

## Report: New Zealand and Australia Faculty Seminar Abroad

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To a biologist like myself, a chance to visit Australia and New Zealand was a tremendous opportunity to explore regions of the planet that are completely different from the north temperate ecosystems I am most familiar with. Because of their longstanding isolation in both time and space from other landmasses, Australia and New Zealand are characterized by an extremely rich and diverse fauna and flora, many of which have no counterparts in the northern hemisphere. At the same time, these regions are in a state of ecological crisis; massive recent population growth and increasing urbanization has precipitated large-scale habitat destruction and species extinctions. This is ironic, because the “frontier” or bush mystique associated with both countries is as prevalent there as it is in the American media, a cultural identity that is associated with natural unspoiled wildlands or outback. Paradoxically, the vast majority (85%) of Australians and New Zealanders live in cities and towns; as a result, most people have little contact with either wildlife in a natural setting, or even healthy functioning ecosystems.

It was my objective in this seminar to (1) learn more about the ecology and evolution of birds and mammals of New Zealand and Australia, and (2) examine the role of human impact on wildlife and wildlands, in the context of the cultural identity of both countries. The following is based on personal observations, information presented by host institutions, and text references.

**New Zealand.** In both New Zealand and Australia, the environment has to a very large extent shaped both the natural and the human history. New Zealand is the most isolated landmass on the planet; consequently the first humans arrived very recently, probably less than 1000 years ago. The terrain is extremely rugged and mountainous, with a predominantly maritime climate. Early accounts describe the rainforests as being so heavy it took 4 hard days to cover less than 20 miles. There were no land mammals (except for 2 bat species) and no native mammalian predators.

The most extraordinary biotic feature characterizing New Zealand is the extensive and diverse assemblage of bird species. Flannery remarks that New Zealand is “a completely different experiment in evolution to the rest of the world”, in that birds evolved to fill essentially all the ecological roles occupied by mammals in other parts of the world, including long-necked browsers, grazers, insectivores, large carnivores, and so on. A significant proportion of species were flightless. Seabirds are especially diverse, because coastal upwellings of cold nutrient-rich waters provide abundant food, and the highly dissected coastline provides many nesting areas. This was made evident to us when we visited the [Taiaroa Head Royal Albatross colony](#), the only mainland colony of albatross in the world. At 9 kg in weight and with a 3-metre wingspan the Royal

Albatross is the largest and most spectacular seabird now extant; to see these birds returning from an oceanic foraging trip is unforgettable. We were fortunate in that the weather conditions for albatross spotting were perfect – cold, bright sun, and a brisk offshore wind. Just as our boat rounded the colony, an adult albatross came banking over the waves, gaining altitude for the final approach to the cliff head where its chick was waiting to be fed. Because eggs are laid in October through December, and the chicks take 11 months to fledge, there are young birds present essentially all year, even in the austral winter. We saw at least 6 young birds in various stages of development, some almost ready to fledge, and others still in their fluffy white baby plumage. Although the albatross were definitely the highlight, the diversity of other seabird life was equally impressive. I counted 6 species of oceanic cormorants (or shags), shearwaters, 4 tern species, and several species of gull. Another highlight was a glimpse of several endangered **Hooker's sea lions**, including several mother-pup pairs.

Unfortunately, New Zealand fauna have been especially vulnerable to human-caused disruptions. It is evident that humans and their companion animals (such as dogs, pigs, cats, and rats) had a direct and devastating effect on both the landscape and the wildlife of New Zealand. Because of its geographic isolation, New Zealand was the last major area to be colonized by humans; thus most extinctions of indigenous wildlife have occurred within recent times. An especially poignant exhibit of extinct fauna at the Otago Museum illustrates this. At least 9 bird species have become extinct within historical times, and all of these were represented in the museum collections. The case of the **huia** was particularly noteworthy.

Huia were sacred to the Maori; numerous cultural artefacts testify to their importance in Maori culture and social organization. Although Maori hunting of huia was extensively regulated by tapu and tradition, subsequent to European colonization, these tapus were disrupted with the breakdown of Maori culture. Demand by European collectors resulted in the hunting of the huia to extinction by 1907.

In a similar fashion, direct over-exploitation has been a significant cause of the loss and reduction of much of New Zealand's wildlife. Evidence suggests that Maori hunting eliminated about 26 species, including 4 species of endemic seabirds, 30 % of endemic land birds, and all 11 species of the giant flightless [moa](#), the last of which became extinct in the 1600s. Many other species were reduced to localised populations, mainly on offshore islands after their elimination from the mainland. However, the greatest number of extinctions coincided with the arrival of European settlers. Extensive habitat destruction occurred as forests were cleared for timber, pasture, and agriculture; these activities resulted in loss of a further 16 species of land birds, one of 2 native bats, and unknown numbers of fish, amphibians, invertebrates, and plants. Commercial hunting extensively reduced marine mammal populations; by 1800 and in less than 20 years the European sealing industry wiped out nearly all seal herds. After years of stringent protection some species have now recovered to the point of being locally abundant pests; however, other species such as Hooker's sea lion and [North Island Hector's dolphins](#) are still of special concern.

Various commentators have described the modern New Zealand landscape, somewhat acidly, as consisting of “sheep, introduced grasses, noxious weeds, and pine trees”. It is evident that the introduction of exotic species – both plant and animal – has taken an enormous toll on New Zealand wildlife. Originally almost 80% of the total land habitat was dominated by evergreen rainforest, with the remainder consisting of conifer broadleaf forest, wetlands, and grasslands. Rainforest has now been reduced to 23%, and wetlands have been reduced by 90% of their original area. Although desirable for pasturing livestock, native grasslands are now heavily degraded by overgrazing, rabbits, and noxious weeds. Approximately 230 species of vascular plants have become naturalized since 1870 at a rate of about 7 per year; most of these are weedy species which out-compete native species. A particularly striking example of the impact of an introduced exotic plant species is European gorse. Originally introduced by sheep farmers as a cheap form of natural fencing and shelter, it turned out to be worse than useless, because it is highly invasive and almost impossible to eliminate when established. The impact of *Pinus radiata* is less easy to gauge. This species was introduced for “re-forestation”, and as a source of pulp and cheap furniture wood; its short harvest cycle make this species more commercially desirable than native woody species, many of which have extremely long (100-200 year) growth cycles. However, soil degradation and water table reduction are extensive with this species; native herbaceous ground cover species are unable to re-establish.

Introduced vertebrate species have been especially detrimental to indigenous bird populations. Since 1769, approximately 80 vertebrate species have become established, of which 34 are mammals. Because New Zealand had no native land mammals (with the exception of 2 species of bat), the effects have been devastating. Mammalian predators (such domestic cats, rats, dogs, foxes, weasels, and possums) take large numbers of ground-nesting birds and destroy nests. Large herbivores, such as deer, goats, and pigs degrade and destroy habitat. I was initially surprised during my first few days in the country when the majority of birds I saw in and around Otago were species familiar to me from a childhood spend in Europe – European blackbirds, spotted thrushes, chaffinches, goldfinches and the like. Many species were introduced on purpose by so-called [Acclimatisation Societies](#), for no better reason than they reminded early white settlers of “home”, or to fill up what was perceived as large “ecological gaps” [see Frith (1973) for a discussion of the rationale behind animal translocations].

In the near future, increasing human demands will impact primarily North Island because the majority of the human population - about 67% - is concentrated north of Waikato. To accommodate the demands of an increasing population, energy use is projected to increase by approximately 1.5% per year. Meeting these needs will be difficult without substantial shifts in patterns of energy use. Although water seems to be abundant, hydroelectric power is not reliable; there are major problems in both prediction and management. Large amounts of water are lost to the sea without containment, and massive yearly variations in availability occur naturally as a result of El Niño Southern Oscillations (ENSO). In the last decade, increasing attention has been directed to the negative environmental impacts of damming rivers. New Zealand is not self-sufficient in petroleum; current reserves can only supply 50% of demand. Furthermore, oil and gas

reserves are located considerably south of the major population centres, therefore there is a large “transmission gap” resulting in an approximate 33% loss of energy. Because of its 1984 anti-nuclear legislation, nuclear power is not an option for New Zealand. This is probably sensible as the most logical places for nuclear power plants are Auckland and Wellington, both of which are sited on major seismic fields. It is anticipated that energy needs will be met by coal-fired energy generation; projected use is estimated to increase from 2 to 17%. However little planning appears to be directed to controlling associated air and water pollution.

The creation of natural reserves in New Zealand began in the late 1800s, but had its greatest impetus in the 1970s and 1980s. Major [environmental victories](#) include passing of key legislation, such as the Marine Resources Act (1971) and the Resource Management Act (1991), and protection of sensitive areas, such as remaining North Island native forests (1980s) and the South West World Heritage Area (1989). At present, approximately 30% of the landmass of New Zealand is set aside as natural reserves.

The role to be taken by indigenous peoples in environmental decision-making is still in the process of determination. The 1840 Treaty of Waitanga guaranteed native rights over natural resources, but there is still little practical recognition of either traditional knowledge or the responsibilities of indigenous peoples.

**Australia** – In contrast to New Zealand, which (in the words of Tom Brooking) was “born modern”, Australia has consistently maintained a “frontier mentality”, in spite of massive and recent urbanization. The stock rider and bushranger are popular and pervasive cultural icons (hence the popularity of Akubra hats, Ned Kelly, and bush poetry). The country retains its commitment to vigorous immigration, and has enthusiastically embraced the concept of multiculturalism (although the latter concept is subject to at least 3 mutually exclusive interpretations).

Like New Zealand, the environment has shaped the history of Australia, although the very different conditions have selected for a radically different trajectory. Australia is the world’s smallest continent, but the largest island; its land area is approximately the same as continental USA but with only 1/10<sup>th</sup> the human population. Unlike northern hemisphere ecosystems, Australian habitats are dominated, not by seasonality, but by low fertility soils, intermittent fire, and above all, the El Niño Southern Oscillations resulting in unpredictable rainfall and long droughts. Disastrously however, development philosophies to the present day are based on ideas of attempting to reproduce ideas of the British “homeland” coupled with European and American technologies more suited to fertile north temperate regions. This mindset totally ignores the ecology and environmental constraints of the real Australia; Flannery predicts that the problems inherent in this “cultural maladaptation” and the spiralling human population will only increase in the near future.

To my mind the most impressive feature of Australia is the sheer diversity of marsupial mammals, and the incredible bird life. The best places to see Australian (or any) wildlife on a limited time budget are zoos, and in this respect the [Healesville Sanctuary](#) near Melbourne was absolutely outstanding. To see a platypus from a distance of a few inches

is something that one could never experience even years of field work, and the new platypus exhibit allows the visitor to see platypus swimming about and behaving more or less naturally. Highlights were definitely the exhibits showcasing such highly endangered species as orange-bellied parrot and Helmeted honeyeaters, but a sight of a [Leadbeater's Possum](#) was the fulfilment of a childhood wish. This little possum was believed to be extinct but was rediscovered in the 1960s; I still have a newspaper clipping on the event.

The widespread impact of human activity and alteration on native habitat was most evident in our tour of Sydney shorelines. The steep slopes and highly dissected coastline allows for the preservation of pockets of habitat even in such a highly urbanized and sprawling city as Sydney.

Captive breeding and reintroduction programmes have been fairly successful in Australia, especially with respect to the most critically endangered species, although, like all these programmes, they suffer from an acute shortage of money and resources. However reintroductions alone cannot reverse the decline of many native populations. For a start, there are few well-controlled planned-release experiments, so assessing the long-term success of these programmes is still difficult. Second, there are relatively few suitable sites available because of habitat destruction and predators. The most successful reintroductions have been on areas remote from human habitation, and habitats that are pest-free or where pests can be stringently controlled and /or eliminated. Re-establishing native plants is difficult because of problems ensuring adequate pollination and seed dispersal; unlike in north temperate zones, the major pollinators and seed dispersers in Australian forests are birds and mammals. A visit to a Perth forest was very striking in that this apparently lush and thriving forest actually had very little native vegetation remaining. In many sections the dominant tree species were introduced non-native pines and gums.

I was fortunate to have a behind-the-scenes visit to the Native Species Breeding and Research Programme at Perth Zoo. The goals of this programme are to obtain scientific data on the reproductive biology of threatened and endangered fauna, and to provide animals for reintroduction into the wild. I have to admit that the numbats were my favourites.

Other Perth Zoo success stories include the western quoll or chuditch (*Dasyurus geoffroii*), the dibbler (*Parantechinus apicalis*), the Shark Bay mouse or Djoongari (*Pseudomys fieldi*), and the western swamp tortoise (*Pseudemydura umbrina*).

In summary, the processes threatening the continued health of ecosystems in New Zealand and Australia are essentially those occurring elsewhere on the planet: habitat destruction, introduction of exotic species, pollution, human population pressure, and human over-consumption. However, because the threats to native wildlife and habitats are far more acute than in the USA, most conservation actions are more proactive, aggressive and emergency-based. Captive breeding and reintroduction programmes have been emphasized in this report, but other strategies in preserving and sustaining wildlands are of considerable importance. "[Biosecurity](#) ", in the form of aggressive quarantine and

border control systems, is the frontline defence against threats posed to the environment by alien species, and has been effective in detecting both 'interceptions' and 'incursions' of invasive noxious species. Grassroots conservation organizations such as [The Wilderness Society](#) have been instrumental in protecting vast expanses of unique wildlands that would otherwise be lost to development, including such biological treasures as the Kakadu, the Daintree, Kangaroo Island, south west Tasmania, and Australia's sub-Antarctic Islands. To a much greater extent than in North America, environmental issues are intimately bound up with questions of native title. Unlike New Zealand, there were no formal treaties or legislation between white colonizers and the Australian indigenous peoples; the entire contact history is an appalling record of massacre and cultural genocide. Furthermore, under the doctrine of *Terra Nullius*, indigenous people were immediately displaced; since the land was "technically" uninhabited, this legal fallacy ensured that there could be no title. In spite of recent legal reforms, there are still considerable difficulties in establishing native title as freehold arrangements took precedence. Apart from these factors, widespread clear-cutting resulted in soil degradation and salinization, transforming native lands to uninhabitable areas.

**See also:**

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