

A zoological revolution: utilising wildlife to conserve wildlife and landscapes

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ABSTRACT

The revolution advocated in this forum is that Australia move away from its European farming practices, as suggested by Australian Museum Director Michael Archer and others, and utilise native plants and animals on an ecologically sustainable basis. For example, developing a consumer market for wild-shot kangaroos as an alternative to conventional sheep grazing has much to offer the conservation of rangelands, but there are some who strongly oppose any commercial use of Australia's wildlife. Philosopher and animal rights activist Peter Singer asks us to "consider whether it is ethically justifiable to kill wild animals, not for survival, but in order to profit from their meat and skins". Supporters of kangaroo harvesting must engage with this argument if there is to be any meeting point for debate with Singer and the animal liberation cause. The central proposition put by Archer, Grigg and all who advocate kangaroo harvesting in the sheep rangelands is that the land itself is so degraded that it is unethical to allow this situation to continue or worsen. The ethical case is therefore broader than the simple question of the commercial culling of kangaroos. The land itself must be taken into consideration when the real issue is the long-term future of the country itself.

Introduction

Arguments for and against the conservation of biodiversity through the utilisation of fauna are reviewed in this chapter. In the introduction to this forum we put the case that a revolution in our perception of the problems and a boldness in seeking solutions were imperative if we are to stem the seemingly inexorable and rapid loss of our fauna.

During the course of editing the proceedings it became clear that many of the issues we are addressing in our profession are backward-looking, driven primarily by a call to protect what remains, and largely overlook the option of searching for a more effective approach to conservation.

It has now been recognised in biodiversity strategies that conservation should take a landscape approach and not be limited to the borders of national parks and nature reserves or to recovery plans for threatened species (e.g. Commonwealth of Australia 1996a, NPWS 1999). If this concept does not take hold, it is our view that Australia will experience an even more massive extinction episode than occurred in

western NSW in the nineteenth century, when 24 species of mammals became extinct (Lunney 2001). Similarly, blanket opposition to the use of native fauna as food items, or to the killing of pest or invasive species that further diminish the capacity of our fauna to survive, points to a set of values that is retrograde from a conservation perspective and even antagonistic to basic pest species management practices. As the keynote speaker in a symposium in the USA on "Valuing Wildlife", Berryman (1987) said that the consensus among fish and wildlife administrators was that the two most ominous threats facing wildlife managers were the continuing loss of habitat and the animal rights movement.

The revolution posed at this forum by Mike Archer, Gordon Grigg, Harry Recher and others is for Australia to abandon its European farming practices so that the land and its associated biodiversity may survive and even continue to evolve in changing times. It has taken skilled modeling and new ideas to demonstrate that global climate change is underway (e.g. Hamilton

2001) and it is in this context that scientists of perception are calling for a rejection of current land use, the restoration of entire native landscapes and the adoption of ecologically sustainable development (ESD) practices as a minimum. ESD has been widely acclaimed because it is, after all, a development paradigm that called for less drastic change than other more wide-ranging conservation options which oppose any development. Thus it is far better than doing nothing, and it is likely to retain broad-based support and be politically sustainable. If, however, Australia were to discard the European model along with its sheep, cows and pesticides, and adopt a model that endeavours to feed Australians from native landscapes, it would serve as a brilliant example for the rest of the world. Whether it would rank as a major revolution of world significance or a minor revolution that is particular to Australia would depend on how successful it proved to be in gaining acceptance with the human community and in restoring the land and stemming the tide of species losses.

The revolutionary proposal

Mike Archer's information tells him that our biodiversity is fading fast, and that prolonging current land-use practices just exacerbates the decline. The slow creep in the growth of national parks will not save biodiversity, and although current laws aiming to restrain clearing may be slowing the rate, they are not putting a halt to it. As a consequence, restoration is now urgently needed, and the groundswell of public concern calls for action.

The solution that overtakes all others, in Archer's mind, is to rapidly replace traditional agriculture with native foods in a landscape managed so as to encourage the maintenance and restoration of our immense natural biological wealth. Grigg's proposal is to reverse land degradation by encouraging kangaroo harvesting over sheep production, a concept he has tested in many major forums (e.g. Grigg *et al.* 1995, Lunney and Grigg 1988). This idea is as profound as the concept Archer is pursuing. The difference is that Grigg is tightly focused on one problem in one landscape which he knows intimately, having flown over it many times over a quarter of a century counting millions of kangaroos (Grigg this forum, Pople 1999).

Archer is keen to test whether Grigg's ideas can bear fruit on practical farms, either privately held

or government-owned. However, as any local farmer from the arid or semi-arid lands can tell you, it will be a slow process. Sitting out a drought might exceed the political life of a supportive politician or a particular government, or even the life of a museum director. A further complication arises with neighbours who do not support the idea and who see kangaroos as adding to total grazing pressure and shoot them to allow sheep to run to the maximum on their properties. The question might then become, whose kangaroos were being shot?

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Many scientists working in the area of conservation biology have published impressive contributions to books and journals and official documents devoted to conservation and management (see, among many others, *Australian Zoologist*, published twice-yearly by the RZS; *Pacific Conservation Biology*, edited by Harry Recher and published quarterly; *Conservation Through Sustainable Use of Wildlife* by Grigg *et al.* 1995; *Conservation Biology* by Burgman and Lindenmayer 1998; the NSW Biodiversity Strategy NPWS 1999). Despite the availability of such publications, it was noted at the forum that the Australian community has a much clearer view of the impact of immediate and visible problems, such as pollution, than it does of the long-term future. Yet it is the not-too-distant future that the conservation biologists mentioned above, and others, are concerned about. The crushing effect of development and human overpopulation on our surviving biodiversity shrinks the time span of the debate to a few human generations. How will the country appear at the tri-centenary on 26 January 2088? Will flying-foxes still grace the city skyline at dusk, will the air be clearer and the streets cleaner, and will populations of our native fauna be flourishing in a grand network of national parks linked across the landscape by intelligent and co-operative ventures with private landowners? Will both governments and individuals be benefiting from a more sustainable use of our native products, including the wildlife itself? Or will we still find ourselves on the same path of relentless exploitation of the land for short-term financial gains?

Senate Report on Commercial Utilisation of Wildlife

The Senate Report entitled *Commercial Utilisation of Australian Native Wildlife* (Parliament of Australia 1998) is basic reading for anyone interested in this issue. In the Executive Summary and Recommendations of this report,

the first conclusion was that “the future of biodiversity conservation in Australia now depends very much on finding mechanisms, and particularly financial incentives, for natural habitat to be restored on private lands. The Committee concluded that, if appropriately managed, commercial utilisation of wildlife is one such mechanism”. In the large chapter devoted to macropods, the Committee states that it “believes that it is a legitimate activity of the Federal Government to support an export industry based on the commercial harvesting of kangaroos, which is being prejudiced overseas by public campaigns based on false information”. It is worth examining some of the points in detail.

The commercial kangaroo industry consists of skin and leather, game meat and pet food meat sectors, both in domestic and export markets. The KIAA (Kangaroo Industry Association of Australia) has calculated that the industry now has a total value of \$240 million annually. According to the Rural Industries Research and Development Corporation (RIRDC), the farm-gate value for the kangaroo industry in 1997 was some \$50 million. Through work by the Agriculture and Resource Ministers Council of Australia and New Zealand (ARMCANZ), there are now strict national hygiene standards applied to kangaroo harvesting for meat. Each State determines its own annual quota for kangaroo harvesting, manages kangaroo surveys, determines the number of kangaroos taken and controls the issue of licences. Each quota is typically 15-20% of the previous year’s total population. Quotas are set to ensure a sustainable yield. The current annual quota is something under 4 million kangaroos, but the quota is often not fully taken up because the harvest is restrained by the market.

The Committee listed the reasons for opposition to kangaroo harvesting: some witnesses opposed the use of animals for any purpose; some claimed that the kangaroo harvest is inherently cruel; others asserted that wildlife differs from domestic stock and should not be used commercially; some believed that kangaroos should not be regarded as a pest; and others did not think it possible to harvest wildlife in a sustainable manner. Under the heading, “Standard of Information received”, the Committee noted that “some of the arguments used by individuals and groups opposed to kangaroo harvesting were based on information gathered at least a decade ago, followed by the claim that ‘nothing had changed since then’”. The

Committee also noted that some submissions presented by animal liberation groups and individuals contained assertions which were not supported by data or were not sourced.

The Committee drew on a 1995 RIRDC report on the future of the kangaroo industry. It noted that there was no commercial farming of kangaroos in Australia, i.e. kangaroos bred in paddocks and held like stock, and stressed that the ecological sustainability of the kangaroo population was a fundamental prerequisite for any kangaroo industry. It made the observation that the game meat industry was labouring under both the pet food legacy of the past and continual misrepresentation by the animal liberation lobby. The Committee urged the kangaroo industry and the pastoral industry to cooperate, and suggested that the government needed to support the kangaroo industry in domestic and export markets beyond lip service. It also noted submissions, including Grigg’s, on the matter of rangeland harvesting – that is, replacing sheep with kangaroos. Although Grigg’s views were recorded with strong support, this was accompanied by cautions with respect to the current economic viability of the proposal, and one view claimed that persuading farmers to switch to “farming” kangaroos would not solve the problem because the great majority would simply “farm” both the kangaroo and their traditional stock, and the “traditional compulsion to overgraze would continue”.

In its Summary and Conclusions to the macropod chapter, the Committee noted that three key interrelated issues are currently facing the industry: matters relating to animal welfare; public opinion about the acceptability of kangaroo products; and whether kangaroos are considered as a pest or as a resource. The Committee also endorsed the approach taken by the Department of Foreign Affairs and Trade in attempting to counteract the factually incorrect material disseminated by some NGOs overseas. The Committee’s final conclusion was to note that contributing to the low public acceptance of the kangaroo industry is the widespread view that superabundant kangaroos are a “pest” to be removed rather than a “resource” to be efficiently utilised.

Engaging with the animal liberation viewpoint

An animal liberationist might point out that since every second macropod species is extinct or threatened, how can we propose eating what is left? Yes, we acknowledge we need expert and

detailed knowledge about kangaroos. For example, in the Western Division of NSW, we know that three species of macropodids are extinct and a fourth is threatened, while another four large species are flourishing to the extent that the total annual number shot of these species is in the hundreds of thousands (Gilroy 1999). Add a touch of hard line animal rights propaganda to these figures, stir in people's sense of "doing the right thing", and there is real confusion in society.

However, high quality care and handling of animals is not achieved through misrepresentation of scientists and their motives, a wishful view of how to conserve fauna nor ignorance of individual species (Lunney 1999). The research position on animals has made real progress in the last 10 years through the publications of organizations such as Australian and New Zealand Committee for the Care of Animals in Research and Teaching (ANZCCART) (e.g. Mellor and Monamy 1999). Kangaroo numbers are monitored carefully, the techniques for assessing numbers are revisited, and the number shot is carefully regulated (e.g. Grigg 1995, Lunney and Grigg 1988, Lunney 1995, Pople 1999, Grigg this forum, NPWS 2001). Despite this, the opposition is still vocal, if not logical.

Common sense says eating kangaroo is a healthy alternative to beef and lamb. Kangaroo provides high quality flesh, ideal both for the diet-conscious as a lean meat and for the connoisseur's table as fine flavoursome game. What is not clear from much of the hostile writing (e.g. Wilson 1999) is whether it contains a vision of how to conserve the biodiversity of Australia. We recognise that the utilisation of native wildlife raises complex and challenging issues but the ethical debate does not start and finish with depicting the slaughter of kangaroos as brutal. It centres most significantly on the appropriate way to manage the land sustainably.

Peter Singer (Foreword to Wilson 1999) asks us to remember that for "virtually all of the history of western civilization, the right of human beings to trample over all species on this planet, and over nature itself, has been taken for granted". He asks us to "consider whether it is ethically justifiable to kill wild animals, not for survival, but in order to profit from their meat and skins... Those who exploit kangaroos, for example, seek to show that the 'resource' is being 'harvested' on a 'sustainable' basis. Kangaroos, then have value only if they can

provide commercial profit and the exploiters want to ensure that the kangaroos survive so that they can continue to be exploited".

This, we consider, is only half true. Although human beings have trampled over many species on this planet, we can now recognise the results of such treatment and have an obligation, in the face of a rapidly expanding human population, to manage the remaining species sustainably (including our own). What Singer evades is the problem that if no commercial value is placed on kangaroos there is no inducement to harvest them on a sustainable basis and they will continue to be shot as "vermin" to protect the sheep industry. This will not stop until farmers and graziers are offered a viable financial alternative.

Cruelty and suffering lie at the heart of Singer's ethical objection to the kangaroo trade: "Those who see kangaroos only as a resource overlook the ethical aspects of how we are treating other sentient beings. Several hundred thousand kangaroos die inhumanely every year". The specific question here is whether shooting a kangaroo in the head is a humane death. If the answer is "no" then the solution may be to improve the quality and supervision of the shooting. We probably all agree that inhumane treatment of individual animals is unacceptable and for that reason protocols have been developed to minimise animal suffering and they need to be rigorously applied. However, the issue of implementing best practice for humane shooting does not really tackle the core of Singer's argument (Singer 1995 and the Foreword to Wilson 1999), and that is that animals should not be killed at all, even humanely, but it does address a primary stimulus to the opposition to kangaroo harvesting, namely the cruelty issue.

We accept the proposition that an ethical outlook must lie at the heart of the decisions to manage wildlife and the land, and that those who own the land or have management rights over it, including governments, do not have the only ethical say in the matter. It is our view, however, that the position of not killing animals in principle runs counter to best wildlife and land management practices. Further, a switch from farming practices that allow land degradation to continue to ones that give restoration a chance is an ethically reasonable approach to the matter. We would all also agree that kangaroo populations must be harvested sustainably and the land itself must be restored to a more native state, thereby conferring benefits on other native

species of no commercial value (e.g. Dickman *et al.* 1993, 2002; Lunney 1995). The question of sustainability appears to be irrelevant to Singer, yet it is on this matter, particularly in the context of ecologically sustainable development, that rests part of the ethical argument for harvesting kangaroos. For Grigg and Archer, the commercial shooting of kangaroos is the practical means of achieving the land restoration that results from removing the harmful effects of sheep and replacing them with locally adapted species.

Singer believes that: "By ceasing to rear and kill animals for food, we can make so much extra food available for humans that, properly distributed, it would eliminate starvation and malnutrition from this planet" (*Writings on an Ethical Life*, cited by Sian Powell in the *Weekend Australian* 21-22 April 2001). This is a reasonable proposal, but it does not apply to every location or region. For example, the sheep rangelands are located mostly in semi-arid and arid lands that are not suited to intensive crops such as Singer suggests might replace domestic animals, but they would be suitable for an expanded kangaroo harvesting industry. Poverty and starvation are arguably the greatest problems in the world today, but the drought-prone Australian rangelands can never become the breadbasket from which the poor of the world are fed, but they are potentially a modest if irregular source of high quality animal protein and leather.

Even if switching from an animal to a vegetable diet were possible, it would only be a short-term option in staving off the impact of overpopulation. There is also the question of nutrition, with most of the people of the world eating some fish or meat or eggs or dairy products. So, who is to go vegan from a nutritional, ecological or ethical standpoint? There is certainly a case for living more simply so that others may simply live, but arguing against a kangaroo industry on those grounds does not seem to make the best sense ecologically. A sudden huge boost in world food supply would only partially alleviate the immediate population problem in the very short-term because the world's population is continuing to grow and mass starvation will continue unless we deal urgently with the question of population growth, a major ethical issue of the modern world. This topic is not only about size, but also about distribution of the population, the local and national impact of the population of each region, their ecological footprint and the environmentally adverse impacts of distributing huge quantities of food and other

goods. As ecologists we are pointing to the diminishing capacity of the land to sustain life, and thereby exacerbating the problem of too many people, and thus support the option of using locally-adapted species, such as kangaroos in the rangelands, that also aims to conserve the land and its biological heritage. It is, we contend, a defensible ethical stand in a complex matter.

The land ethic

The central proposition put by Archer and by Grigg, and indeed most of those who advocate kangaroo harvesting in the sheep rangelands, is that the land itself is so degraded that it is unethical for us to allow this situation to continue. Some suggest that the answer is to move all the people off these lands and leave the lands to regrow as a wilderness, but that does not seem to be a culturally or politically likely solution as it would leave 30-40% of the State unoccupied, at least in the short-term. The case for an expanded system of national parks in the rangelands remains strong, but it will not be the sole solution to conserving regional biodiversity, where most of the land is in private hands or leasehold. The most intelligent solution to conserving biodiversity will be to work with the grazing community. Graziers have shot kangaroos since the early years of the wool industry in the mid 19th century, and continue to shoot them as pests in numbers that exceed the number going into the commercial trade. Kangaroos are shot mainly to relieve the total grazing pressure for the benefit of sheep, and many of the shot kangaroos are left to rot on the ground or are sold to the pet food trade. The carcasses themselves, however, cause environmental problems in providing a superabundant food source for red foxes and feral cats, pigs and dogs which in turn increase predatory pressure on small native mammals, birds and reptiles, and possibly also sheep.

The solution that has much to offer is kangaroo harvesting as a replacement for sheep grazing under the strict rules of ecologically sustainable development, with attention to all aspects of the cruelty issue. We contend that it not just a question of not killing kangaroos for commercial use. The land also matters, including the diversity of life that depends on it, but in any case a ban on the commercial use of kangaroos would do little to slow the killing of kangaroos as agricultural pests. As Grigg points out, some two to three million kangaroos are harvested every year and sold for low prices as skins and pet food because landholders still consider them to be a

pest rather than a resource. His proposal is for an exploitative industry that would give life to the rangelands by providing farmers with a financial incentive for reducing sheep numbers and thus the damage they cause the environment. This is also the rationale behind Archer's proposition.

The wider issue is the long-term future for the bush itself, its health and sustainability. Over the last 15 years Gordon Grigg has propounded a new strategy that is potentially satisfying to the bush, and his thesis has already had a good airing (Grigg *et al.* 1995), but it does not seem to be to city tastes nor has it captured the imagination of the entrepreneurs on the land. It may well be that more community involvement and ownership is needed, which means stronger emphasis on implementing Objective 1 of the NSW Biodiversity Strategy (NPWS 1999), namely, "Community consultation, involvement and ownership". It may also be that the public debate on the principles and the science of the matter need further extension, hence this forum.

Stemming the tide of extinctions

In the first ever compilation of the State's vertebrate fauna, with an official listing of the conservation status of each species, we found in 1992 that mammals constituted the worst affected class, with 27 species extinct, a further 50 species threatened, of 130 species present in NSW at the time of European settlement (Lunney *et al.* 2000a). Recent survey work has found three new species for the State, putting the number of mammals at 133 species, and two of the three new species immediately entered the endangered schedules (Lunney *et al.* 2000a), and the third new species is set to enter the list. The plight of some groups shows that the true depth of the losses has gone largely unnoticed. The rodents, an order that has a pestilential public image, are the worst affected (Dickman *et al.* 2000). From a landscape perspective, the Western Division of NSW has displayed the greatest vulnerability of all to European settlement, with 24 mammal species becoming extinct within 60 years of first settlement in 1841, and most within one human generation. The primary cause was the export-driven wool industry, which dictated filling the land with sheep in numbers that were way beyond its capability to sustain (Lunney 2001).

In the same study (Lunney *et al.* 2000a) it was found that while 26% of the State's vertebrate species qualified for listing as threatened,

populations of about 10% had stayed the same or increased in numbers. This is part of the ecosystem disruption process (Recher 1999). Even if most species decline, some will increase in a new environment. The ecological processes that underlie the causes of decline, such as land clearing, killing of native predators and increasing the number of watering points in the landscape, cause some species to rise in number. The macropods display this well with half of the species declining, some to extinction, while others, the commercially shot species of kangaroos, have increased. The problem of overabundance of some kangaroo species in some locations is ecologically part and parcel of the same threatening processes that have given Australia such an extraordinary reputation as a once-megadiverse nation that has seen such a great loss of its fauna since European settlement 213 years ago. Nowhere in Australia is this more stark than in the Western Division of NSW, where sheep numbers driven by export wool prices caused such profound damage to the land and the native fauna in the nineteenth century (Lunney 2001). Yet it is in this troubled landscape that the commercial use of kangaroos for human consumption offers a real chance of reversing the trend. As ecologists with an enthusiasm for conserving our native species and their habitats, we consider that it is consistent – and ethical – to eat native fauna from a native landscape rather than allow a transformation of the landscape into one hostile to most native species so that imported and ill-adapted species, such as sheep, can flourish.

The sixth global extinction episode

Fauna losses are mounting at a greater rate than we are undertaking action to curb the losses and institute restoration programs. Steady action, gradual change and balanced progress are not enough to avert the impending sixth global extinction. The fifth global extinction saw off the dinosaurs and ushered in the age of mammals. In this case, an external force, a meteor, causing drastic climate change is generally agreed to be the primary cause. Now, the sixth extinction is being caused by human-induced changes, principally habitat loss and ecosystem degradation.

Since European settlement in 1788, Australia has become an outstanding contributor to the world list of extinct mammals. Eldredge (1998) from the American Museum of Natural History provides a global list of animal species extinct from circa 1600. There are 60 mammals on the

list, of which 20 are Australian. One could cavil about the details of the Australian extinction, such as whether the two species from Christmas Island should be counted, but the fact is clear in the age of mammals: Australia is a leader in the sixth global extinction episode. To mammalogists like Mike Archer, this is an outrage. He has spent the bulk of his working life sifting through the palaeontological evidence to trace the evolution of the Australian mammal fauna. Will the last phase of his working life as a museum director be spent expanding a register of extinctions that covers only two centuries, an infinitesimal period of time compared with the tens of millions of years over which the Australian mammal fauna evolved? His answer is: "Not if I can help it!"

There is an urgent need to apply the stated ideals in the national and state strategies for conserving biodiversity (Commonwealth of Australia 1996a, NPWS 1999) to avert an ever-worsening chronicle of loss in the State of the Environment reports at either the commonwealth (1996b) or State level e.g. NSW (EPA 2000). Harry Recher may well be right; eating kangaroo is a good idea, but it will not reverse the loss of biodiversity. Recher shares with Viggers and Lindenmayer the view that we need to press even harder for the prevention of further land clearing and habitat degradation. Habitat loss is, in their view, the basic cause of the loss of biodiversity, and should be the target of our conservation efforts.

Despite their apparent differences, all speakers at this forum and, indeed, most of the participating audience, as evidenced from question and answer sessions, share a profound concern for the loss of fauna, the loss of biodiversity and the depletion of the natural landscapes. What was less clear was the vision of what Australia might look like in the future. Archer's palaeontological past has equipped him well for this task. His revelatory book *Riversleigh* (Archer *et al.* 1994) demonstrated that landscapes change, that species go extinct and that entire regional faunas can fade from the face of the earth. Will this again be the fate of the Australian fauna in the next hundred years?

Conclusion

The modest restraints that existing laws place on development will still allow many vulnerable species, such as the koala, to slide onto the endangered schedules, even though the problems for this species have been identified and the solutions carefully articulated. The solutions aim

to give a balance to human needs and the desire to locally manage the habitat requirements of koalas where local threats, particularly dog attack and motor vehicles, can be reduced by local action (ANZECC 1998, Lunney *et al.* 1999, 2000b, 2001, Lunney and Matthews 1997). However, the rate of implementation of the solutions, such as the preparation and execution of shire-wide plans of management for koalas, is slower than is necessary for the conservation of existing koala populations and koala habitat, and the slide will continue. Concerted action is required but it is neither possible nor reasonable to point the finger at just one group, such as the state government, local developers or local council. Collectively, car owners who drive the pace of road upgrading are, in effect, forcing the clearing and fragmentation of prime koala habitat and killing koalas on the roads; dog owners who allow their dogs to roam in packs at night are contributing to the silent death of koalas by dog attack; and councillors who do not support environmental zoning to protect koala habitat are also hastening the loss of local koala populations. This koala example illustrates that it is possible for scientists and local communities to work cooperatively to conserve fauna habitat on private land and to take a landscape approach while working within a set of national objectives. Although the Coffs Harbour Plan of Management for koalas took a huge amount of effort (Lunney *et al.* in press), it has demonstrated the necessity of linking sound science and good planning with a convincing local economic framework (Hamilton *et al.* 2000). The zoological revolution is arguably underway, but as yet it is moving at a speed too slow to match the rate of loss.

Australian mammalogists, who are profoundly concerned with the conservation of Australia's mammals, consider that eating kangaroos is consistent with their conservation principles. The Australasian Wildlife Management Society and the Australian Mammal Society have adopted a policy that articulates this view. The kangaroo's place on the coat of arms has totemic significance, but that does not preclude eating it, especially as it is such a healthy meat. Scare campaigns that imply that it may carry a new disease pale when one looks at the list of diseases in domestic stock. Ecologically sustainable development in the rangelands includes utilising kangaroos and decreasing the stocking rates of the sheep as well as dedicating new reserves and restoring the eroded landscapes and waterways.

No other formula to date has proposed a sound means of doing this, including the massive Western Lands Review (Anon. 2000).

The careful management of a sustainable harvest of kangaroos that places the onus on those who use kangaroos to restore the landscapes as the sheep are replaced offers a new solution to biodiversity conservation and the restoration of the land. To be successful, it means that kangaroos must return a profit to the landholder. This is part and parcel of ecologically sustainable development. It is not a sell-out of conservation principles but a way of overcoming the limited framework of a primarily protectionist approach to policy. New reserves, and total protection of all species through legal means, including threatened species legislation, have characterised much of biodiversity conservation in NSW for

the last half century. This traditional approach is one that has a great record, but it is now proving to be inadequate. Researchers have played their part in identifying causes of biodiversity loss, in selecting and managing new reserves and assisting to develop and implement threatened species legislation, but one can only agree with Wood's (2000a, b) general thesis and global perspective that this has been insufficient to reverse the losses. Although Archer and Grigg may not be totally right – the economic returns to the rangeland grazier from a conversion to kangaroos have yet to be demonstrated, and the cruelty to animals issue may be a greater concern in the public mind than has been recognised – they are far closer to a real solution for biodiversity conservation than current practices in land use are offering.

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