postponed until:
 - (1) management plans have been drawn up;
 - (2) existing management problems, such as feral animals and weeds, have been addressed, and fire management strategies to minimise tourist impact have been worked out and implemented;
 - (3) the biology of reserves has been thoroughly studied, and sensitive habitats and landforms and locations of rare and threatened species identified;
 - (4) interpretive facilities have been developed.
21. The monitoring of sites subject to heavy visitor usage, including quantitative sampling and the use of photopoints.
22. That the area between Broome and Karratha be included in the Ramsar Agreement, the Australian-Japanese Migratory Bird Treaty.
23. That biological surveys be prepared of all unsurveyed conservation reserves, especially areas to be affected by developments.
24. That biological surveys of the following areas be prepared to ensure that the proposed conservation reserves are representative of the diversity of the areas, and include all rare and restricted species and areas of greatest biological importance:
 - (a) King Leopold Range;
 - (b) Roebuck Bay and the Eighty Mile Beach;
25. That biological, geological and anthropological surveys of the Oscar, Napier and Geikie Ranges be undertaken for the same reason.

26. That research be undertaken into the effect of different fire regimes on rare and threatened species.
27. That long term fire plots be set up and used in all plant communities and animal habitats in all reserves to determine the effect of existing fire regimes on species diversity.
28. That research be undertaken into methods of revegetating degraded areas using locally harvested indigenous species.
29. That the Western Australian Government give Drysdale River National Park, Prince Regent River Nature Reserve and the proposed Mitchell Plateau, Walcott Inlet and Edgar Ranges National Parks all Class A status.
30. That the Federal Labor Government stand by its party platform of no mining in National Parks by:
 - (1) refusing export licences for mineral extraction from parks, proposed parks and areas which were excised from parks for the purpose of facilitating mining;
 - (2) offering grants and other assistance for park management only to those States and Territories which agree to prohibit mining in National Parks and other conservation reserves.

ADEQUACY OF PRESENT AND PROPOSED RESERVES

Even though 3.4% of the total area of the Kimberley is conserved in National Parks and Nature Reserves (Hinchey, 1982) the areas that are conserved are far from representative of all plant and animal habitats in the region. For example sixty percent of the plant communities described as occurring in the Kimberley by Specht *et al* (1974) are unconserved. Biological surveys undertaken in the region highlighted further deficiencies. A survey of Dampier Peninsula (McKenzie, 1983) found that the array of coastal plant communities (especially coastal limestone communities), more luxuriant forms of Pindan communities and well watered communities on Phanerozoic sandstone occurring on the Peninsula were all inadequately conserved. In addition, Kabay and Burbidge (1977) drew attention to the 'inadequate representation of the better quality vine thickets (or monsoon forest) and the complete lack of protection of the palm communities growing on laterite at Mitchell Plateau and elsewhere'. Similarly McKenzie (198-) concluded that 'the coverage of the South West Kimberley and Great Sandy Desert by conservation reserves is so poor '.... that many of [the] plant species and all but a few of the communities they form' are presently not conserved in Western Australia. Also, the now rare and restricted Bilby, the Forest mouse and the bat *Tadarina cf. beccarii*, all of which occur in the South West Kimberley, are not conserved in Western Australia (McKenzie, 1981). A further major deficiency is the lack of reserves containing the productive alluvial and outcrop surfaces of the Fitzroy, Joseph Bonaparte and Ord Sedimentary Basins with the exception of three small reserves. These reserves, Windjana Gorge National Park, Geikie Gorge National Park and Tunnel Creek National Park 'represent special features rather than the widespread

surface types of the region and, therefore, do not serve to adequately represent or conserve the range of local flora or fauna types' (Bungle Bungle Working Group, 1984).

The inadequacy of the existing reserve system was, however, recognised by the government in the 1970s and a Conservation Through Reserves Committee was set up to make recommendations to the Environmental Protection Authority on additional reserves which would counter existing deficiencies. This committee recommended the creation of a further twelve reserves on the Kimberley mainland, the dedication of 18 Kimberley islands as conservation reserves and the enlargement of three existing reserves (Conservation Through Reserves Committee, 1978). Despite the endorsement of most of these recommendations by the Environmental Protection Authority in 1980 (EPA, 1980), *to date none have been implemented*. This has been partially due to the conflicting interests existing in the area. For example, interest has been expressed in the development of a tidal power station and a Naval exercise area within the proposed Walcott Inlet National Park while Cape Londonderry has high potential as a source of diamonds (Pers. comm. B. Muir, 1985).

In developing its recommendations the Conservation Through Reserves Committee was:

constrained to a degree by prior commitment of lands to other purpose, notably pastoral use. As a result the proposed reserve system [was] still deficient particularly with respect to representation of areas with high pastoral potential, notably heavy alluvial plains and riverine areas associated with the major sedimentary basins of the Kimberley (Bungle Bungle Working Group, 1984).

One such area fortunately exists in the Ord River Regeneration Reserve, an area which is currently held by the government under the control of the Department of Agriculture.

The 'discovery' by the media of the Bungle Bungles, a spectacular range within this area, resulted in considerable public interest in the area. Consequently the government set up a Bungle Bungle Working Group which subsequently recommended the creation of a national park containing the Bungle Bungles and surrounding areas which contain examples of some of these poorly conserved land units (Bungle Bungle Working Group, 1984). Despite this, deficiencies still exist with the existing and proposed reserve system of the Kimberley. These are described in detail below:

Mitchell Plateau

The Mitchell Plateau area contains substantial reserves of low grade bauxite ... The proposed boundaries [of the proposed Mitchell Plateau National Park] have attempted to, whenever possible, exclude economic deposits of bauxite and to minimise interference with their exploitation (Environmental Protection Authority, 1980).

As a result the proposed park consists of two areas on either side of the plateau. It entirely excludes the lateritic plateau with the exception of some small outliers (Hnatiuk and Kenneally, 1981). This is in spite of

the findings of previous surveys that vegetation on laterites in the Kimberleys are poorly represented in the existing reserve system (Kabay and Burbidge, 1977) and that 'laterite plateau with dense eucalypts and palms is scarce or absent elsewhere in the Kimberley' (Johnstone and Smith, 1981). Although the proposed reserve is representative of the basaltic and sandstone areas which surround the plateau, a Western Australian Museum survey of the Mitchell Plateau area found significant differences between the biota of these areas and that of the lateritic plateau: The *Eucalyptus tetradonta* - *Eucalyptus miniata* alliance 'is most extensive on the lateritic plateau and its scree slopes', the *Eucalyptus latifolia* alliance is 'largely confined to ... the plateau' while the *Calytrix exstipulata* - *C. achaeta* alliance is 'best developed on the lateritic plateau' (Hnatiuk and Kenneally, 1981). This lateritic plateau also contains the greatest mammal diversity in the area (Pers. comm. R. Howe, 1985) and is of high aesthetic appeal due to its extensive dense stands of *Livistonia eastonii*, a palm species endemic to this area.

Also excluded from the proposed reserve is Airfield Swamp, a large body of standing water on the plateau, containing six plant communities. Hnatiuk and Kenneally (1981) describe it as being 'of particular interest on the Mitchell Plateau where such large bodies of standing water are not common'.

For these reasons it is essential that the proposed reserve be enlarged to include a significant area of plateau vegetation connecting up the two presently proposed areas. Included in this area should be Airfield Swamp or another similarly large and diverse plateau swamp.

Due to the presence of a wide range of landforms and a protracted wet season, 'the Mitchell Plateau area has the largest number of [mammal] species collected from any area of similar extent in Western Australia' (Kitchener *et al*, 1981). 'It is possible ... that of the 64 mammal species reported from the Kimberley, as many as 50 species may occur in the Mitchell Plateau area' (Kitchener *et al*, 1981). The area also has a high diversity of birds and plants for the same reasons; 649 species of plants, fungi and lichen and 219 species of birds have been recorded from the area (Hnatiuk and Kenneally, 1981). The diversity, however, is also attributable to the lack of disturbance which the area has experienced until recently. The area has never been extensively grazed by domestic stock (Kitchener *et al*, 1981) and contains no introduced rats, mice, foxes, goats or donkeys (Pers. comm. R. Howe, 1985). However, due to mineral exploration, since 1965 the area has been made increasingly accessible to motor vehicles. This has allowed for increasing numbers of tourists to visit the area. Evidence exists that an increase in fire frequency has occurred during this period (Hnatiuk, 1977) and that these 'frequent fires ... have encroached on ... vine thickets' and appear 'to be resulting in depletion of understorey shrubs' in the other plant communities (Hnatiuk and Kenneally, 1981).

The eventual exploitation of the bauxite on the plateau will also have an even more major impact on the area. This impact won't be confined only to the direct effect of strip mining and of the construction of loading facilities. A significant increase in the numbers of persons living in the area will result in more off road vehicle damage and trampling of banks of waterholes, a further increase in fire frequency and a greater likelihood of weed invasion.

The relatively undisturbed condition of the area, the high species diversity and the present and potential threats to the area are cogent reasons why the area should be proclaimed a national park and actively managed as a matter of urgency. Even though bauxite mining is not expected to occur in the area until the end of the century due to the present low world price of bauxite, it is imperative that park management plans be devised and thoroughly implemented before this mining commences. Also of importance is the setting up of and use of fire plots to determine the effects of various fire regimes on the native fauna and flora of the area and the implementation of fire control measures. The protection of vineforests in the proposed park from fire is of paramount importance, these being the 'richest' semi-deciduous vineforests on the Kimberley mainland (Johnstone and Smith, 1981). Also, a resident ranger should be posted on the plateau immediately to implement these recommendations and to prevent the further formation of tracks by tourists and tour operators.

Roebuck Bay and the Eighty Mile Beach

An important area completely omitted from the Conservation Through Reserve Committee's and Environmental Protection Authority's recommendations is the area of coast between Broome and Karratha. This area is the most important roosting site in Australia, and one of the most important roosting sites in the world, for migratory birds (Pers. comm. B. Lane, 1985). Half a million waders each year use this area to rest and feed while migrating from Southern Australia to Asia (Pers. comm. R. Jaensch, 1985). Due to the large tidal variation and the very gradual declination of the coast, the area is rich in nutrients and thus also supports a high diversity of fiddler crabs, echinoderms and molluscs (Pers. comm. D. Jones, 1985).

The increasingly rapid growth of Broome's population is a potential threat to the most important part of this area, Roebuck Bay. The consequent building boom will be of particular concern should it occur along the coast.

Also of particular importance is Ridell Beach Reef which contains a population of the attractive, endangered mollusc, *Chicoreus rubiginosus*, which is presently threatened by collectors (Sweetman and Jackson, 1985). Despite the closure of this reef to shell collectors in 1985 'the reef [has] deteriorated in both the quantity and complexity of marine life, particularly shellfish' since this closure (Sweetman and Jackson, 1985).

An urgent need exists for a comprehensive biological survey of this area to determine the part most suitable for reservation. It is strongly recommended that a marine and terrestrial coastal reserve be created which includes representative areas of reef, mudflat and beach habitats and includes the most important areas for migratory birds. Permanent rangers are also essential to minimise tourist impact and prevent the harvesting of marine life in the proposed park by tourists and commercial collectors.

In spite of the importance of this area for migratory birds, this area is not covered by the Ramsar Agreement, the Australian-Japanese Migratory Bird Treaty. *In view of its importance, it is recommended that it be included in the treaty.*

The Bungle Bungle Region

As previously mentioned, a committee representing all interested parties, the Bungle Bungle Working Group, recommended in 1984 the creation of the Bungle Bungle National Park. Although the majority of recommendations made by the Working Group are acceptable, the proposed boundaries are unsuitable for the following reason. Although the proposed reserve includes areas of productive alluvial surfaces previously mentioned as being inadequately conserved in the Kimberley, the area included is inadequate considering its degraded condition. Since the lowlands of the Antrim Land System, the lower slopes of the Elder Land System and the interfluvial slopes and frontage country of the Nelson Land System are all severely and/or extensively degraded and eroded (Bungle Bungle Working Group, 1984), it is essential that extremely large areas of these landforms be included to ensure that viable populations of all species surviving on these land units are adequately conserved. *It is therefore recommended that further areas of the Ord River Regeneration Reserve to the South of the proposed park boundary be included in the reserve. It is particularly important that the least degraded, non-revegetated areas of all land units be included in the proposed National Park since all active revegetation undertaken by the Agriculture Department has to date been using exotic species. As recommended in the report of the Bungle Bungle Working Group (BBWG, 1984) it is essential that sufficient funds be made available for revegetation of degraded areas and for on-going cattle and donkey eradication and that only locally harvested propagules of indigenous species be used for this revegetation work.*

The Phanerozoic South-West Kimberley

The 1984 report of the Bungle Bungle Working Group stated that:

additional representation of [the productive alluvial and outcrop surfaces that occur in the Fitzroy, Joseph Bonaparte and Ord Sedimentary Basins] is needed if the conservation reserve system is to retain much of the natural biological diversity associated with these areas. Throughout the Kimberley these surfaces are being degraded by heavy and preferential grazing by stock and feral animals. The need to include representative areas in conservation reserves and actually rehabilitate them is thus a matter of some importance.

Although this Working Group recommended the creation of a reserve in the Ord Basin (the Bungle Bungle National Park) no recommendations were made in the other two basins largely due to the lack of availability of unallotted Crown land in these areas. However, since this report, the government has forfeited and purchased six leases in the South West Kimberley containing large areas of these poorly conserved landforms. *It is therefore recommended that the least degraded, representative areas of these six stations, be conserved as a National Park and revegetated where required using propagules from the indigenous flora.*

Oscar-Napier-Geikie Ranges

Although a subcommittee of the Australian Academy of Science recommended in 1962 that 33,000 ha of the Oscar-Napier Range be set aside as conservation reserves, the combined area of the three small National Parks that presently exist in this limestone range amount to only 18% of the area recommended. Furthermore these three parks only represent special features rather than the widespread surface types of the region.

To date 'little is known of the biota associated with [these] ranges [since] no comprehensive biological survey has been undertaken' (WA National Parks and Reserves Association, 1978). It is known however that the:

land snails of the Napier, Oscar and Geikie Ranges are unique, almost all of them being endemic to these ranges. Each range has its own suite of species different from but related to species in the other two ranges (WA National Parks and Reserves Association, 1978).

The ranges also contain unique geological sites and many Aboriginal sites (Pers. comm. N. Nannup, 1985). *There is, therefore, a need for a coordinated biological, geological and anthropological survey of the whole limestone range system and adjacent conglomerate ranges. The results of this survey should be used to determine the boundaries of several possible National Parks which would be representative of these ranges. Special consideration should be given to including the Chedda Cliffs, Morown Cliff and Lawford Range areas in these reserves as justified by WA National Parks and Reserves Association (1978).*

Also included should be Brooking Gorge. Even though the Environmental Protection Authority (EPA, 1980) did not unequivocally support the Conservation Through Reserves Committee (CTRC, 1978) recommendation that this area be made into a National Park, it did state that 'if signs of significant deterioration of the gorge became apparent, the question of reservation ... be reconsidered'. Since cattle grazing has caused considerable erosion to the banks of the river in the gorge (Pers. comm. N. Nannup, 1985) it is important that the Conservation Through Reserves Committee recommendations be implemented.

Although the Environmental Protection Authority (EPA, 1980) recommended 'that the National Parks Authority review the adequacy of the existing boundary' of Geikie Gorge National Park, it made no similar recommendations for Windjana Gorge National Park and Tunnel Creek National Park. The need for such a review is evident for Windjana Gorge National Park where the present boundary makes it difficult to exclude stock from the fragile riverbanks in the gorge. As a result, these have been and are still being heavily degraded by large numbers of stock which are attracted to the permanent waterholes in the gorge. *It is thus essential that the boundaries of Geikie Gorge, Windjana Gorge and Tunnel Creek National Parks are all reviewed and extended to allow for effective fencing and adequate management.*

King Leopold Range

A study of rare and geographically restricted plants of the Kimberley (Van Leeuwen, 1984) concluded that these species occur in 'five main centres of concentration'. All these areas with high concentrations contain conservation reserves with the exception of the King Leopold Ranges. A 1980 report of the Environmental Protection Authority (EPA, 1980) did, however, recommend that 'the vacant Crown land formerly leased as Bell Creek Station' in the King Leopold Ranges be declared as a National Park and 'should suitable opportunities occur', that those parts of Mt Hart Station that lie adjacent to the south and west-northwest of this proposed reserve be added. Although the essence of these recommendations are acceptable, the proposed final boundary is vague. *It is therefore recommended that an extensive biological survey be undertaken in this range to determine a proposed park boundary which will maximise species diversity and include all rare and restricted species.*

Marine Reserves

In the first report of the Conservation Through Reserves Committee it was noted that the need for aquatic reserves is widely recognised in Australia. Consequently in their report on the Kimberley (CTRC, 1978) it was recommended that an aquatic reserve be declared adjacent to Prince Regent River Nature Reserve. This area, however, is not representative of all aquatic communities that occur in the Kimberley. Areas of shoals, for example, are not represented in the reserve system.

One such area, the Rowley Shoals, was subject to a Western Australian Museum survey and was found to be 'biologically, geomorphologically and recreationally unique in Western Australia' (Berry, 1982). This reef, which is 300 km north-west of Broome, has:

an impressive tropical marine faunal assemblage that is likely to be unsurpassed in terms of diversity or spectacle elsewhere in Western Australia and [is] comparable with the best coral reefs in the world (Berry, 1982).

This reef supports many 'spectacular and rare species' and 'diving on the Shoals [ranks] amongst the most spectacular in Australian Waters' (Berry, 1982). *The recommendations in Berry (1982), that the Rowley Shoals be declared a marine park, should be supported.*

At present the Shoals are subject to increasing pressure from charter boat operators and commercial shell collectors (Berry, 1982). The reef contains large reef fish, giant clams and other large or spectacular molluscs all of which are under threat.

Experience elsewhere has shown that large slow growing species which are fearless of man or incapable of avoiding him are very quickly depleted. Expeditions to collect shells for commercial purposes ..., spear-fishing and bottom fishing for reef fish are activities likely to quickly degrade the present situation unless immediately controlled (Berry, 1982).

This indicates the urgency that exists for the area to be declared as a marine reserve and actively managed.

PARK MANAGEMENT

Management of parks in the Kimberley has been and is still almost non-existent. For example, in 1984-85 only \$62,000 was spent on management of Kimberley parks, all of this being spent on tourist facilities at only one park, Geikie Gorge National Park (Pers. comm. B. Muir, 1985). Similarly, only one permanent and five temporary, mobile rangers operate in the Kimberley. These are all based in Windjana Gorge, Geikie Gorge and Tunnel Creek National Parks and spend most of their time maintaining and administering camping areas. These reserves make up only 0.2% of the total area of conservation reserves in the Kimberley. Prince Regent River Nature Reserve and Drysdale River National Park, the combined area of which is almost as large as Kakadu National Park, are entirely unmanaged except for the occasional rounding up of stock by adjacent landholders (Pers. comm. C. Done, 1985). All reserves are largely unfenced from adjoining pastoral leases and interpretive facilities are virtually non-existent.

The lack of expenditure on management also extends to management plans; no reserves in the Kimberley have had management plans developed for them. This is despite a 1980 recommendation by the Environmental Protection Authority (EPA, 1980) that park management authorities 'prepare a management plan [for the Prince Regent River Native Reserve] to take into account increasing public interest in the area'. Furthermore, no comprehensive biological surveys have been done for Geikie Gorge, Windjana and Tunnel Creek National Parks and Parry Lagoon Nature Reserve.

This lack of management cannot be justified in terms of lack of threats to these reserves. A survey of Prince Regent River Nature Reserve (Miles and Burbidge, 1975) found that 'the sandy banks of Blyxia Creek were severely trampled' by cattle. 'Well defined pads through the box complex and sandy plateau woodlands' were also found at two of the sites surveyed. This survey also noted 'bushfires spreading through the reserve from the east' while another report (Environmental Protection Authority, 1980) noted 'increased public interest in the park' in terms of tourism. An example of the threat to the park from uncontrolled tourism is the track which was forced through the reserve down to the banks of the Prince Regent River in 1984 by the local tour operators, the Lacey Brothers. No permission was sought or granted for this track (Pers. comm. C. Done, 1985). Also increasing numbers of tourists are visiting the reserve by boat. Since this reserve is 'one of the world's outstanding and scenic natural history reserves' (Miles and Burbidge, 1975) and since it contains 28% of Western Australia's northern flora, 60% of the Kimberley's mammals species and 39% of the Kimberley's bird species (Miles and Burbidge, 1975), *the drawing up of a management plan should be treated as a matter of urgency*. The existence of large populations of the Golden-backed Tree Rat and the Scaly-tailed Possum, both of which are now extinct from large areas of their previous ranges (Strahan, 1983) also highlights this urgency.

In Drysdale River National Park 'an obvious management problem is the presence of wild cattle' (Kabay and Burbidge, 1977). A survey of this park (Kabay and Burbidge, 1977) noted 'severe trampling and grazing effects on the grasslands fringing the sandy alluvial flats' and 'damage

... to *Pandanus spiralis* thickets fringing the banks of the Carson River near Woorakin Creek'. 'Eroded areas created by cattle dust-bathing between the woodland and riverine communities [were recorded as being] common'. This same report also noted that 'it is only a matter of time before the area begins to receive a significant visitor impact' the control of tourists already being an obvious management problem.

A survey of Point Coulomb Nature Reserve (McKenzie, 1983) similarly found significant impact by cattle while 'the widespread influence of fire ... [was found to have] sharply reduced mature stands of the *Acacia* dominated 'Pindan' vegetation for which the reserve was originally proclaimed'.

Although the Conservation Through Reserves Committee noted in their 1978 report (CTRC, 1978) that Parry Lagoon Nature Reserve was 'being damaged by cattle' and recommended that 'this should be controlled', to date these recommendations have not been implemented.

This same report also noted that 'increasing numbers of tourists will create management problems in the future' in Geikie Gorge National Park but failed to mention the problem of severe invasion by the introduced vine Wild Passionfruit (*Passiflora foetida*). Not only is the problem of this species competing with native species not recognised, a tourist brochure of the park produced by the National Parks Authority presents it as an attraction.

Although tourist pressure is also a problem in Windjana Gorge National Park, the most pressing problem is severe riverbank degradation by cattle. Although attempts have been made to keep cattle out of the gorge by the use of electric fencing, this has been only partially successful due to the absence of resident rangers during the late dry season and wet season, and due to the unsuitably situated boundary of the park. A further problem in this park is uncontrolled fire. These fires enter the park from surrounding pastoral leases and result in the lowland areas of the park being burnt almost every year (Pers. comm. N. Nannup, 1985).

For the above reasons it is recommended that:

- (1) *Management plans for all conservation reserves in the Kimberley be drawn up and implemented. These management plans should be publicly available, subject to public input and parliamentary approval and, following approval, legally binding on the Department of Conservation and Land Management.*
- (2) *Sufficient rangers be employed and sufficient funds expended so that adequate management can be implemented. This should not, however, be at the expense of conservation reserves in other areas of the State.*
- (3) *The only operations and developments permitted in a reserve previous to the biological surveying of the reserve and the drawing up of a detailed management plan, should be those necessary for the preservation or protection of wildlife, for safety or for research.*

The Bungle Bungle Working Group (BBWG, 1984) noted that:

'it is in part the remoteness and intrinsic wilderness values of the proposed [Bungle Bungle] National Park that have captured the public's imagination. Upgrading of road access would, to a degree, diminish these values'.

This comment applies equally to all other reserves in the Kimberley. *It is therefore recommended that minimal tourist development of all reserves in the Kimberley be permitted.*

4. LEGISLATIVE PROTECTION

The Classification of Kimberley Reserves

In Western Australia, National Parks and Nature Reserves are afforded varying degrees of legislative protection according to a 'Class' system. Those reserves which are declared as 'A Class' reserves cannot be cancelled, reduced in areas or have their boundaries or purpose changed without an Act of Parliament. In comparison Cabinet can make such changes to a 'B Class' reserve without an Act of Parliament but must give an explanation to Parliament. 'C Class' reserves, however, can be altered without an Act of Parliament and without an explanation to Parliament.

With such a system it is imperative that the class of protection given to a reserve indicates the value of the reserve rather than whether it is suitable for other land uses such as mining. To date, however, the latter consideration has predominated in the classification of several of the reserves in the Kimberley. For example, when the Environmental Protection Authority recommended the creation of the Drysdale River National Park it also recommended 'that the area be made a Class A reserve'. However, 'negotiations with the Mines Department finally resulted in the Class B status being adopted' (Kabay and Burbidge, 1977).

Similarly, in its report to the Western Australian Government on proposed reserves in the Kimberley, the Environmental Protection Authority stated that it:

recognises the high mineral potential of the Kimberley Region and the need for systematic exploration in order to test this potential. With this in mind, the Authority has preferred to recommend Class B and C classifications to all but one of the recommended areas (EPA, 1980).

One such area is the proposed Edgar Ranges Nature Reserve. A comprehensive biological survey of this area found that it contained large numbers of presently unconserved species and plant communities (McKenzie, 1981). One such species, the now rare Bilby, has undergone massive decline since European settlement (McKenzie, 1981). The report of this survey concluded 'in view of the importance of the Edgar Ranges Area to conservation of Australian Wildlife' the proposed reserve should be 'given Class A status'. Despite this the Environmental Protection Authority recommended a Class B status for the reserve.

Similarly the Environmental Protection Authority recommended the changing of the status of Prince Regent River National Park only to Class B. This was despite the recommendations resulting from a comprehensive biological survey of the park which recommended that it become an A Class reserve (Miles and Burbidge, 1975). This survey based its recommendations on their findings that the reserve contains 60% of the Kimberley mammal species, 39% of the Kimberley bird species and 28% of the State's northern flora. It concluded that the park is an 'outstanding conservation area rich in flora and fauna, and with interesting historical association and Aboriginal sites ... [and for this reason] its value to nature conservation in Australia is enormous'.

Another proposed reserve which warrants an A Class status is Mitchell Plateau National Park, the biological importance of which is outlined earlier in this report. Despite this, the Environmental Protection Authority recommended only Class B status for this reserve (EPA, 1980).

Similarly only C Class status was recommended by the Environmental Protection Authority for the proposed Walcott Inlet National Park since it 'does not believe that the recommendations for reservation as a National Park should prejudice future decisions relating to a tidal power station'. This is despite the presence in the Kimberley of Lake Argyle, the largest man made lake in Australia, the hydroelectric potential of which is not being used.

For the reasons given above it is recommended that the Western Australian Government give Drysdale River National Park, Prince Regent River Nature Reserve and the proposed Mitchell Plateau, Walcott Inlet and Edgar Ranges National Parks all Class A status.

Mining in Conservation Reserves

Both the IUCN and CONCOM definitions of a National Park clearly exclude the possibility of mining being permitted in such an area. The former definition describes a National Park as:

a relatively large area ... where one or more ecosystems are not materially altered by human exploitation and occupation, where plant and animal species, geomorphological sites and habitats are of special scientific, educative and recreative interest, or which contains a natural landscape of great beauty.

Governments were exhorted to take steps 'to prevent or to eliminate as soon as possible, exploitation or occupation in the whole area'.

The Council of Nature Conservation Ministers (CONCOM) decided in 1970 that a National Park was:

a relatively large area set aside for its features of predominantly unspoilt natural landscape, flora and fauna, permanently dedicated for public enjoyment, education and inspiration, and protection from all interference other than essential management practices

Despite this, Section 23 of the Western Australian Mining Act 1978-81 provides that National Parks and nature reserves are open for mining. Although Section 24(4) states that no mining leases or general purpose

leases may be granted over any National Park or 'A Class' nature reserve in the South-West Land Division unless both Houses of Parliament consent to the granting of such lease by resolution, no such controls exist for reserves in the Kimberley. Consequently, at the time of writing, preliminary exploration for diamonds was taking place in Prince Regent River Nature Reserve (Pers. comm. J. Clark, 1985) despite 'its value to nature conservation in Australia [being] enormous' (Miles and Burbidge, 1975).

The Australian Labor Party's Federal Platform commits the present Federal Government:

... to promote the conservation of fauna, flora, landscapes and genetic diversity by ... opposing mining or any other activity in National Parks which adversely affects the prime function of the park i.e. nature conservation (paragraph 16c).

It is therefore recommended that the Federal Government stand by its party platform by:

- 1. Refusing export licences for minerals extracted from parks, proposed parks and areas which were excised from parks for the purpose of facilitating mining.*
- 2. Offering grants and other assistance for park management but only to those States and Territories which agree to prohibit mining in National Parks and other conservation reserves.*

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ATTACHMENT 1
EAST KIMBERLEY WORKING PAPERS 1985-87

- 1985/1 East Kimberley Impact Assessment Project: Project Description and Feasibility Study.
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ISBN 0 86740 181 8
ISSN 0816-6323
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