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Forest & Bird

Native forest along the spectacular Ahaura River Gorge in North Westland has long been sought for reservation by the Wildlife Service (1976, 1977), DSIR (1981) and conservation and recreation groups. The Ahaura Gorge is recognised as a Wild and Scenic River in the draft Government inventory. However, delays in the Government's long-promised reserve/development package for the North Westland-Buller native forests have already doomed some forests in the proposed Ahaura Gorge reserve. On December 13 1985, 12,000 cubic metres of timber from Sale Area 628 at Bywash Creek, a superb dense rimu-beech-covered terrace just above the gorge, was offered to the Kopara Sawmill Co. Prior to this our Society had believed all the proposed reserves would be secure from logging pending the Government decision.

The company has now roaded the forest and logging will commence shortly (see inset photo). Conservation groups have identified equivalent timber in an adjacent cut-over rimu forest now deteriorating from logging damage. This could be used to save the magnificent Ahaura Gorge virgin forests. However, so far Forest's Under-secretary David Butcher refuses to offer the alternative timber to the logging company.

Photo: Les Molloy Inset: Kevin Smith

Cover caption: The jagged slopes of Te Atakura, the highest peak on Rarotonga, rise above steep and densely forested valleys. A series of articles on South Pacific rainforests is featured inside.

Photo: Rod Hay.

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Tropical Rainforest Destruction — A Global Problem

The imminent demise of tropical rainforests is not just a problem that faces the countries where this devastation is occurring, but one that affects us all. Though the forests that remain cover only 2 percent of the globe, they are the habitat of half of all surviving species of living things. Forty percent of our medicines originate in these forests. Their future value to science, plant breeding and animal husbandry is incalculable, not to mention their present value to both the people and wildlife that find a home in such forests. These mind-shattering statistics show the problem is an urgent one: more than 11 million hectares a year, or almost 30 hectares a minute of rainforest is disappearing!

Readers of *Forest and Bird* this issue will become aware of a multiplicity of conservation problems facing the Pacific Islands — the closest area of tropical rainforest to New Zealand. Increasingly the islands are becoming the focus of logging activities; appropriately it should therefore become the focus of a conservation effort from New Zealand. This magazine heralds the beginning of a campaign by the Society together with Pacific Island, Australian and other New Zealand conservation groups to assist island conservation. A special appeal is to follow in the middle of the year; please donate to this generously.

Successive governments have spoken of our "Pacific identity" and of cementing relationships with the small nations of our region. In the political and the practical arena, this has led us to consider more carefully the needs and aspirations of our Pacific neighbours. As a result, our development aid has become increasingly focussed on Polynesia and Melanesia. In accepting the tenets of the New Zealand Conservation Strategy, New Zealand officials have recognised the need to balance development with conservation within this country, but have we embraced that philosophy in terms of our assistance outside? Certainly, our government has participated in some important conservation projects, notably the establishment of O Le Pupu Pu'e National Park in Western Samoa.

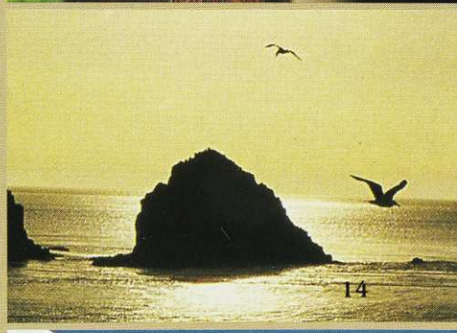
It could be argued, though, that development aid projects do not receive the amount of environmental scrutiny which similar works would be subject to here. While we cannot dictate to other nations the sorts of projects they should undertake, we can at least give a sympathetic hearing to requests for assistance in conservation. In such a way, the lessons New Zealand has learnt can be passed on.

We need to be bold in approaching these problems, but this boldness must be tempered with a clear understanding of the community needs and structures of the nations concerned. Environmental or scientific arrogance has no place in any assistance which we may be able to give.

Alan Edmonds, President

C·O·N·T·E·N·T·S

Articles



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PACIFIC TROPICAL RAINFORESTS

What can be done to save them?

By Guy Salmon

Most of the indigenous peoples of the Pacific still live close to their forests. They know their forests well and love being in them.

Very often the outsider coming to a remote village and seeking permission to explore the surrounding forest will be assigned two or more young men of the village as guides. A deep sense of courtesy and concern for one's safety (and perhaps also a desire to watch what the visitor is up to) seems to be the motivating spirit for this practice. A reciprocal gesture of a gift is therefore very appropriate.

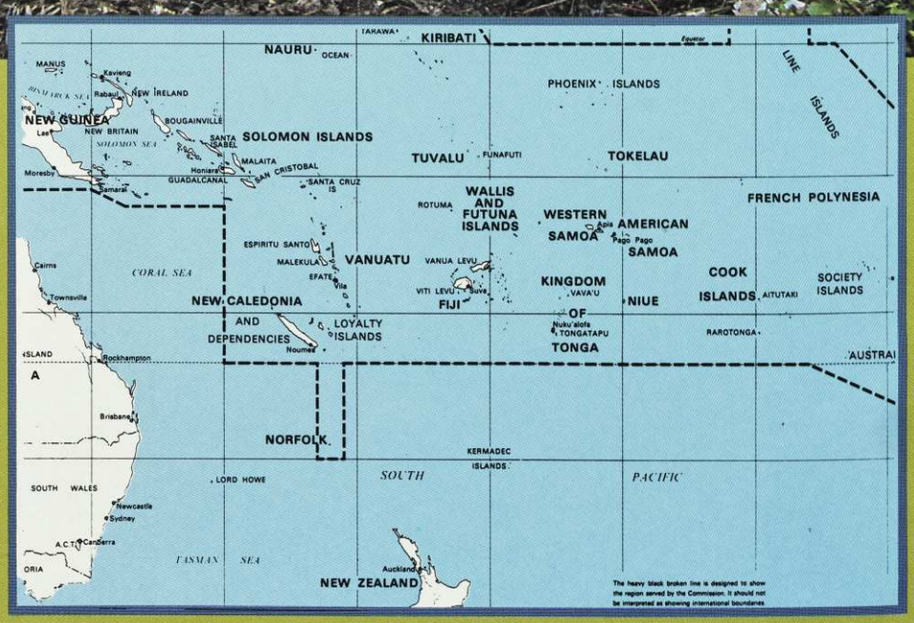
Whatever the reasons for their assignment, there is no mistaking the enjoyment of these young people at simply being in the forest; nor their familiarity with the forest world.

Absorbing its richness

It is not just a question of knowing the tracks and routes, the edible fruits and birds, and the plants useful for medicine or building materials, although these things are all obviously important to their way of life. There is more to it than that. A seemingly endless knowledge of the traditional names of numerous plants and animals, and a keen appreciation of beauty in the forest; tells of a people who spend much time in contemplation in the forest, and who have absorbed its richness into their own being.

In the strangely scented luxuriance of the tropical forest — across all the barriers of language and culture — there grows a gradual mutual recognition: that we are each conservationists. It is that recognition, reinforced several times in the backblocks of Fiji, Samoa and New Caledonia, that gives this particular conservationist a lot of hope about the development of conservation action in the South Pacific.

Yet a grassroots conservation spirit in the village communities is far from being the only force at work in the Pacific. In the villages themselves, rapid population growth in recent years has dramatically increased the need for land clearing for growing food — throwing the people into an unsustainable relationship with their surrounding forests. And the lure of wealth and modernity seen in the cities — and among the tourists — has sharpened the desire for modern material goods and



Map of the South Pacific

Opposite: The Samoan lifestyle is closely linked to the forest, and is seriously affected if the forest is removed. The *fale* (house) is constructed of selected poumuli poles (*Securinega samoensis*) and coconut. The canoes, used for lagoon fishing, are made from specially durable *fau* (*Pariti tiliaceus*)
Photo: Guy Salmon

Below right: Logs stacked awaiting export at a jetty at Asau in Western Samoa. This is a scene that is becoming more and more common on islands throughout the Pacific.
Photo: Guy Salmon

Below: Log exporters ransacking the tropical forests leave behind the lower section of the trunk with its big plank buttresses.
Photo: Guy Salmon

services, most of which have a high imported component. To pay the import bill, governments are increasingly resorting to forest exploitation and the export — not only of timber — but also of vast quantities of unprocessed logs.

Dereliction and resentment

In the Solomon Islands, giant companies like Unilever hop from one island to the next, stripping off all the logs as they go, leaving dereliction and resentment behind. Log exporting has recently spread to Fiji and Samoa while woodchipping as well is expanding in Papua New Guinea. These developments have gravely shortened the lifetime of the South Pacific's potentially merchantable lowland native forests. In the most serious cases — such as Western Samoa — almost all will be gone in 10–12 years.

While the plight of the Pacific forests appears grim, the conservation of tropical forests in the world as a whole amounts to an immense and desperate problem. These tropical forests are a world heritage of profound importance. They are an incredibly rich storehouse of plant and animal species compared to temperate forests like ours. Their protective influence on land, water, food and genetic resources and on climate is vital to the future of hundreds of millions of people. Their progressive destruction by multinational timber companies and by the land-clearing activities of poverty-stricken rural peoples — often displaced, landless, and nearly hopeless — is a contemporary planetary disaster. The degradation and clearance of this great forest resource has reached such colossal momentum now that one can say with certainty that it is the ability and will of enlightened people to act within the next decade that will determine what if anything survives.

For us in New Zealand, the problem may seem unmanageably large. Nonetheless there is a contribution we can make to conservation in the area nearest to us — the South Pacific. This is an area with strong biological links to our own nature heritage — as anyone quickly appreciates on seeing the variety of recognizeably familiar plants in the forests, from the ferns and orchids up to the giant Pacific species of the podocarp and kauri families. These Pacific forests are close to us, and increasingly readily visited; and it is our own accelerating demand for their decorative timbers that is contributing markedly to the destruction of these forests.

Our official overseas aid programme is assisting reforestation in several Pacific countries — taking over obligations which the exploiting timber companies invariably neglect. Unfortunately, our replanting role also eases the conscience of some island decision-makers as they authorise increased native forest exploitation.

The replanting is almost entirely in exotic trees, and aimed very largely at industrial rather than village use. Environmental assessment of the aid programme remains vestigial and there are grounds for concern about some of the projects. Little is being done to help define watershed protection forests, permanent nature reserves or national parks. To some extent, the aid programme is limited by the fact that it depends on requests from recipient governments.

Conservation groups come in

That is where non-governmental conservation groups can come in: to seed and support the establishment of conservation groups in Pacific countries, and to work with concerned local people to build awareness of the need for conservation policies and practices. That in turn will feed back into new types of requests of the New Zealand aid programme, whose implementation we can also encourage. Already, Australia is funding the establishment of a nature reserve of a Pacific kauri species, *Agathis macrophylla*, on Erromango island in Vanuatu.

Pacific Island local concern is there all right. For example, the furnituremakers' association of Western Samoa has fought a lonely fight against log export policies, invoking the broad conservation conscience of the community in pamphlets and broadcasts which speak not only about the imminent loss of timber resources but also about water supplies, recreation, the hunting of *lupe* (pigeon) and the long term welfare of the whole community. In the Solomon Islands, where village residents have ransacked a logging camp and bitterly opposed logging, efforts are being organized to bring other village leaders who are considering log export deals on their own islands into contact with those island communities which have already experienced the results of logging. In Samoa, the alternative concept of "village parks" promoted by Iosefatu Reti in an accompanying article needs funding for a demonstration park. And Fiji has an established National Trust which promotes conservation and environmental education but is desperately short of staff, expertise and financial support for its projects and activities.

Clearly there is much which can be done to help fledgling conservation efforts in the Pacific, as well as to influence the substantial overseas aid programmes of governments like Australia, New Zealand and Japan which are heavily involved in the region. Voluntary conservation organizations in New Zealand, Australia and the Pacific are now forming a "joint campaign" grouping to pursue these goals. The support of all our members will be needed in these efforts.

Memorable experience

New Zealanders will increasingly want to visit the beautiful Pacific forests themselves. The way into a Pacific island forest is usually through a village; and there visitors will encounter the old-fashioned values of politeness, hospitality and reciprocity, and the strong sense of respect for the individual, that make up such an important part of all the Pacific cultures. Exploring their forests with these people is one of the most memorable experiences there is.

We must remember that upholding the values and expectations of the *tangata whenua* is a vital part of such an experience. More and more young New Zealanders are exploring the Pacific; we are losing the sense of belonging wholly to Europe. Quite a good test of whether we may consider ourselves people of the Pacific is whether we can take up the challenge of involving ourselves in Pacific concerns, and do so in a manner welcomed by the island peoples themselves.

BEYOND THE PALMY BEACHES

by Executive member Professor John Morton

A Pacific Island begins with the line of wave-break where the reef-edge drops way into deep water, so very blue. Behind this rim are the shallows, sun-warmed and cloudy green. Further in, pressing down to white sand, is the coastal forest: free and lush, with waving palms to leeward, or low dense canopy on the trade wind side. Over the sand run purple *Ipomea*, of yellow cables of beach dodder (*Cassytha*).

This is the coast the islands have in common. It is Pacific-wide: fed and recruited from an ocean-mix of plankton, and of woody seeds. Of these the coconut is merely the largest, originating who knows where, in the vastness of ocean and time.

To find the special quality that gives each island its personality, makes it different, we must strike into its forest heartland.

Into the forest depths

Fiji's Viti Levu is by Pacific standards a huge island. You can push into it from Suva's Laucala Bay up the Rewa River, with huge mangrove swamps as quiet and remote as the finest I know, in Papua New Guinea. Or you can drive west, passing at Serua a score of immense banyan figs, to Sigatoka. Here you can take the winding river road inland to the forest depths at the centre of the island.

But right near Suva there is a not too strenuous afternoon's climb, up the 600 m. of Mt Korombamba: by the logging track of bright red clay, up to the trig station where the breeze is cool and you can take in the whole expanse of Suva Barrier Reef and Laucala Bay.

On this wet side of Viti Levu island, the forest is well stratified. The climb brings us up to Fiji's podocarps that — unlike New Zealand's — are trees of high level.

No one has written a proper guide to this climb. After Parham's invaluable *Plants of the Fiji Islands*, my own debt is to the deep knowledge of Saula Vodanivulu, botanist of the Fiji Herbarium, who taught me anything I know about the island's flora.

Large trees logged

All this forest has been cruelly logged. Only a few of the old timber trees, up to 30m tall, break out above the second canopy to show what the high forest must once have been. They are kauvulu (*Endospermum macrophyllum*: Euphorbiaceae); bauvudi (*Palaquin stehlinii*: Sapotaceae); makita (*Parinari glaberrima*: Rosaceae); and — most notably — the Fiji kauri, dakua (*Agathis vitiensis*) now almost milled out save at the island's deep centre.

But the second storey is immensely rich. Diversely assembled are all those hardwood families marginally represented by one or two species in New Zealand. Here is to be found a host of *Myrsine*, and *Elaeocarpus* and *Geniostoma*. There are lots of Meliaceae, with *Dysoxylum gillespianum*, a timber tree planted in straight lines in the old loggings. Two huge families are Myrtaceae (notably with *Syzygium*, *Decapspermum* and *Cleistocalyx*); and Caesalpiniaceae with *Bauhinia* and *Cassia* species, mainly outside the forest. There are Sterculiaceae with bright flowers and open pods, an abundance of fan-leaved Araliaceae, including *Schefflera*. There is the Moraceae, with the glossy green bread fruit tree, (*Artocarpus*) on the forest edge. Of the early angiosperm families, there are Piperaceae (*Piper* and *Peperomia*); Annonaceae (custard apples and sour-sop, and Lauraceae with *Cinnamomum* and *Litsea*.)

At shrub level, Rubiaceae abound as in New Zealand; but with attractive scented flowers — *Dolicholobium*, *Canthium*, and *Ixora* and fragrant white *Gardenia*. A curiosity of this family is the swollen based ant-plant *Hydnophytom*. The tree ferns are *Dicksonia* and *Cyathea* like ours. But in Fiji they are overshadowed by palms: *Veitchia* and *Balaka*. There are as well pandans and *Cordyline*, big gingers with windmill sails like *Alpinia*, and handsome banana palms.

Vines and climbers

A host of families produce vines and tendril climbers. The milky Apocynaceae have climbing *Alstonia* and *Carruthersia* recalling *Parsonsia* in New Zealand. There are climbing yellow *Dillenia*, *Smilax* climbers like our own supple-jack, and *Freycenetia* which are tough, scrambling pandans. There are climbing aroids *Epipremnum*; wild yams, *Dioscorea*, and thongleafed *Flagellaria*.

The Verbenaceae have a shrub *Feredaya* climbing over the highest forest. The Asclepiadaceae provide wild *Hoya*, common down to the mangrove swamps. Blanketting a whole canopy to the tree tops is often the white-flowered convolvulus *Merremia peltata*.

New Zealanders will recognise lots of *Lygodium* and filmy ferns; the two fern allies: *Lycopodium* and big *Selaginella*; and — for good measure — two *Psilotum* species.

The Korombamba climb has two botanic prizes. The offbeat gymnosperm *Gnetum gnemon* ('sikau') with its glossy oval leaves and red 'berries' and a magnolia ally, *Degeneria vitiensis* ('masiratu') unique to Fiji and discovered only in 1934. Saula at the herbarium generously pressed on me its spirit-preserved flowers and bean-like pods: a precious treasure I didn't think I should lightly carry away. Instead, I sketched them and brought back a sliver of wood to make histology slides.

At the top of Korombamba, the gymnosperms break through, and finally dominate. There is their hard-timbered 'yaka', (*Dacrydium nidulum*) up to 30m tall, but more like a spreading beech than our own rimu. 'Dakua salusalu' (*Decussocarpus vitiensi*) has glossy green pinnate leaves; and in 'gaugali' or 'baukiwaga' *Podocarpus nereifolius*, the leaflets are quite big and lanceolate.

Onto the Cooks

2,000 km. further east, with far fewer species than Fiji, the Cook Islands are nonetheless botanically exciting. Rarotonga is still as captivating as Cheeseman found it on his visit around 1900. Half a century earlier missionary John Williams, wrote of a coastal stretch which was intensively gardened to feed 30,000 inhabitants.

'The whole island was in a high state of cultivation and I do not recollect having witnessed anything more beautiful than the scene presented to me, when standing on the side of one of the hills, and looking towards the sea shore'.

Between rows of superb 'chestnut' trees (*Inocarpus*) stretching from the mountain base to the sea, were bright green irrigated taro beds.

The gardens lie between Rarotonga's two circular roads, the modern Ara Metua to seaward, and inland — still amost complete — the thousand-year-old Ara Tapu.

With the years of decline, in copra, banana and now citrus exports, much of the garden area is wild and reverted: a haven of fertile and picturesque neglect.

Today's food crops are chiefly cassava (*Maniota*), and the several sorts of taro, still to be seen laid out in neat rows. Round the villages, guava and bright *Hibiscus* and ill-scented *Lantana* are taking over. Back up the valleys are banana plantains gone wild. There are scrambling vines of passion fruit, and *Ipomea*, and the little bright orange gourd, *Momordica*. There is a host of reverted economic species: paw paw, mango, alligator pear, custard apple, orange, lime, guava,

The tree fern, *Cyathea decurrens*, is discovered in the lower valleys of Rarotonga. *Photo: Ewen Cameron*

Inset: A seedling of the ancient Fijian podocarp *Decussocarpus vitiensis* is not unlike our own miro. *Photo: Guy Salmon*

granadilla, coffee, manioc, bombax.

Rarotonga's glory

But the glory of Rarotonga is in its central crown of forest, with the panorama to be scanned in the half-day's cross-island walk.

A million years ago, Rarotonga's high cone of basalt collapsed at the middle, to leave a central caldera, with a jagged rim around which other vents were to erupt. One of these, after erosion, has left its dense crater plug, as the tall-standing Needle ('Te Rua Manga').

I first made the climb to the base of the Needle, then down to the opposite coast, with my old friend and student, Gerald McCormack. For the Education Department of Tonga, he is researching and interpreting the reef and plant biology of the Cooks.

named by him *Fitchia speciosa*. It is a fast growing composite, with big, glossy leaves and large pendent heads, like orange-tipped globe artichokes.

At the high levels and on craggy places, is Rarotonga's pohutukawa, a form of the Pacific-wide *Metrosideros collina*. Already in August, crimson tufts were showing. With its delicate pink leaf buds, this makes a charming tub-plant at Auckland sea-level.

Through all the Cook Islands, bird species are few. Round the villages, the 'government bird' mynah is as common as a sparrow. The forests have a Rarotongan fruit dove, a starling and a rare flycatcher Gerald McCormack is studying. Our own long-tailed cuckoo is there as well.

Right up to the Needle come also birds from the sea: Ivory white and the most ethereal of all sea-birds, is the white tern

Pacific Islands such as Samoa offer much to the tourist interested in natural history. The Togitogiga Recreation Reserve was set aside in 1978. A IUCN/UNDAT scientific team has recommended that 6 percent of Western Samoa's land area be reserved as national parks. *Photo: Mark Bellingham*

The unusual Rarotongan tree, *Fitchia speciosa*, is fast growing with large heads like orange-tipped globe artichokes. *Photo: Ewen Cameron*

Cool enough at most times of year, the climb up to the crown, starts from Avarua town centre, following the clear stream up the Avatiu valley to the power station. Right to the Needle, progress is easy by grasping the root plexus of the lovely, complete canopy of *Inocarpus* chestnut trees. The beach hibiscus ('au') remains a common tree right to the top. The lower canopy has its own tree diversity: *Homalium, Macaranga, Bischofia, Cecropia*, and of course a host of rubiaceans: scented white *Gardenia*, and *Morinda* vine, and — in drier places — *Mussaenda*.

There are genera familiar from New Zealand, but never with the bewildering species wealth of Fiji. Thus Rarotonga has its one only, *Myrsine* and *Pittosporum*, and — at upper levels — its own *Weinmannia*. There are lots of shrubby *Piper* and perching *Peperomia*. A *Meryta* species, — smaller than our own — is agreeably common.

Reaching down the high ridges into the shaded gulleys, is a novel tree of Rarotonga's own, discovered by Cheeseman and

or 'pirako'. High overhead are white, tropic birds 'rakoa' with forked tails like a slender marlin spike.

Tourism: the island way

The Cook Islands have dollar parity with New Zealand and Rarotonga enjoys a direct flight to Auckland. It is coming up to the tourist pretensions of Fiji. With sand, sunshine and blue water — swimming pools, duty free shopping, golf and riding, ethnic cuisine (and Rotary meetings at the 'Rarotongan' resort), tourism is flourishing. Development money is being actively enticed.

A 250-bed resort is being envisaged at Amuri village on the incomparable Aitutaki Atoll. The carrying capacity (ecological, psychological, social and, most practical, sewage disposal), will break under such strain.

Heritage still intact

In the Cook Islands it is not too late to discover the old heritage, of which big pieces are still intact. Even in Fiji, there are a few places where forests have not been timber-ravaged; where mangroves have not been cut for firewood, or torn out for marinas; and reefs that haven't been ransacked for commercial dealers.

For Rarotonga, as it still authentically is, there could be increasing earnings from discerning tourism. There are people today in the Cooks who realise this well. One could be the Rarotongan Wickham Exham, whose half-day tour of the island shouldn't be missed. A home-educated resource economist, he drives his tour minibus like a modern-day William Cobbett. His 'rural ride' tells us about history and customs, horticulture and economy. At $15 a head, the package tour ends with a superb traditional meal served by his wife Maria, in their garden with bird of paradise plants, starfruit, Spathodea, Bombax, cotton and lychee trees.

To grasp the truth about the Cook Islands will need just this kind of interpretation and revelation. The best sort of aid New Zealand might give could be a biology or ecology-based 'green corps'. This could carry forward the work and spirit of the old peace corps. It would need good insight, and capable writing: different and indigenous for each of the Pacific nations. Even for their separate islands, as Gerald McCormack is today doing on Rarotonga.

Complex tropical forests

Rain forests left intact could one day bring the same incitement to tourism as the reefs and snorkelling grounds. Complexly layered and stratified into their profusion of habitat space, reefs and tropical forests are the most complex communities on the planet: every fragment of them living, or the product of life.

But visitors should want to know the names and lives of their inhabitants. An uninstructed snorkel dive, a glass-bottomed boat cruise, or a forest walk without names is a voyeurist experience soon forgotten. If we are to understand these places fully, we must be wrestling with Tane and Tangaroa, to seek the names of their children of the forest and sea, just as Jacob wrestled with Israel's God until daybreak to find out his supreme Name.

As any tourist can realise on a Sunday morning, Cook Islanders have been deeply Christian people, with a spiritual base of awareness that in our developed world seems superseded and lost.

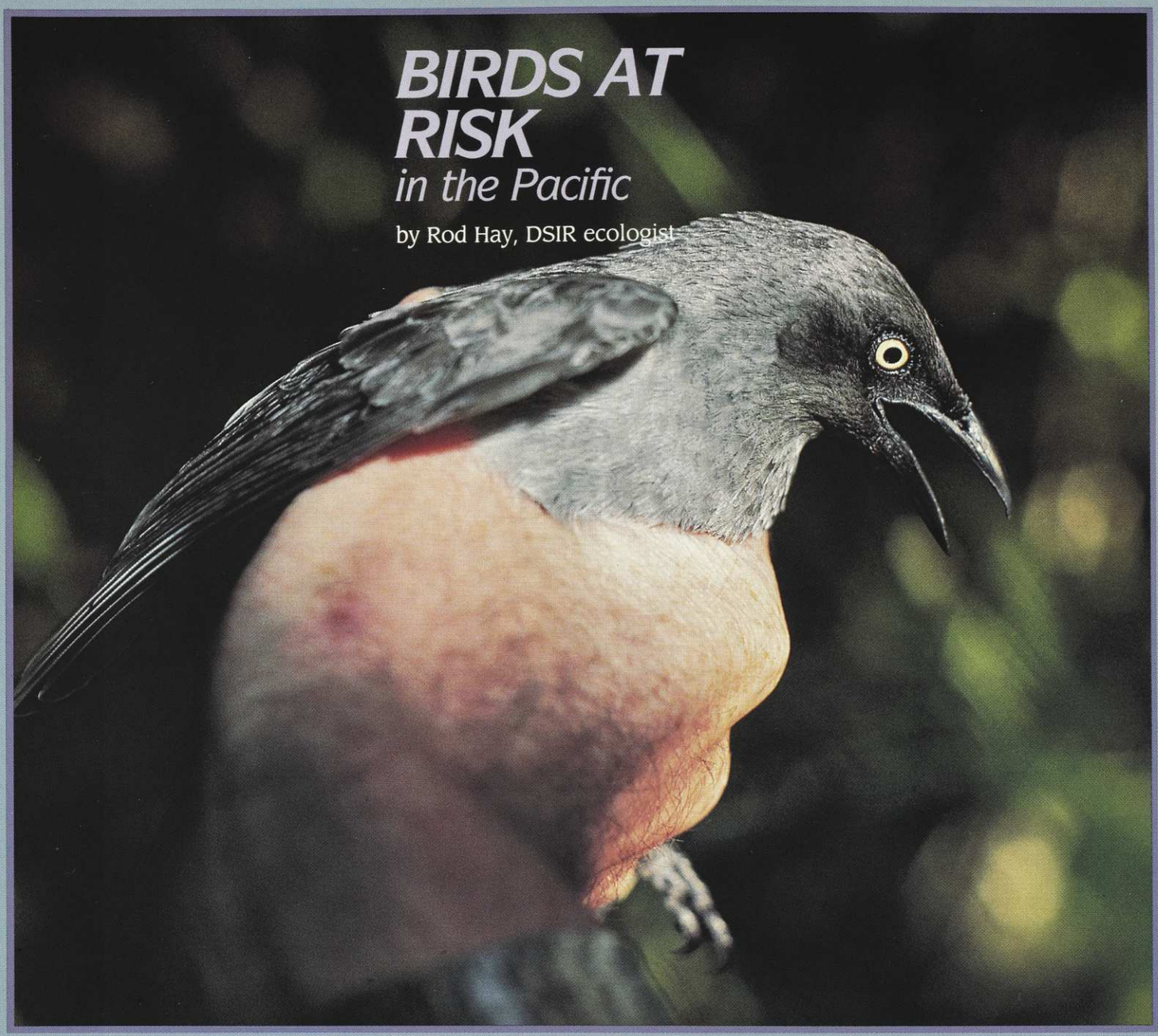
As big a question as any that faces these new nations, must be whether their island Christianity can teach the lesson not of exploitative development but of the Franciscan understanding that gives to the natural order its mystical and ethical due.

These people could be like Naboth of Jazreel who owned a vineyard (I King, 21, 1-5). King Ahab pressed him:

'Give me your vineyard to add to my vegetable garden. I will give you a better vineyard for it, or if you prefer, I will give you its worth in money'. But Ahab answered him: 'God forbid that I should give you the inheritance of my ancestors'.

BIRDS AT RISK
in the Pacific

by Rod Hay, DSIR ecologist



The Rarotonga starling, a species endemic to the island, is restricted to unmodified forest. *Photo: Rod Hay*

The Rarotonga flycatcher, or kakirori, is one of the rarest birds in the world, with only between 20-30 birds remaining. *Photo: Rod Hay*

Scattered over a vast area of ocean, the islands of the Pacific present a special conservation challenge. There is, on average, one endangered bird species for every 90,000 inhabitants, a figure higher than for any other region of the globe. This illustrates both the size of the problem and the lack of resources available to solve it.

In order to understand the distribution and composition of Pacific birds it is necessary to know a little of the origins of the islands themselves. They can be classified into four main types whose age, size and isolation all affect their biological diversity.

Fragments of continental land-masses (e.g., New Calegonia and parts of Palau) on which may survive relicts of an ancient avifauna isolated since the fragmentation of the southern super-continent, Gondwanaland. Because of their age, these islands tend to have a wider array of rock and soil types than the other types. This may be reflected in a high biological diversity. New Caledonia, for example, has an extremely large number of plant species.

Volcanic islands. These range from young active volcanoes without a highly developed vegetation (e.g., Matthew and Hunter Islands, southeast of New Caledonia), through older and well-forested but sometimes still active volcanoes (e.g., Savaii, Western Samoa), to eroded volcanic remnants (e.g., Rarotonga, Cook Islands). The plains and valleys of these older volcanic islands are generally characterised by high soil fertility.

Atolls. Very low-lying islands of coral growing on the submerged stump of an old volcano. Atoll soil is generally poorly formed and of low fertility. Because of their uniformly low altitude and small size, they provide a low diversity of habitats and are more susceptible to the effects of catastrophes such as hurricanes. Without refuges, bird species are more likely to be completely eliminated during such events. Typically formed as rings of islets enclosing shallow lagoons, atolls are distributed across the Pacific in the zone where water temperature allows for sufficient coral growth. The many atolls of the Tuamotu archipelago, the Marshall Islands and Tuvalu are typical.

Raised atolls. In certain areas, tectonic processes lift the sea floor and expose

limestone to form "makatea" islands or raised atolls. While soils, particularly on the younger islands, are generally of low fertility, the range of topographies and altitudes means that a greater range of microhabitats develops. Niue Island (at 259 sq.km., the largest raised atoll in the world) and Henderson Island of the Pitcairn group are examples of raised atolls which, through time, have evolved into a relatively diverse series of habitats.

The birds of the Pacific are divided into three broad categories: resident land birds, locally breeding marine species and migratory shore birds.

A number of shorebird species such as the bristle-thighed curlew and the wandering tattler breed in the high arctic but are found around rocky shores and reef platforms during the northern winter. The unique record of a turnstone nest on a small coral islet in New Caledonia may give a clue to the origins of the one sedentary shorebird of the region, the Tuamotu sandpiper.

Most of the land birds have reached the South Pacific by island-hopping from either Asia or Australia. For example, the reed-warblers (genus *Acrocephalus*) are native to Europe and Asia and are spread in an arc across the Solomons, Micronesia and north-eastern Polynesia. The honeyeater family has spread northeastwards from its origin in Australia.

New Zealand is the source of a number of birds such as the kaka and N.Z. pigeon in Lord Howe and Norfolk Islands, and the kakariki in Norfolk, New Caledonia and the Society Islands.

There are a few species whose lineage is so ancient that they are either relatives of the Gondwanaland avifauna or migrated into the region in a past too distant to allow us to trace their relatives. The cagou in New Caledonia is not closely related to any other bird family though it may have connections with the extinct *Aptornis* of New Zealand. In Samoa, the enigmatic tooth-billed pigeon is unlike any other pigeon living, and the reasons for its survival there are not clear.

Are island birds at any greater risk than those of mainlands? Potenially yes, since small land areas mean small populations and remoteness makes it difficult to recolonise an island if the population is wiped out. What then are some of the problems facing Pacific island birds and their habitats?

- Modern and traditional agriculture is encroaching increasingly on natural habitats, particularly where the human population is growing rapidly, as is happening in the Kingdom of Tonga. There, every male reaching the age of majority has a traditional right to several acres of land for gardening. The land area is already insufficient to sustain this, with the result that slash-and-burn farming proceeds at a rate greater than that of the capacity of the forest to regenerate abandoned sites.

- The abundance and accessibility of cheap timber is drawing logging companies from all over the world to the larger Pacific Islands. The logging method is often little more than "timber mining". Even if the concept of sustained yield harvest were a management objective, it has little basis for becoming a reality in these poorly understood tropical forests. For example, timber rights to the whole of San Cristobal Island in the Solomons have recently been given to an American company. An operation that benefits the Solomons little is being carried out with scant regard for the habitat of a large number of bird species, including six endemics. Almost nowhere in the area is even a representative reserve system an integral part of a forestry programme.

- Human settlement of uninhabited regions threatens some important islands. Only recently was the threat posed by an American millionaire and his cattle-ranching plans on Henderson Island averted. This saved, for the time being, one of the least modified and important "islands for science" in the region.

- Tourism can be a double-edged sword. While a potentially low-impact form of industry, it is not often planned with the appropriate sensitivity to the natural environment. In Fiji, for example, seabird colonies are now being bulldozed to make way for hotels so that tourists can get away from it all to a "South Sea Island Paradise". Islands are being cleared of vegetation to create the park-like environment perceived as being attractive to visitors.

- Just as introduced predators have devastated the avifaunas of New Zealand and Hawaii, they may be poised to do so in other areas of the Pacific. Fortunately, though some species such as the endangered Tuamotu Sandpiper are certainly rat susceptible, most terrestrial birds have not fallen victim to these rodents. The mongoose, however, introduced to Fiji to control rats in cane plantations, has almost destroyed the ground birds of Viti Levu and Vanua Levu.

- Avian disease has been frequently invoked as a reason for the elimination of most indigenous Hawaiian forest birds from low altitude areas. Difficult to study in wild bird populations, mosquito-borne diseases are clearly in need of investigation, particularly in the Society Islands and Guam, where dramatic bird losses may be related to their introduction.

- Hunting represents a threat, particularly to rare and localised species such as the pigeons of eastern Polynesia. Evidence from sub-fossil records suggests that a large number of species, including the Marquesas pigeon — now confined to Nuku Hiva — were once much more widespread. Polynesian as well as European settlement has taken its toll.

Scientific collecting is not immune from criticism as academic as well as conservation interest focusses in the region. Though widespread, conspicuous and characteristic of the whole Pacific, colonial seabirds are in urgent need of conservation in some areas. Because of their abundance, nesting boobies, noddies, frigates and petrels are an attractive food source, so much so that islands which have been inhabited longest now have few seabird species.

The core habitat of the only surviving population in Tonga of the red-breasted musk parrot, *Prosopeia tabuensis*, will possibly be protected by Tonga's proposed 'Eua National Park. *Photo: Paddy Ryan*

Inset: The Samoan broadbill on a Hoya vine. *Photo: Mark Bellingham*

- Natural disasters such as the havoc wrought on Christmas Island's seabirds by the extended El Nino phenomenon in 1982-3 are, of course, unavoidable. Nevertheless, the likely occurrence of phenomena such as hurricanes and volcanic eruptions highlights the danger of restricting bird populations to small isolated remnants of habitat. A dramatic example is that the entire population of the Malau or Niuafo'ou Megapode is restricted to one Tongan island that is currently showing symptoms of an imminent eruption.

- In many areas, the traditional system of land tenure renders the establishment of reserves a complex task, requiring the approval of a multitude of owners as well as that of the Government. Conservation agencies need a detailed knowledge of traditional patterns of land ownership and management when planning and negotiating for protected natural areas.

- Perhaps the most fundamental and pressing problem concerning birds of the region is a lack of information. It is very difficult to make conservation recommendations when there is little or no information on the species or the area one is seeking to protect. For example, our entire knowledge of the Versicolor Flycatcher *Mayrornis versicolor* of Ogea Levu in Fiji comes from specimens collected in the 1920s. So far as is known, no one has looked for the species since then, even though the island is relatively accessible. Remote areas of the larger Pacific Islands, particularly the Solomons, Vanuatu, parts of Fiji and Western Samoa, are poorly known, as are the extensive archipelagos of Tonga, the Tuamotus, and much of Micronesia. Even in Hawaii, where bird-watchers abound, a species new to science and new to all human experience was discovered as late as 1973. The po'ouli, a small Hawaiian honeycreeper was discovered in rainforest of Maui by a group of students. Wildlife surveys of key areas are urgently required. Lack of information is not only a problem for scientists and decision makers but also for inhabitants of the region. In many cases traditional knowledge has been lost or buried in westernisation and not been replaced. Educational material designed to nurture a new respect for wildlife is urgently needed.

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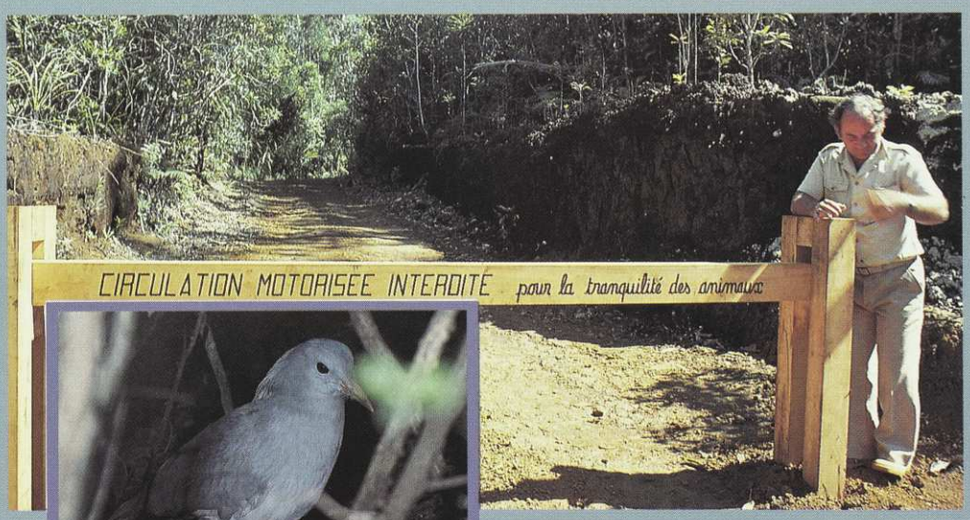
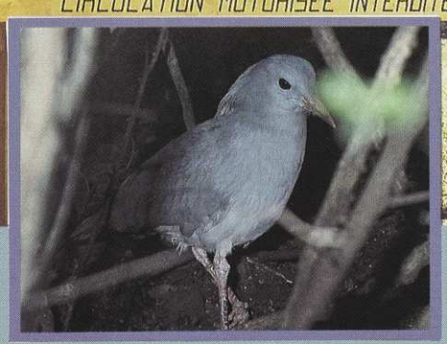




Work is already being done to preserve some areas in New Caledonia where the cagou (inset) survives. Here a reserves ranger secures the entrance to Parc Territorial de la Rivière Bleue. The cagou is flightless and confined to New Caledonia forests. *Photo: Rod Hay*

Research and action on a variety of fronts will help with some of the most critical problems. Firstly, reliable wildlife surveys are needed, with both locals and non-islanders involved.

Secondly, action on behalf of some key species may help to secure their survival while providing valuable publicity and spin-offs for conservation generally. Species in need of particular attention are cagou in New Caledonia, the tooth-billed pigeon in Western Samoa, the Tuamotu sandpiper, and the Rarotonga flycatcher. Birds which require special attention are the pigeons of eastern Polynesia.

Thirdly, a network of protected areas, reserved and looked after under the law and traditions that apply in the region under concern, is a key to conservation of birds and ultimately to the wise use of island resources.

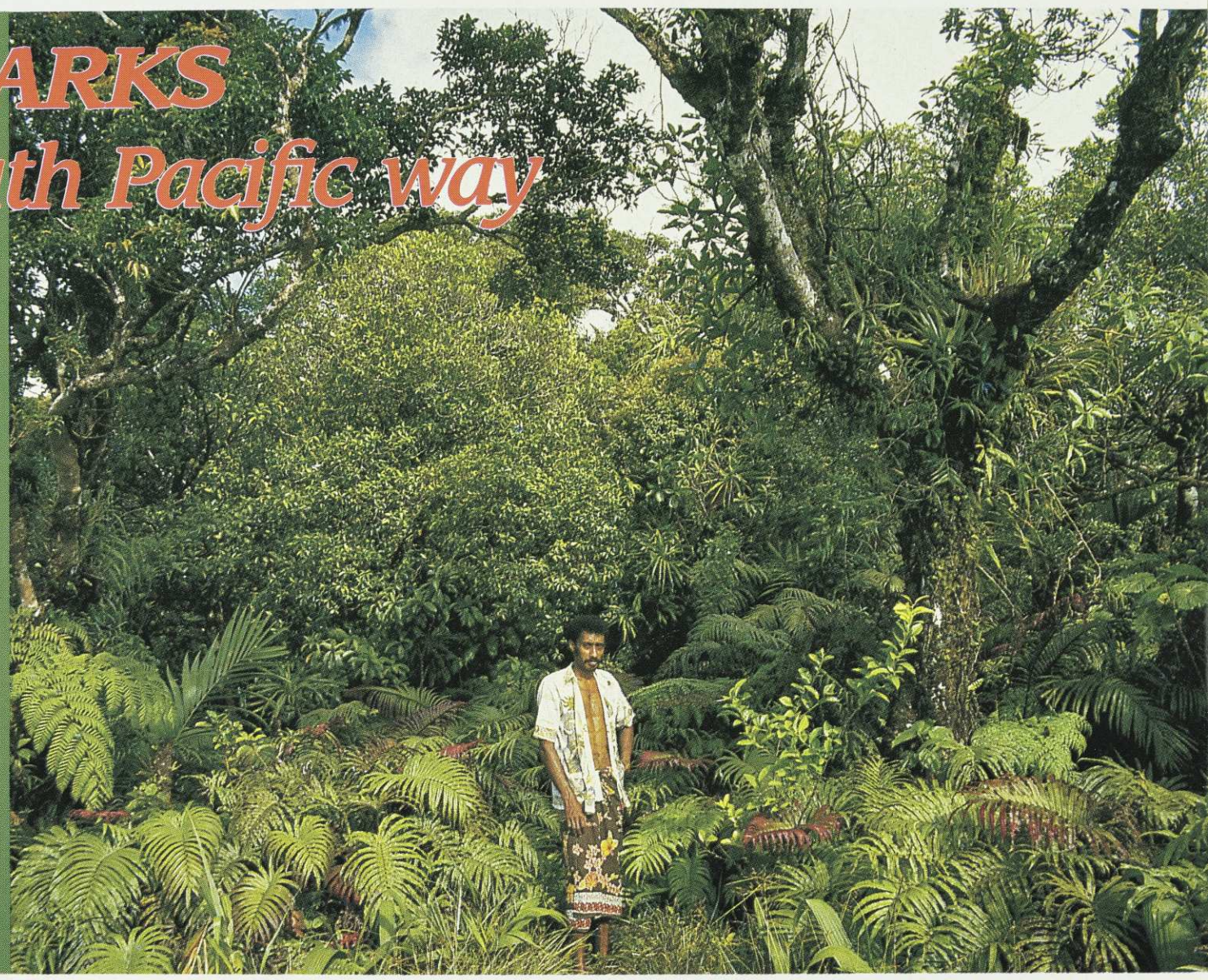
Forest and Bird has co-operated with the South Pacific Regional Environment Programme and the International Council for Bird Preservation in producing a review of bird conservation in the Pacific Islands.

An eruption near the turn of the century covered more than 50 sq km of Savaii with lava like this. Natural events can devastate habitats already reduced by man. *Photo: Rod Hay*

NATIONAL PARKS
Seeking a South Pacific way

by Iosefatu Reti

Iosefatu Reti *is co-ordinator of the South Pacific Regional Environment Programme, based in Noumea. Until recently he was chief forestry officer for Western Samoa, a position which includes responsibility for Samoa's national park and reserve system. This article is an edited version of his key-note address to the Third South Pacific National Parks and Reserves Conference held in Apia, June 1985.*



heritages can be best protected for the benefit and enjoyment of their people.

The national park concept

National parks were defined and adopted by the General Assembly of IUCN in New Delhi in 1969 as follows:

"A National Park is a relatively large area,

- **where one or several 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 and,**
- **where the highest competent authority of the country has taken steps to prevent, or to eliminate as soon as possible, exploitation or occupation in the whole area and to enforce effectively the respect of ecological, geomorphol-**

area" criterion will prevent countries which are anxious to implement nature conservation programmes from doing so either because they could not justify in financial terms setting aside large areas for national parks, or the areas available are not large enough.

Although this may vary from country to country, an area of 1000 hectares has been widely accepted as the minimum size of a national park. This immediately places our small island nations at a disadvantage in view of our limited land areas. It would be in the interest of the small islands to be more flexible in this respect.

Conflicts could result

National parks are a relatively new concept and are therefore little understood, especially in the South Pacific. In Western Samoa, and many other Pacific countries, most of the land is held under customary ownership with the chiefs (matai) having the sole right and authority for control and use of the land. Thus the preservation of these areas for national parks or for any other use without prior agreement by

Traditional use of land

Perhaps the most common problem of conservation programmes is attributed to the traditional use of land. Shifting cultivation by subsistence farmers has been identified as a continuing danger to protected areas and has been outlawed in such areas.

Admittedly, the people's need for food deserves the highest consideration and wherever possible this priority use of land is encouraged. Hence in selecting areas for conservation purposes, this need should always be borne in mind.

In our small island nations in the South Pacific, conserving huge areas may appear to undermine the desire for agricultural development and the need to sacrifice one for the other without compromise appears to be unavoidable. Unfortunately for conservation, it is often the protection of land that is sacrificed in favour of development. Ironically enough, the restrictions implicit in the definitions of national parks which often prevent compromises to be made, is in many cases the very reason for voting against conservation.

With limited farming capital, the village farmers will continue to rely on traditional methods of clearing forested land (shifting cultivation) for better soil and yields. Hence, protected areas have to continue with the threat that at some stage, they could lose some land to cultivation.

Where some parts of national parks have been cultivated and settled, the problem is much more difficult and sometimes dangerous to resolve.

Perhaps the most difficult situation is where permanent settlement and establishments have been created on protected areas — and this is not an uncommon problem in the Pacific.

Naturally, this will mean prosecution under law but one often wonders whether the law could achieve the best solution which will not only enable the encroacher to agree to settle elsewhere but equally importantly, assure the park managers of his co-operation in future. I strongly feel that the law will badly fail in the latter requirement.

The exercise of Government authority over village lands may create more problems than it can resolve, particularly if such authority should require village people to stop their traditional ways of life.

Where government authority is exercised over village land, the following requirements must at first be assured:

- Funds are available to buy rent/lease or compensate the people for the land.
- Government can count on village support for the undertaking and protection of the parks.
- There is adequate security that the area can be protected in perpetuity.

Whilst some countries may be better off than others, Pacific Island countries are generally faced with considerable difficulties in allocating funds for "non-developmental" projects.

Similarly, village support for government projects imposed on their land could be at least, temporary, thus making the long-term security and success of such projects doubtful.

Alternatively, national parks and other conservation projects involve modest capital and could be undertaken by village people with technical and professional guidance provided by government.

In this approach, the much needed village support can be counted upon as village rule can be called upon to enforce conservation measures upon village people. Furthermore, the people's suspicious feelings of eventually losing their land to government can be eliminated and the long-term protection of the area is therefore assured.

Whatever incentives and benefits offered, it is crucial that village support is assured, and there may be no better way of getting this than letting them have a feeling of belonging and a sense of responsibility of being involved in actually setting up protected areas.

Accommodating traditional practices

Until educational and promotional programmes are fully under way, it is desirable that serious consideration be given to ways and means of accommodating certain traditional practices within protected areas. This may call for comprehensive research into land capabilities and potential uses. It might be feasible to set up a "core area" for perpetual protection. Other areas can be subjected to other forms of land uses based on the capability of that land.

Naturally such an arrangement will require close supervision and strict adherence on the part of the farmers to restrict their activities within their assigned boundaries, and to conform to certain practices. However, the reduction in the number of people to deal with in the protected areas makes the problem easier to handle. Also the identification of farmers working within the protected areas will provide the necessary screen preventing other people from trespassing into the core zone.

An educational effort

How do we go about getting people's support for a concept that they hardly understand and may require them to give up their hunting rights and access to other commodities which have been available to them for ages?

This is probably the biggest question faced by park managers and administrators in our region.

In our small island countries with limited land but with high rates of resource depletion, it may be necessary to look at setting up pilot national park areas for demonstration to be backed by extensive educational programmes.

The availability of demonstration projects will make teaching the concept much easier and the effect of incompatible practices easily seen. Educational and promotional programmes are crucial to the sustenance of the people's interest and national acceptance of the concept.

The concept of national parks must not be promoted through trial and error. We have to understand right from the beginning what we need and what we wish to achieve. Thus, the need for demonstration areas becomes critical.

The example set by Western Samoa appears to be slowly working, and it is expected that on-going educational programmes will eventually lead to full acceptance and adoption of the concept.

I believe a desirable goal, in fact, will be to identify and describe a form of national park which is truly "South Pacific".

Opposite: In the Pacific there is very little public land. More than 90 percent of the region's native forests are owned at the grassroots level by local people under traditional tenure systems. For conservation proposals to succeed, they must be adopted by the owners themselves. *Photo: Guy Salmon*

Right: The needs of the shifting cultivator or subsistence farmer can conflict with national parks, unless the needs of both are carefully planned and accommodated from the start. *Photo: Rod Hay*

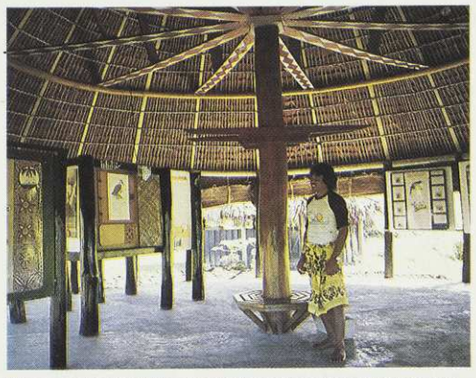
Below: In Samoa, decisions about lands and forests are of the highest importance. Such decisions are taken by the chiefs (matai) meeting in the fono, the characteristically Samoan meeting house. *Photo: Guy Salmon*

Protected natural areas in the South Pacific

Birandra Singh is the conservation officer for the Fiji National Trust. This article is an edited version of his keynote address on the Pacific to the World Conference on National Parks held in Bali in 1982.

A river fisherman on New Caledonia's forested east coast. Traditional conservation practices in fisheries and forest gathering allowed Pacific peoples to live in harmony with their environment for generations. That balance is now changing. *Photo: Guy Salmon*

As was common to most societies in the pre-industrial era, the inhabitants of the many islands in the Pacific Ocean had a pattern of living dependent very much on the coastal or terrestrial resources that were available to them at the time. The coastal dwellers were natural swimmers and seamen, which aided them to reap harvests from the seas and reefs. Micronesians were the only Oceanian people who did deep sea fishing.



Ranger Kolati Poai at the O Le Pupu-Pu'e National Park information centre fale, Samoa. *Photo: Mark Bellingham*

Islanders living along waterways towards the middle of islands developed methods of obtaining game from the forests, including pigs (probably originally introduced by the early arrivals on the islands), birds and large lizards. Both coastal and inland peoples also practised slash and burn agriculture — primarily growing rootcrops and leaving the land fallow after harvest — and collected fruits and root crops growing wild near the settlements.

Conservation through "taboo"

Enough examples can be given to illustrate that there was a great tradition of conservation practice in the Pacific, especially through the use of "taboo" areas or practices; these taboo systems had extraordinary socio-religious power. No doubt there were exceptions but these probably depended on the availability of plentiful supplies in relation to the size of human population. Where population pressures were high, the natural environment was destroyed, e.g. grasslands of Marquesas, Papua New Guinea and western Viti Levu (Fiji). In Fiji we also know that some bird species including a pigeon were hunted to extinction in the 18th century. The prehistoric inhabitants of the Pacific islands practised intelligent conservation, and used technologies adequate for those times; but they also depended on the sanctions of social customs to be successful.

During the past century, as visits to this region increased with arrivals from Europe and Asia, a commercial value was established for almost all resources. The introduction of new methods of transportation and communication also brought the indigenous inhabitants of this region in contact with new ideas, styles of living and technologies for resource use. This has affected and will undoubtedly continue to affect the traditional conservation concepts in the future. Even if the intentions of the new arrivals were good, their end result has been the slow eradication of traditional practices that maintained the delicate balances between humanity and nature. Tourism, industrialization and the introduction of intensive agricultural systems based on exotic species of plants and animals are bringing about far-reaching changes.

The rapid deforestation of the higher islands that has taken place is a major concern to scientists, conservationists and other inhabitants of this realm. The forests on quite a number of islands are being extracted for export earnings; mines on different islands are fast removing the mineral wealth of the islands. Records show an increase in fish catch every year

Fiji's rare endemic crested iguana was recently protected in a sanctuary on Nadua Taba Island, with the co-operation of nearby villagers. *Photo: Paddy Ryan*

with the introduction of modern fisheries technologies. The rapid increase in tourism in the region has also led to modifications and alterations in the landscape and seascape of the coastal areas. The increase in population has created a demand for more lands for settlements and therefore removal of forests or reclamation of swamps (mangroves), involving quite large earthworks. Some of the changes may be necessary to respond to people's

Protected areas by country

There are a number of protected areas but only a few contain forest.

In the **Cook Islands**, two reef areas totalling 250 ha were established as national parks in 1972.

In **French Polynesia** there are no National Parks, but two areas on Tahiti Island (Mount Marau and Pari Coast) are at present under consideration. French Polynesia has a number of small reserves.

In **Fiji Islands**, eight nature reserves and an animal sanctuary have been estalished:

RESERVE	FEATURE
Tomaniivi (Mt Victoria) 1,350 ha	sub-montane cloud forest
Nadarivatu, 93 ha	tropical rainforest
Naqaranibuluti (Mt Lomalagi) 280 ha)	rainforest
Draunibota Island, 2 ha	small island
Labiki Island, 0.3 ha	small island
Vuo Island, 1.2 ha	small island
Vunimoli, 20 ha	tropical rainforest
Ravilevu, 4,000 ha	tropical rainforest
Yadua Taba Island, 60 ha	crested iguana sanctuary

In **Kiribati** (formerly the Gilbert Islands) there are no national parks but there exist bird sanctuaries on Christmas, McKean, Birnie and some of the Phoenix Islands.

In **New Caledonia**, conservation action was started in the 1950s and has resulted in several types of protected areas. Some of these are open to mining activity. The major achievement is the *Parc Territorial de la Rivière Bleue*, a substantial forested area east of Noumea.

Papua New Guinea is a leader in protected area systems among the developing countries of the Pacific:

Varirata National Park: situated about 40 km from Port Moresby, the park covers an area of about 1000 ha. It comprises both rainforest areas and open savannas typical of the Port Moresby area.

McAdam National Park: situated neat Bulolo, the park covers an area of approximately 200 ha. It contains one of the last virgin stands of Araucaria.

In addition to these areas, negotiations are at an advanced stage for the establishment of a national park at Mt Wilhelm, Mt Kemeagi and other areas. There are also several Wildlife Management Areas where the wildlife resource is harvested in accordance with conservation practices agreed to by local people.

The **Solomon Islands** has one national park, the Queen Elizabeth Park (6,080 ha) which is subjected to traditional rights by inhabitants within the park boundaries. There are seven bird sanctuaries on small islands.

Tonga will soon have a major terrestrial park on the island of 'Eua, which lies 19 km south south-east of Nuku'alofa. Being the geologically oldest island in Tonga, having considerable altitudinal variation and being lightly settled and developed, 'Eua possesses the most extensive undisturbed habitats in the Kingdom. The proposed national park on the east side of the island encompasses 1,400 ha and four major habitats: the ringing reef; the coastal region; the eastern ridge; and the ridge summit.

In 1974 **Western Samoa** passed legislation to provide for a National Parks and Reserves system. A year later a comprehensive approach was undertaken through a study by IUCN and UNDAT, which recommended the reservation of 6 percent of Western Samoa's land area (38,220 ha in national parks). The following is the present situation in Western Samoa:

Tusitala Historic and Nature Reserve: 128 ha on the outskirts of Apia.

O Le Pupu — Pu'e National Park: This area of 3,000 ha was set aside by the Government as the country's first National Park in March 1978. The land was previously government land and stretches from the southern coast to the dividing ridge at Mt Fito on Upolu Island, thus providing a range of ecotypes found on the island. It is hoped that O Le Pupu — Pu'e will serve as a demonstration area and thereby foster wider public and political support for the concept of National Parks and Reserves.

Togitogiga Recreation Reserve: this reserve was set aside by Government in 1978. It is a small riverside area containing 2 waterfalls and a very popular swimming hole.

There are a number of other areas currently under consideration for reservation in Western Samoa.

needs and aspirations, but present exploitation tends to be on a "grab what I can now" basis with little or no concern for the future. The point is not to stop utilization of resources but to ensure there is a wise use so that the balance of nature is maintained.

Problems and prospects

In the Pacific one of the most important features in planning for protected areas is the question of land tenure and traditional rights. On most of the island nations a large percentage of the land is owned by the communal owners. The ownership of this land passes from one generation to the next and it cannot be alienated. A majority of the existing protected areas are on land already alienated to the government in the past. Today almost all areas that are in dire need of protection lie within customary ownership. It is a very slow process to convince the customary owners of the importance of conservation areas and the long term benefits associated with such designations.

The other problem faced by a lot of the island nations is finance to establish and manage protected areas. The economies of the nations are such that protected area systems are not recognised as being of high priority because the returns from these areas cannot be counted in dollars.

In Fiji we have realised that if forest areas are to be protected then the communal owners must be compensated with the same amount of money that they would receive if their timber had been logged. To raise this amount of money within this country is a very massive task.

The smaller nations in the Pacific are faced with further problems of employing personnel to manage areas. The management costs involved if the islands are widely scattered are fairly high and almost all nations other than Papua New Guinea lack trained personnel or funds to train their manpower needs.

Conservation education vital

One of the major factors that encourage the creation of protected areas in the Pacific is conservation education, which has been included in almost all school curricula. Also the attendance at seminars, workshops and conferences has enlightened many decision makers towards protected area concepts.

At national levels the renewed interest in traditional cultures and lifestyles has given rise to rethinking about the traditional conservation practices and methods of resource use.

The interest of industrialized countries in keeping island nations in this region as "islands in sun with white sandy beaches fringed by coconut palms and with a backdrop of tropical forests" has meant that some funds are available from tourist ventures for protected area systems.

Also the pressures from the scientific community in relating the extinction of species to man's impact on island eco-systems has contributed towards an increased awareness of protected area systems.

Finally, the rapidly depleting resources of the island nations should give rise to thoughts of the use of national parks and reserves as key mechanisms in maintaining the life support systems necessary for human survival. The governments in the region should recognize that parks and reserves are basic elements in balanced resource management.

SOUND POLICY NEEDED

Mid-summer, Queen Charlotte Sound; a Cook Strait ferry laden with eager sightseers carves its way through a glassy sea. Yet what impression does the traveller gain of the way New Zealanders care for their natural landscape as the boat makes its way along this scenic gateway to the South Island? *Margaret Peace,* **a long time battler for the Sounds, here chronicles a history of use and abuse, with a warning of further threats to this special area. She is a Forest and Bird executive member and served on the Marlborough Sounds Maritime Park Board in 1984–85.**

From a scenic point of view, the Marlborough Sounds landscape today presents only a bruised and battered remnant of its former glory. That the Sounds are still rated as worthy of visits from overseas tour ships is significant, and a compelling reason to protect and enhance the scenery for the future.

The landscape is not all that has suffered; indeed, the history of European use of land and water resources in the Sounds can be seen today as a sorry saga of wasteful destruction of a uniquely beautiful area for short-lived economic gain.

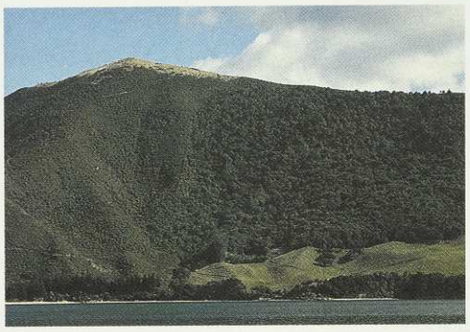
Will that pattern continue? Because the Maritime Park comprises protected areas that are widely scattered and often isolated it becomes doubly important that the lands connecting these are carefully managed, as they are mostly regenerating shrublands. These are the very areas which are now threatened by large scale afforestation, with major companies pressing to establish pine forest over large slices of the landscape.

Sounds history

The entire Sounds area covers some 1500 square km, of which 20 percent is farmed, just over four percent is in exotic forest, leaving about 75 percent as reserves or unproductive land. Native timber logging, burning for farm clearance and by several generations of farmers to prevent bush reversion has severely modified the latter. Despite this, large areas of the Sounds are rapidly regenerating into native forest.

Botanist Dr Geoff Park has estimated that less than 100 hectares of Sounds vegetation remains in its virgin state. Nevertheless, there are still some remnants indicating the original diversity of plant communities, including coastal shrublands, luxuriant lowland mixed podocarp/hardwood forest, montane beech forest and even a small patch of alpine tussock/herbfield on the summit of the highest peak, Mt Stokes.

The ecological significance of the Sounds is underlined by the fact that various plants reach their southern limit of distribution here. They are also home to a number of endemic and endangered animals: Hamilton's frog, the king shag, a giant weta, several paraphanta snail species, yellow-crowned parakeets and yellowheads.



Maud Island, showing the total extent of native bush left after burning for the original farm. The island is the only habitat remaining for Hamilton's frog. *Photo: Margaret Peace*

The summit of Mt Stokes (1204m), the only Sounds site with alpine vegetation. Healthy tussock and *Olearia* are found inside the fenced plot, but outside the vegetation, including *Celmisia macmahoni*, is threatened by goats and pigs. *Photo: Margaret Peace*

Historically the Sounds are important: for evidence of early Maori occupation (from the 12th century); for Cook's visits in the late 18th century (marked by a memorial at Ships Cove, noteworthy for being the spot where goats and pigs were first introduced); and for the setting up of the first New Zealand whaling station, at Port Underwood in 1820. Whaling continued in Tory Channel until 1964, by which time there were few, if any, whales left.

Farming difficult

With no thought of preserving natural values, impossibly steep hill country was burned to create farm land. However, farming was hampered by access problems and the naturally low fertility of the steep clay soils was exacerbated by the disastrous cycle of tree removal, severe erosion, precipitated by frequent, violent rainstorms.

The 1960s saw a network of roads established, serving nearly all Sounds residents, who were also supplied with telephones and electricity. Such services were often installed without much consideration for the environment.

It was a long time before scenic and scientific values were given a high priority, although early this century 5000 hectares of land was set aside as a Climatic and Timber Reserve. In addition, up until the 1970s various scenic and historic reserves totalling some 10,000 hectares were being managed by separate local reserve boards.

Integrated management of reserves only became possible in 1972, when the Marlborough Sounds Maritime Park was established, with a board of 12 members appointed by the Minister of Lands and chaired by the Marlborough Commissioner of Crown Lands.

Today the Maritime Park encompasses a total area of more than 51,000 hectares, including 130 reserves ranging in size from tiny rocky islets to blocks of 5000 hectares. Most have scenic reserve status, five are historic reserves and five are wildlife sanctuaries, nature or scientific reserves. There is also a Sounds Foreshore Reserve, a 20 metre wide strip winding above the high water mark around some 900 km of coastline.

Management problems

The past history of the Sounds has posed a host of problems; more especially today, though, the conflicting interests of the many different users have been difficult to satisfy. From its inception the Park board has been dominated by Sounds farmers and boat owners. Despite regular attempts, no-one with specific conservation or scientific interests managed to get a voice on the board until 1983, when the writer was appointed.

Unfortunately an overall management plan for the Park was not forthcoming until 1985. However, it was always understood the basic policy included: (1) protection of native plants and animals (the paramount aim); (2) protection of scenic, scientific and cultural values; (3) promotion of recreation and cultural values, provided this did not harm the environment; (4) Reduction of exotic animal numbers to as low levels as possible and control of exotic plants.

Too often the board has acted contrary to this policy. For example, it proposed to plant pines on reserves at Mahakipawa and Waimaru, a plan so fiercely contested by Forest and Bird, NFAC and locals that it was changed to a policy of eradicating wilding pines on all reserves.

For years the board promoted the concept of building a major road through one of the most valuable reserves (Kenepuru); this was vigorously opposed by conservationists, the Wildlife Service and the DSIR before the former Minister for the Environment, Russell Marshall, finally quashed the scheme.

Leaving Tory Channel, early morning ferry.
Photo: T. Fitzgibbon

Gannets nesting at the end of Waimaru Peninsula, Pelorous Sound. There are now about 60 nests in use, developed from a single pair first noticed 15 years ago. *Photo: Beverly Baseman*

A further ongoing bone of contention has been the failure by some board members to recognise the importance of restricting public access to rat-free sanctuaries such as Maud Island and the Chetwodes, where rare species require vigilant protection (takahe and kakapo were recently transferred to Maud Island).

Despite the fact that new buildings cannot be built on the foreshore reserve, and existing ones have to be licensed, pine planting has been allowed down to the water's edge and stock have not been strictly controlled — what purpose has a foreshore reserve in those circumstances?

Exotic animals have not been dealt with severely enough by the board — even though Dr Geoff Walls' DSIR reserves survey shows many forests and giant snails are doomed unless pig numbers are drastically reduced. Captain Cook's legacy also returns to haunt nature on Arapawa Island, where a family has lobbied nationwide for ten years to keep feral goats on the island's scenic reserve, arguing they were a valuable old English breed. Finally last year, and at great expense, an electric fence was built to exclude all feral stock from the reserve. A similar fence is planned to bar pigs from the alpine community on Mt Stokes, where the plants have been severely depleted (*Celmisia macmahoni* and *Astelia traversii* are endemic).

It has taken a long time for the natural values of the Sounds to be recognised. However, today most treasure them and want to work for their protection, and to allow sensitive recreation use — not only in the reserves but also in the forests regenerating over vast areas abused in times past.

The Marlborough Sounds form a unique recreational playground and — in the areas where the original vegetation remains — a scenic paradise. If conservationists are vigilant enough, they will be able to protect the regenerating forests from fire, bulldozers and introduced animals and it will be possible to restore some of the original forested beauty of the Sounds.

A vision for Waipoua

"Waipoua — a museum for kauris to rot in" — **Forest Service, 1952.**

Today such an attitude would be laughed out of court; however in 1952 the notion that forests did not need tending like a garden was virtually heresy, making McGregor's achievement in obtaining state protection for Waipoua nothing less than Herculean.

He spearheaded a 50,000-strong petition to Parliament, so weighty that it was trundled in on a wheelbarrow, seeking a National Park for Waipoua in its entirety. Instead he got a Sanctuary containing only the dense kauri forests and upland hardwood forests. The unique coastal forests and regenerating kauri heathlands were omitted. McGregor had won a war, but much of his battleground remained unprotected.

The virtues of Waipoua have long been lauded by politicians, officials and the New Zealand public. Many, such as Prime Ministers William Massey and Joseph Savage, had a personal concern for its integrity.

Originally it was safeguarded from the ravages of logging by its inaccessibility. But as the lowlands surrounding Waipoua were cleared for farmland, pressure was put on the Government to push a road through the forest. Massey refused to sanction the road; however, following his death in 1926 work was commenced. At the time McGregor declared it would drive a wedge through the heart of the forest (a wedge which has been driven deeper with the recent destructive road widening).

Logging started in Waipoua in 1943 for the "war emergency," despite timber being available in other areas. This "emergency" logging continued at an accelerated rate after the war had ended. Much of the kauri was exported and some ended up as fence posts and battens.

Waipoua addition

The present 9105-hectare Sanctuary is merely the nucleus of a much larger area of forests and shrubland worthy of protection. Two recent moves may bring a Waipoua National Park much closer.

In January 1985 Forest and Bird proposed a 3000-hectare addition to the Sanctuary to take in the lowland and coastal forests and heathlands between the Sanctuary and the Tasman Sea. This area is one of the few sites on the west coast of the North Island where there is a continuous forest sequence from coastal to upland forests. It has a number of other unusual features: giant kauri stands on sand dunes surrounded by heathlands; unique kauri-monoao-silver pine forests; a colony of the rare *Pittosporum pimeleoides*.

For more than a century the majestic kauri has been toppled at an alarming rate until only remnants of this wonder of the forest world remain today. One of these — Waipoua Forest on Northland's west coast — was not protected until conservation stalwart Professor Barney McGregor took up its cause. Waipoua was created a Sanctuary in 1952 — but had in fact Barney McGregor won his battle? Not entirely. Society northern regional officer *Mark Bellingham* **outlines two important new reserve initiatives which bring McGregor's vision closer to reality.**

Professor Barney McGregor, chief advocate for Waipoua Sanctuary.

Other features of interest in the reserve proposal include several Maori settlement sites along the Waipoua and Wairau rivers and fossilised kauri trunks in the sandhills — evidence that kauri giants may once have grown right to the ocean edge.

Two new loop tracks have been proposed to link a coastal route with the old Coach Road in Matarau Forest and a Wairau River route with the famous Cockayne kauri (outside the Sanctuary), plus the Sanctuary giants Tane Mahuta and Yakas. Both walks would take trampers through a range of fascinating forest sequences.

A journey along the Wairau River shows how arbitrary our legal boundaries can be. Rising high in the Parataiko Range, this watercourse trickles down onto the Waipoua Plateau. Each year thousands of visitors cross the footbridge over the Wairau as it winds sluggishly past Tane Mahuta within the swampy upland kauri forests.

Reaching the edge of the plateau, the river suddenly loses the protective cloak of the Sanctuary as it rushes seaward, tumbling over rapids and down waterfalls, dropping some 350 metres along its 13 km course. Along the length of the river sand grey columns of pristine kauri, mixed with tarairi, tawa and totara; this is the only Northland river with a virtually untouched catchment. Yet much of this unique area is still unprotected in a "kauri management zone", a Forest Service brainchild which demands that other species are ringbarked in order to boost logging volumes of planted kauris.

The Forest and Bird Waipoua Sanctuary extension proposal has still to be evaluated by the Government's Protected Areas Scientific Advisory Committee; however, within both the Forest Service and the scientific community there is considerable support for it.

McGregor Reserve

The second Waipoua initiative is the 146-hectare McGregor Reserve, opened in December 1985 by the Native Forest Restoration Trust on the south side of the Sanctuary.

This reserve, affording magnificent views across the Sanctuary, is grassed in the centre but will be revegetated. Much of it is tawa-tarairi forest studded with many giant totara.

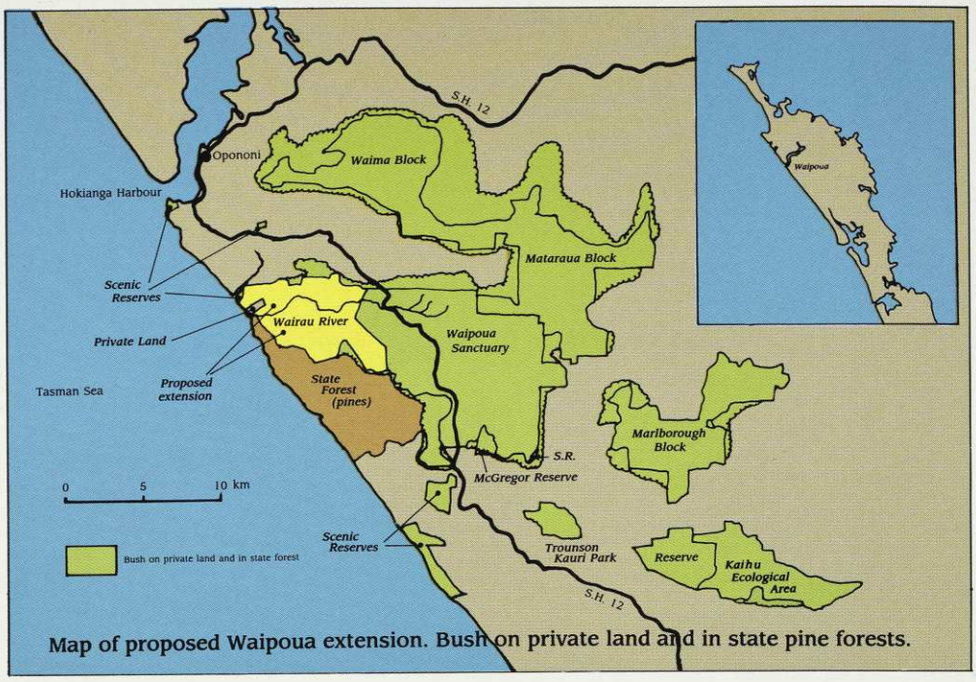
The speed with which money had to be found to finance purchase of the reserve provided members of the Trust with some heart stopping moments. At the beginning of October the Trust knew it had only six weeks to find $102,500, though the financial burden was reduced somewhat with an offer of $40,000 from the QE II National Trust, provided the appeal could raise the remainder.

Owen Lewis, Chairman of the Native Forests Restoration Trust, points out that the appeal was an interesting lesson in the importance of every individual's effort. Most of the money consisted of small donations from thousands of people, and the deadline of November 20 was met with ease.

Opposite: The white rata vine, *Metrosideros albiflora*, an attractive climbing plant found throughout kauri forests. *Photo: Brian Enting*

Inset: The picturesque Waipoua River viewed from the Waipoua bridge. It has been suggested that the main factor in saving Waipoua was the lack of a major stream flowing to a suitable harbour from where the logs could have been shipped. *Photo: Brian Enting*

Kauri regeneration in the proposed Sanctuary extension. Fossilised kauri trunks in the sandhills show that these giants of the forest may once have grown right to the ocean edge. *Photo: Mark Bellingham*



Map of proposed Waipoua extension. Bush on private land and in state pine forests.

"We sent out 45,000 pamphlets, mostly to the northern North Island but in fact we received some donations from the South Island and overseas. Local Forest and Bird groups were also extremely helpful," he says.

The project marks a new direction for Waipoua, and returns an important part of the forest into the safe custody of Tane. Day-to-day management of the reserve will be in the hands of the Conservation Department and kauri planting is planned.

Already the healing process has begun. At the December opening ceremony the first miller who cleared the land 40 years ago turned up at the dedication and planted a miro, grown from one which had once stood in Waipoua.

Private forest razed

National interest has almost exclusively focussed on Waipoua, yet it is only part of a larger forest block that covers 25,000 hectares. This includes the Waima, Matarua and Waipoua blocks of Northland Forest Park and some 4500 hectares of privately-owned forest. Tragically most of this privately-owned forest is unprotected and is being progressively cleared.

In the past five years large scale exotic forestry by New Zealand Forest Products and Shell Oil has razed native forest and blanketed farmland to the east and south-east of Waipoua. Although the momentum of this conversion has slowed recently, the companies still control the fate of several large blocks of native forest. It is an appropriate time for them to foster lasting community goodwill by giving these native forests full protection.

When the Conservation Department takes over administration of state forests and crown reserves, most contiguous publicly-owned native forests will be managed as one unit. But is this enough? The new department should live up to its name by actively pursuing forest protection on private lands more vigorously than the agencies it supplants.

McGregor's vision of an extensive national park may be closer than we think.

Earnslaw Station

A case history

In the South Island, 2.7 million hectares of high country land, or 10 percent of New Zealand's total land area, is public land divided amongst 365 pastoral leases. Much of this land is severely eroded or home to many special native plants and animals; some of it is also productive Merino country; parts are inhospitable to either plant or animal life, yet curiously some runholders still seek to retain grazing rights over it. In this article pastoral lands researcher Bruce Mason investigates the history of one controversial lease and argues that a large proportion of it has such high recreation, natural and scenic value and little farming value that it should now be resumed by the Crown.

It has been pointed out that the removal of land from runholders' leases can hurt their sense of ownership more than their pockets. The recent history of Earnslaw Station, at the head of Lake Wakatipu, goes a long way to proving the truth of this adage.

At 2820 metres, Mt Earnslaw is impressively high, towering over the tramper on the valley floor who has made his way up the swift flowing Earnslaw Burn to the southern foot of the mountain. A more dramatic alpine setting with such easy access would be difficult to find.

Immediately ahead lie the mounds of a glacial moraine, the rock and debris of which were deposited thousands of years ago from an extension of the Earnslaw Glacier; waterfalls stream over rock faces as the summer melt continues; the eye is continually arrested by the awesome ice blocks of the glacier and the snowy approach to the summit — an imposing west Otago massif in a typical west Otago valley.

However, the complete and simple elegance of the timeless landscape contrasts markedly with land tenure maps of the area; a complex mosaic, the result of 120 years of European land allocation and reallocation, now overlays the tussock, beech, rock and ice.

As a result of hasty South Island land speculation of the mid-19th century, Mt Earnslaw, south glacier and all, became part of a pastoral lease, giving the runholder grazing rights over vast areas too steep even for mountain goats.

By the 1960s the absurdity of the situation had been recognised, culminating in the removal of 9250 hectares from the lease in 1973. But, despite this mountainous area having no pastoral value whatsoever, the lessee staunchly fought to retain this rights of exclusive possession over this land.

Thirteen years later the 33-year lease is up for renewal. Most of the Earnslaw block is considered unsuitable for farming but ideal for outdoor recreation and worthy of protection for the range of native plants and animals found there. Mountainous overhangs, waterfalls and alpine barrens can support recreationalists but few sheep. What possible use could such land be to a runholder?

In 1861, the year that gold was first rushed in Otago, the Earnslaw district was first settled for farming. Mt Alfred and the flat, fertile lands between it and the Rees River were taken up and the lower slopes of Mt Earnslaw were grazed extensively in conjunction with two other large runs. Another type of gold — a "golden fleece" — was about to be spun.

Claimants' plans, for the sake of simplicity, extended run boundaries to the skylines. Runholders needed only to find some unused land, define its boundaries and ride back to Dunedin or Christchurch to legalise their claims. In such a haphazard fashion the high country was "won".

The 20th century has seen competing claims being made for Earnslaw Station

Severe geological erosion above the Earnslaw Burn. The land above the forest is in pastoral lease, and the National Park boundary runs along the crest-line.

pastoral lease land. In 1952 the lease covered 14,900 hectares, but at the time it was apparent that some of this would become part of the yet-to-be gazetted Mount Aspiring National Park. A special condition of the lease stipulated that the lessee was not entitled to compensation if any area was resumed for the National Park. This provision remains.

In 1971 a 364-hectare wedge of beech forest in the Dart Valley was surrendered and added to Mount Aspiring National Park. Protracted negotiations however failed to achieve surrender of the Earnslaw massif and Forbes mountains for inclusion in the Park. The Labour Government then stepped in and forcibly removed 9250 hectares for the Park in 1973.

Today the pressure continues for more of the lease to be resumed for recreation or conservation.

The Earnslaw Burn has long been the route for climbing access to the south face of Mt Earnslaw. However, it is more generally used by trampers crossing between the Rees River and Earnslaw Burn or to Paradise via Turret Head. Such trips normally take two days.

As a lower but isolated massif from the surrounding mountains, Mt Alfred provides an excellent view of the district, in particular of Mt Earnslaw, the Dart and Routeburn Valleys. The more Glenorchy develops as a holiday centre, the more demand there will be for day walks — already there are calls for a track to the summit of Mt Alfred.

The pastoral lease fronts onto the important fishery of Diamond Lake, Lake Reid and Diamond Creek. Most of the fish are brown trout, with some rainbow and small landlocked quinnat salmon. Particularly popular with anglers is the five-km stretch of Diamond Creek upstream from where it meets the Rees. Fine alpine scenery and often difficult angling make this a rewarding stream to fish. Because it is a lake outflow, the stream is not prone to flow fluctuations, and is therefore prime trout habitat.

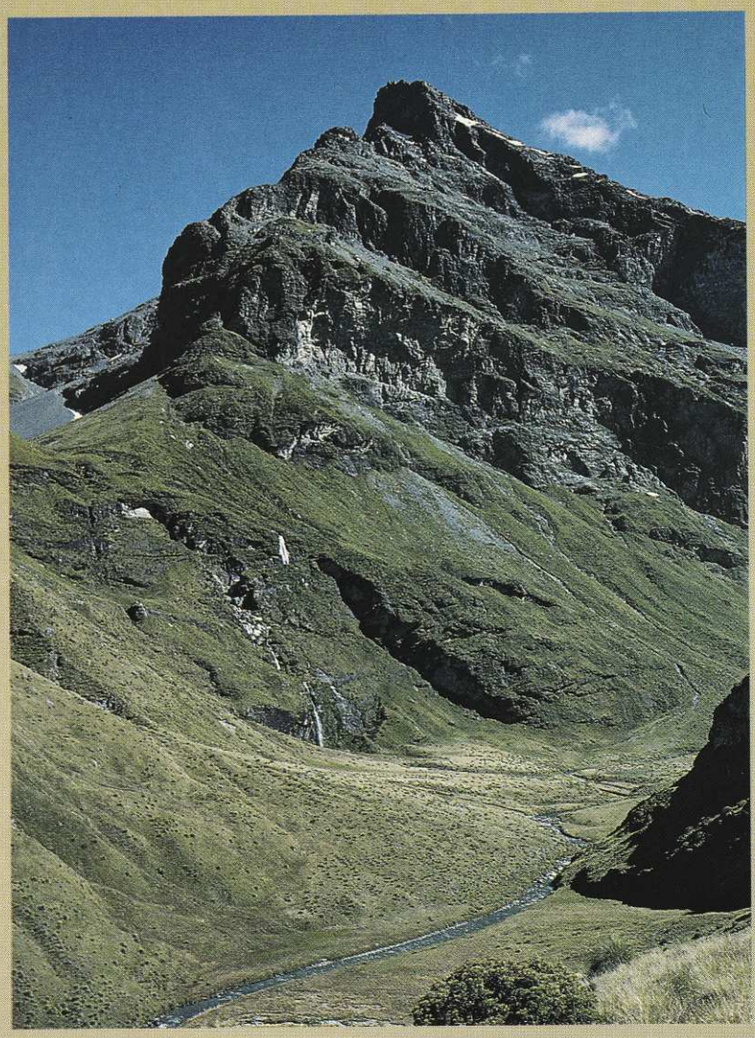
The forests within the pastoral lease all provide valuable bird habitat, with a similar range of species to that found within the adjacent state forest. Kakariki and South Island robin are among the more notable species, common here but reduced in numbers elsewhere in New Zealand.

At the beginning of this century a number of eminent entomologists explored the Earnslaw district for insects because of the ease of access and the attraction of the rich and varied vegetation. It has thus become the type locality for dozens of alpine species, providing the scientific benchmark for many species of wider distribution.

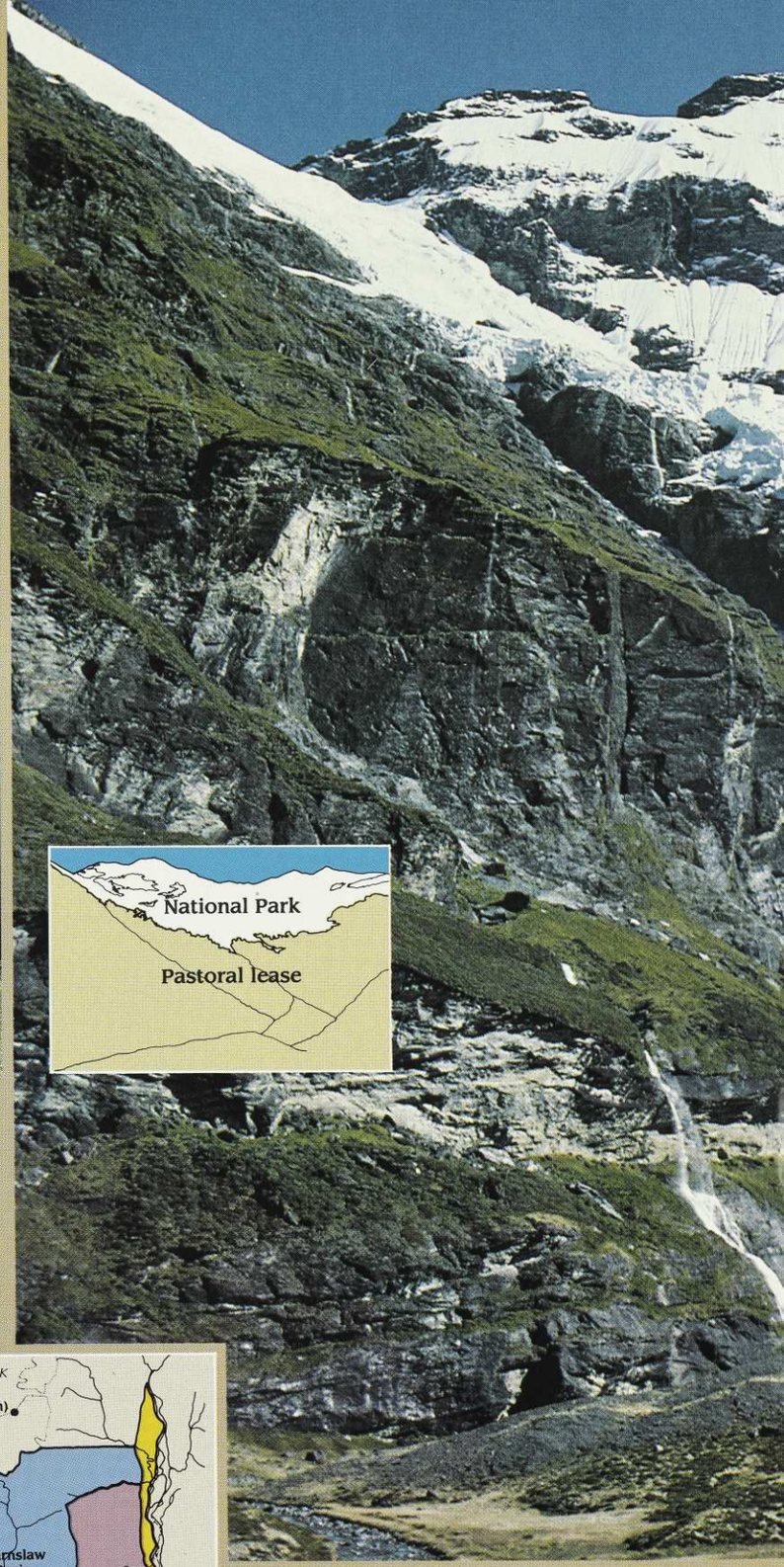
The Land Use Capability system ranks land from Class 1 down to Class 8, according to its production value. On this score, 68 percent of the Earnslaw block is Class 8 — severely eroded and totally useless for grazing — and 17 percent is Class 7e, prone to severe erosion. The only substantial areas of sustainable pasturage are on the Rees Valley flats and the toe of one spur. This block is lightly set-stocked year round with 1260 wethers.

Mt Alfred is a mix of state forest, pastoral lease, reserve and private land. The lower, forest-cleared slopes are Class 6 (moderate capability for pastoral use) and have been partly improved through aerial oversowing and topdressing. The upper snowgrass slopes are Class 7e.

The High Country Public Lands Coalition (comprising Forest and Bird, Federated Mountain Clubs, the National Acclimatisation Societies and the Deerstalkers Association) have proposed the following changes to the Earnslaw lease:



The imposing Turret Head (2340m.) Everything in this photograph is within pastoral lease, even though all the land above the basin floor is Class 8, considered unsuitable for grazing. There is a very limited area of Class 6e on the basin floor.



The south face of Mt Earnslaw towering above the Earnslaw Basin. The absurdity of some pastoral leases is graphically illustrated in this photograph; up until 1973 everything here was included in the Earnslaw Station pastoral lease. The glacier and above is now part of Mount Aspiring National Park, but the sheer rock faces below still remain in pastoral lease.

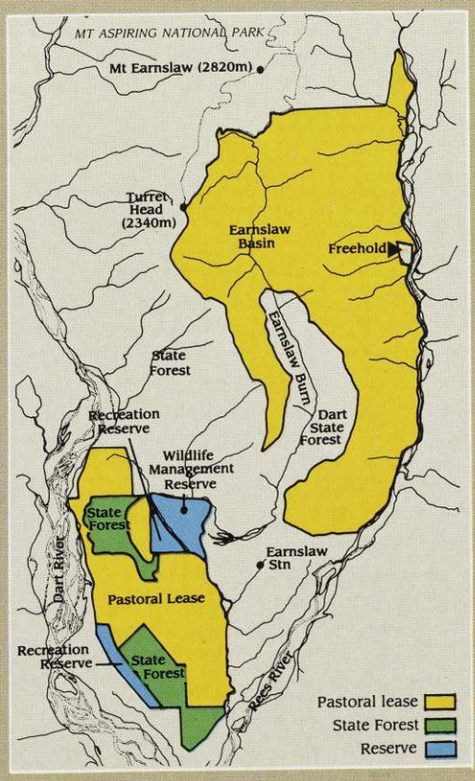


Fig 1: Earnslaw Station showing present land tenure.

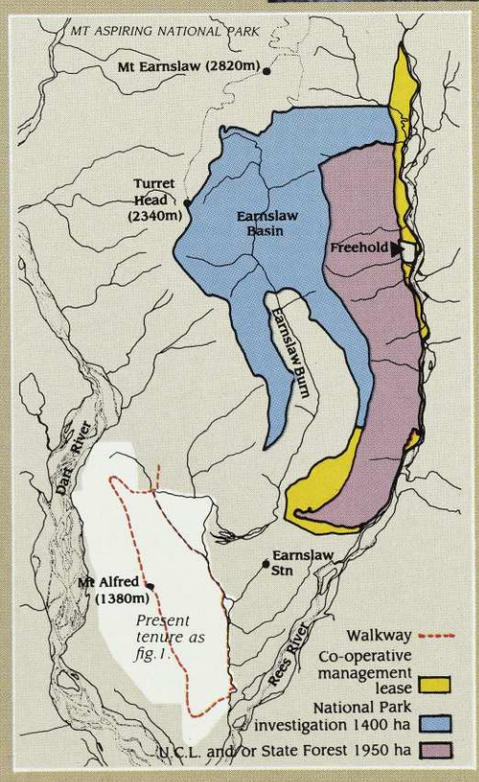


Fig 2: Earnslaw Station showing proposals for resumption.

Earnslaw block

- Resumption from the lease of most of this block.
- National Park investigation over Earnslaw Burn catchment.
- Issue of a special co-operative management lease over the grazing lands to integrate nature conservation and recreation with grazing.

Mt Alfred

- Renewal of the pastoral lease, but with effective control of soil disturbances and burning. Stocking to be restricted in upper snowgrass.
- Rationalisation of "straight line" boundaries between lease, state forest and reserves.
- A Mt Alfred walkway.
- Penalties or compensation for illegal roading within adjacent reserves.

The total area of Mt Earnslaw Station is 6550 ha, consisting of 5250 ha pastoral lease and 1300 ha freehold. Although resumption of the steep lands and forests of the Earnslaw block would reduce the total area of the property by half, it would have minimal impact on the farming operation, because most of the land resumed from the lease is severely eroded and unsuited for grazing.

Part of the extensive beech forests within the lease which the High Country Public Lands Coalition wants to see resumed. The runholder would still graze the flats. Rees Valley.

Nevertheless, it would be only fair for compensation to be paid were there any consequent reduction in sheep numbers, however small this would be.

Such a move would not make the run uneconomic. Virtually all the areas suitable for sustained pastoral production would remain in the run. On the lower river flats there is scope for enormous farm production increases and voluntary Catchment Board land improvement schemes provide financial incentives for this. Several years ago the Lands and Survey Department reported the whole property could easily be split into three economic farming units.

Clearly, then, conservation and development can be integrated on the slopes and valleys around Mt Earnslaw.

PARTNERSHIP for PRODUCTION and PROTECTION

Conservation director Gerry McSweeney reports on a successful visit to the Mackenzie Basin where scientists and high country farmers managed to find common ground.

The first real test for the Protected Natural Areas Programme (PNA) took place earlier this year in the high country of the Mackenzie Basin. Happily the programme passed with flying colours.

The test was not whether representative examples of New Zealand's natural landscape could be identified — this had alredy been done through surveys in at least eight parts of the country — but rather whether the value of identified areas could be conveyed to the landowners and lessees and mechanisms then had to be developed to integrate protection with other productive uses of the land.

PNAs cover only six percent

The ½ million-hectare Mackenzie Basin was first surveyed for representative reserves over the 1983–84 summer. A report produced in late 1984 identified about six percent of the Basin as priority natural areas, deserving further evaluation and appropriate protection. In February 1986, the Government's scientific committee for protected areas (PASAC) visited the region to evaluate priority natural areas.

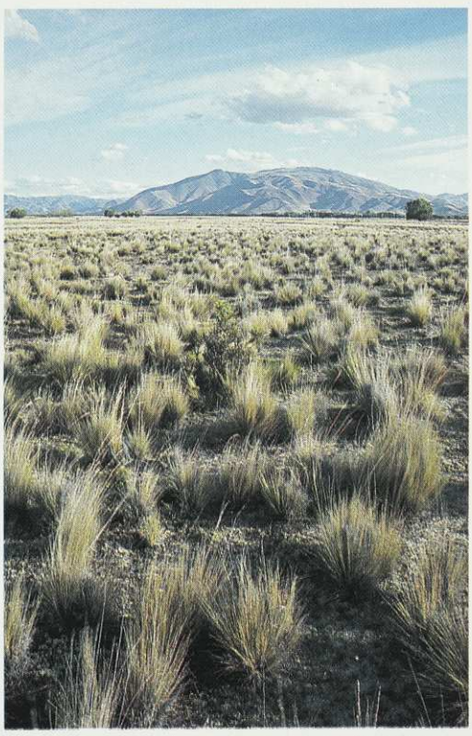
It was to be a most unusual visit for the committee, which previously had been accustomed to evaluating proposals in uninhabited state forests. Lands and Survey wanted the committee to understand the implications of PNA proposals for high country farming. As Canterbury's Land Commissioner Laurie Kenworthy told PASAC's first public meeting in the Mackenzie basin: "If tussock grassland reserves are to have a long term future, we need the understanding and long term support of lessees and landowners.

Prospects for a successful visit seemed poor. The whole future of high country public lands is undecided with continuing debate on whether to place them into a narrow commercial corporation or into a neutral stewardship division of the Depart ment of Conservation. Rabbit problems also confuse the issue. Immediately prior to the PASAC tour, the Mackenzie branch of Federated Farmers had voted to stop any further co-operation with the representative reserve programme until Government assisted them by introducing myxomatosis.

However what took place over the week-long tour by the PASAC committee was a shift from public posturing, and heated debate, to an encouraging example of dialogue in the finest New Zealand tradition. By the end of the week most people emerged with the realisation that multiple use of the high country is possible, involving a partnership in both preservation and production between the public, the government and high country runholders.

Pests number one enemy

High country runholders have many fears. Partly cushioned by high fine wool prices and fast developing tourism alternatives on their properties, they voice less of the economic despair of the smaller lowland farmers, but more their opposition to anything which might reduce pastoral production. Many see pests as their number one enemy: both spiralling rabbit numbers and attendant control costs; and uncontrolled expansion of weeds such as the introduced flatweed *Hieracium* and the rosehip-covered sweet briar. For Alan Innes of Black Forest Station, *Hieracium* and rabbits seem to eclipse all other concerns. However other farmers are less worried. They see the rabbit problem as unimportant nationally but locally severe, demanding intense poisoning programmes and tighter stock management. They also believe that both briar and *Hieracium* can be controlled by stock management, pasture improvement and in some cases the controlled use of goats.



Simon Cameron's support means that Ben Ohau Station's Pukaki river flats could soon be New Zealand's premier protected short tussock grassland. *Photo: Gerry McSweeney*

Michael Murchison, Chairman of the high country committee of Federated Farmers, told PASAC's first public meeting that outside pressures for the surrender of eroded mountain ranges, for recreational use and for nature conservation are "the greatest threat to our future".

Since the 1960s Governments have subsidised lowland development by runholders in return for the retirement from grazing of pastoral leases on severely eroded mountain ranges. Initially started to prevent further erosion choking rivers downstream, retirement programmes have now broadened. They seek also to preserve the unique alpine vegetation of the high mountain lands from further grazing damage and to allow the vegetation to continue holding the soil mantle.

Although runholders have been the major beneficiaries of these subsidised retirement programmes, lack of progress in recent years in achieving the voluntary retirement and surrender of the severely eroded mountainlands led government last year to adopt a new policy. This now requires the identification and compulsory surrender of such lands, subject to appropriate compensation. Runholders have been vocal in their opposition to the new policy. They dislike being reminded that their leases only give them right to the pasture not the soil and thus on the severely eroded public lands where little pasture remains they have little or no lease entitlement. The surrendered mountainlands are highly valued by trampers, climbers and hunters. Clearly too they have great scientific and conservation value.

At lower altitudes, the runholders also fear outside interference. Many of them were caught up by the massive Waitaki hydro developments. More recently there has been considerable interest in preserving habitat for the rare black stilt, down to eleven breeding pairs and restricted to high country wetlands in the Mackenzie Basin.

New era of balanced land use

Traditionally, pastoral farming has ruled the roost in the high country. It is therefore easy to understand runholders worries about outsiders promoting recognition and protection of the multiple values of the high country. Nevertheless most of their runs are Crown land under pastoral lease, which require balanced use of the high country, even if in times past the administration of the leases has almost exclusively favoured farming.

Former runholder and Land Settlement Board member Arthur Scaife told Mackenzie Basin runholders in February that programmes like the representative reserve programme were always going to happen.

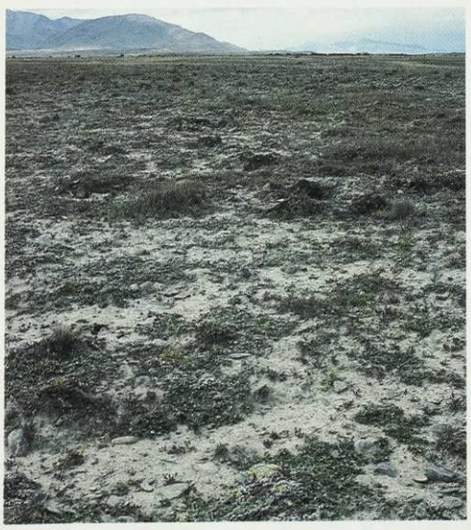
"We high country people ourselves accelerated the PNA programme by seeking further freeholding. We also complained about proposals to increase our rentals and as a consequence got a comission of enquiry (the Clayton Commission) established which inevitably accelerated such things as the PNA programme." (Peppercorn rentals are paid for the 2.7 million hectares of high country pastoral leases — $131,000 in 1984–85 or 6 cents a hectare. Government policy is for these rentals to progressively increase to more realistic levels.)

The scientific committee evaluating the Mackenzie PNA areas worked like Trojans. They spent up to ten hours a day and long into the night evaluating most priority natural areas in the northern Mackenzie

Raupo lagoon and the Ben Ohau Range — a priority natural area on Ohau Downs pastoral lease. *Photo: Gerry McSweeney*

Basin. They were always accompanied by the runholder on the properties they visited.

Despite earlier fears, what emerged during the week was an understanding and acceptance of the value of representative reserves. "I get a little less concerned as time goes by that we high country people have as much to worry about from the PNA programme as we first thought," commented Arthur Scaife.



Short tussock is threatened not just by cultivation and topdressing but also by rabbits and *Hieracium* flatweed which have devastated this tussock area. *Photo: Gerry McSweeney*

Even farmers' fears allayed

Farmers' fears were allayed by the realisation that for many of the PNAs, what was required was not a high fence and a "keep out" notice. Rather the protected short tussock grassland would need to be extensively grazed. Although dominated by native plants, these grasslands have expanded because of human fires and animal grazing. This would need to continue to perpetuate the tussocks and prevent the eruption of introduced grasses and *Hieracium*. Although controlled extensive grazing would be required in the PNA areas, management agreements for such areas would have to preclude oversowing, cultivation and other development. Such activities are not a legal right of a pastoral lessee, rather they are a privilege for which the lessee must make specific application.

This in part explains the willingness of Lands and Survey Deputy Director-General George Macmillan to bite the bullet on the runholders' question whether lessees will be compensated when PNAs are established.

"I accept without question, and so does the Land Settlement Board, that if a lessee is being asked to forgo some development opportunity that he is automatically entitled to undertake, he is entitled to compensation". He also emphasised that in general establishment of PNAs could only be by negotiation.

As the runholders thawed to the concept of representative reserves, equally dramatic was the growing realisation amongst the scientists of PASAC of the impact of rabbits and weeds on the Mackenzie Basin.

At the beginning of the week runholders' spokesman Michael Murchison had assured PASACs first public meeting that, "Runholders are conservationists and generally accept that these are natural areas that may need protection."

With virtually no reserves through the high country today and wetlands and tussockland eliminated over wide areas by pasture improvement programmes, the public could be justifiably sceptical about Michael Murchison's statement. However during the week in the Mackenzie it became increasingly clear that if runholders understood the purpose of the PNA programme they were willing to co-operate in establishing representative reserves.

"Fescue tussock has always been a special feature of Ben Ohau station — especially on the block beside the main road. We're keen for it to be left for the future", says Simon Cameron, who with his wife Priscilla and his parents, farms the station near Twizel.

Short tussock on river gravels was once the most extensive vegetation type in the Mackenzie. However today it has disappered from most of the basin through pasture improvement, hydro development and roads. The PNA survey team identified a 300 hectare short tussock area on Simon Cameron's property. It is a spectacular example of short tussock, native broom and native herbs. When the PASAC team inspected the area it was alive with tussockland animals — tiger beetles, short horned grasshoppers, lizards, banded dotterel and pipit.

NZ's finest short tussock area

If Ben Ohau's tussock is to be maintained and *Hieracium* and introduced grasses kept

in check, extensive grazing by merino sheep must continue. On the adjacent Twizel airstrip where grazing is excluded, introduced browntop grass and *Hieracium* have swamped the short tussocks. Simon Cameron has very generously suggested that the PNA area could be expanded to include the whole short tussock covered paddock — some 1,500 hectares. This would undoubtedly be the finest protected short tussock area in the whole country and negotiations have now commenced to protect it through a covenant. This will allow for controlled grazing but preclude destruction of the short tussock by cultivation and oversowing, although the dry and stony land is clearly unsuited for such pasture improvement anyway. In exchange, the Government will clearly have to show its commitment to rabbit control in the short tussock reserve.

Just as a partnership is needed to create representative reserves, another partnership is needed to tackle the rabbit problem. Myxomatosis introduction is not considered by a 1985 Environmental Impact Report to be the answer. There are problems in its effectiveness and speed of control, wide public opposition to its use, possible negative effects on our trading image and possible infection of domestic rabbits. Greater state assistance with rabbit poisoning in critical areas is one alternative. Another suggestion has been the commercialisation of the wild rabbit. Clearly the rabbit issue is a problem for all New Zealanders, not just high country runholders.

The devastating impact of rabbits on a Ben Ohau Station fence post. From left to right Simon Cameron (runholder, Ben Ohau), Professor Kevin O'Connor (PASAC), Laurie Kenworthy (Commissioner of Crown Lands, Canterbury) and Arthur Scaife (Land Settlement Board).

Simon and Priscilla Cameron are not alone in wanting to protect the natural character of the high country as part of their farming operation. Further south, Don and Mary Lou Blue farm Ohau Downs Station. As well as fertile cultivated flats, this pastoral lease includes spectacular tussock and shrub covered glacial moraines studded with small lakes and wetlands.

"We've been careful to look after the lakes and the tussock on the moraines — they make Ohau Downs special," Don Blue told me recently. "However they also provide one of our few stock watering areas so stock must have access to them."

About 500 hectares of moraines and lakes on the Blue's pastoral lease were identified by the PNA survey as deserving protection. Unfortunately the PASAC team did not have time to visit the area in February.

The type of negotiations described above are not going to be possible everywhere. Not all runholders will necessarily be as sympathetic. Nor will the scientists always be so flexible. There are tall tussock, shrubland and wetland associations where grazing must be excluded if the plants are to have a long term future.

Attitudes will not change overnight. It will take time for runholders to recognise that the public interest in their leasehold lands need not be a threat. Rather it can be used as an ally against both rapacious rabbits and a Land Development Corporation greedy to maximise its rental income. Equally difficult for nature conservationists will be accepting that preserving some types of tussocklands may require continued grazing.

The key to successful achievement of PNAs is clearly mutual understanding.

Runholders, officials and nature conservationists all seem agreed on one thing — the momentum now behind the Mackenzie programme must not be now lost.

MOA'S ARK
the natural world of the Moa

by Barney Brewster

Long before Polynesian seafarers discovered and settled New Zealand, this ancient archipelago was inhabited by a race of giant birds — the moa.

When our primaeval islands first drifted off from the Gondwana supercontinent, around 80 million years ago, the ancestral moa had already embarked for the long ocean journey. Moas were the original New Zealanders — a feathered family remarkable for their size, their lack of wings and their uniqueness to New Zealand.

Because the moa is extinct, scientific study of the bird has been made particularly difficult. The dodo of Mauritius, that epitome of extinction, left something for science in the way of travellers' descriptions, paintings and preserved parts; but of the moa? Bones, and more bones, and few other traces.

Over the last century moa bones have turned up in their thousands in caves, swamps, river beds and sand dunes, as well as early Polynesian middens. But complete moa skeletons, with bones still articulated, are quite rare, although vital for species identification. This is important because definite knowledge of an animal's biological status forms the basis of all further scientific enquiry.

Since the mid-19th century, many zoological systematists have laboured over the moa's family tree, suggesting over 60 names. W.H. Oliver, the author of the most recent scientific monograph on the moa (1949), considered there were 28 species. Since then, the number of species has been whittled down to 12. Such an array is surprising when contrasted with the limited number of types of New Zealand's other ancient bird lineages — the wrens, wattle birds, thrushes and kiwis. The number of moa species, and especially the absence of sub-species, has also been criticised from an ecological perspective.

The ultimate answer

Because our moa heritage remains mostly in the form of bones, the reconstruction of species can only really be assessed from variations in bones, principally the skull, pelvis or the leg bones (the most commonly found). But, then, today's scientists have serious difficulties in differentiating between the bones of different kiwi species, and between keas and kakas — birds readily distinguished in real life. 'Scientists are no closer to being certain about how many species of moa existed in New Zealand than they were 150 years ago', according to Dr Phil Millener, an avian paleontologist now with the Smithsonian Institute. He believes that biochemistry is the ultimate answer. You can't argue with biochemical labels, he told the 1983 Pacific Science Congress.

Fortunately, there is at least general agreement on moa generics, although the lack of common names for the six broader categories of moas makes for a forbidding list: *Anomalopteryx, Megalapteryx, Pachyornis, Emeus, Euryapteryx* and *Dinornis*. This catalogue of scientific tongue-stoppers must be very off-putting to the average museum visitor!

Moas came in a great range of sizes. The *Dinornis* species were the largest. Recent scientific estimates of their maximum height vary from 2.7m to around 4m, but they are regarded as the tallest of modern birds. Other moas graduated in size down to about 1m high, but there were some notable variations in build. Some were slender and probably graceful, others were very squat and heavy birds, and would have waddled about in a most ungainly fashion. All were entirely wingless. It is this which makes the moa truly unique among birds. Even the kiwi has vestigial wings, 5cm long, with a reptilian claw at the end, but the shoulder girdle of the moas lacked even a socket for a wingbone to fit into.

This extraordinary devolution of the forelimbs must be linked to the very favourable circumstances that the original moa bird inherited millions of years ago, when this capacious ark set sail from the rest of Gondwanaland. The ancestral moa occupied a tract of country larger than the New Zealand of today, with little or no competition, or danger from serious predators. We can presume this from the success of the moa's radiation into many species.

Massive penguin

From the immense numbers of subfossil bones, still being found in caves, swamps and mudsprings to this day, we can be confident that moas were flourishing only a few thousand years ago.

Flightlessness and giantism are hallmarks of isolated populations of birds, and there have been other examples in New Zealand. The kakapo survives (just) as the world's largest parrot, whereas the flightless NZ goose (*Cnemiornis*) and the giant flightless rail *Aptornis* do not appear to have lingered long after the arrival of people. Our islands were once home to another giant bird, the penguin *Pachydyptes*. This massive bird, around 1.6m in height and weighing about 100kg, is known from 40 million-year-old marine sediments at Oamaru. On the basis of the huge size of the kiwi egg, relative to bodyweight, it has also been suggested that the kiwi was once a much larger bird. Its present size might be a specific adaptation to nocturnal life in the deep forest.

Moas and kiwis are grouped with other large flightless birds — the Australian emu, the cassowary of New Guinea and Queensland, the African ostrich and the rhea of South America — under the name 'ratites'. The Latin-derived term refers to the ridgeless breastbone of these birds; flighted birds retain the ridge for the attachment of flight muscles.

Many scientists believed that all these birds had a common ancestor, and until the theories of continental drift gained wide currency in the 1960s, the natural tendency of northern hemisphere scientists was to locate the origins of these birds close to home. Contemporary wisdom now focuses on the forests of South America as the ratite family seat, and on Antarctica as the bridge for their wide dispersal.

Flying ancestor

Some scientists have regarded the anatomical and structural similarities among the ratites as only a good example of the converging forces of evolution, but studies of chromosome material from the living ratites now suggest a common origin from a flying ancestor, at an early stage in the age of birds.

The kiwi and the moa have been paired in the popular mind from the earliest days of their scientific discovery. The curiosity of the British and European public was considerably aroused by reports of the strange tailless, 'wingless' kiwi, while the moa became famous by an astute diagnosis from a single bone, brought to London in 1839. Biochemical studies of kiwi genetic material suggest a split with other birds of the Australasian region only 40-45 million years ago. However this conflicts with the geological evidence, as a split from emu/cassowary stock at this time would postdate the oceanic separation of that continent and New Zealand.

It is generally thought that moas came to this country on foot, around 150-140 million years ago, before the development of mammals and the break-up of Gondwanaland. Unfortunately the fossil record has nothing to add to this, nor does it give any clues to the subsequent evolution of moas in New Zealand. Terrestrial vertebrate fossils are in fact completely lacking fot this extended period, with not even that most ancient of animals, the tuatara, making an appearance. However, we can be sure that moas were witness to the long series of changes as this primordial land rose and weathered over the aeons. Climatic change accompanied the purely topogragraphic. Twenty million years ago, coconut palms grew in Northland, kauris prospered in Southland, and moas saw it all.

The ratite connection gives us good reason to look at the moa's living cousins, es-

pecially the kiwi, the emu and the cassowary, for the probable habits of the extinct bird. We should also contrast the outline of the moa with a fearful contemporary from South America, the giant terror bird (*Andalgalornis*) which died out about 3 million years ago.

The terror bird compares well in height with a middle-sized moa such as *Emeus*, but the terror bird's large and powerful head, and athletic build, are adaptations for a carnivorous way of life. Different features bring out the opposite in the moa; the small skull and heavy legs and feet of *Emeus* imply an unhurried, herbivorous life.

Only the *Dinornis* moa exceeded the terror bird in size; in silhouette *Dinornis* was also much lighter on its feet than two other of the middle-sized moas (*Pachyornis* and *Eurypteryx*) and could be considered the giraffe moa, although early reconstructions exaggerated its height by articulating the skeleton to maximum effect!

Pachyornis was the remarkble heavyweight of the middle-sized moas, but all three types were around 1.3m tall. The smaller moas, sometimes called 'bush moas', were *Anomalopteryx* and *Megalapteryx*. These two genera have a more graceful appearance, and were no doubt more agile than the larger moas. Like *Emeus, Megalapteryx* seems to have been restricted to the South Island.

Appearance of the moa

Well, what did moas look like, and how did they live? From mummified fragments of *Megalapteryx*, discovered in Central Otago last century, we know that this moa had a downy cover of feathers — with purplish black centres and golden buff edges — from the base of its bill down to its toes. On the examples of the emu, cassowary and kiwi, scientists have supposed that other moas may not have had a complete covering of feathers. Some moas may have had the bare neck of the emu, or the colourful fleshy neck wattles of the cassowary, or the bare lower legs and feet that characterises all three Australasian relatives.

Moa feathers have been found up to 18cm long, and some are double-shafted, that is, have a smaller accessory plume. Like other ratite feathers, moa feathers have lost any semblance of aerodynamic efficiency, and have more of a soft, hair-like quality. 'Stuffed' moas in our museums have been recreated using emu and kiwi feathers over wooden frames. ('Monstrously bad reconstructions', for the most part, according to one paleontologist). Isolated moa feathers have been found with a variety of colourings — a brownish red, white on black, speckled grey and bluish purple — but apart from *Megalapteryx*, there has been no possible identification. Maori legend reports weka and kiwi colourings for some moas, and a tradition published early this century links *Dinornis* to the name *kuranui*, which may be translated as either 'big red' or 'big prize'. Memories of the moa are very vague in Maori oral tradition, however, and at least one story of *kuranui* contains elements suggestive of a lingering image of the extinct NZ eagle.

Feather pits have been noted in some skulls of *Dinornis* and *Pachyornis*, indicating a feather crest, probably sexual, on the top of the head for some moas, although preserved remains of *Megalapteryx* show a reduced, downy covering on the head. Interestingly, in only two cases have moa feathers been found among Maori relics, although bird feathers were especially prized by the Maori. At the British Museum, Sir James Hector discovered moa feathers attached to a taiaha, a souvenir of Cook's voyages. The only moa skin recorded in an archaeological context was a narrow strip of *Megalapteryx* skin, sewn in a cloak of weka skins, found in an Otago burial cave about 1890.

Moas feature with any certainty in only two of the Maori cave drawings which have survived. A particularly impressive group of three bird outlines in the Craigmore cave, near Pareora, South Canterbury, can only be interpreted as moas. The three figures, regarded as authentically pre-European, show a bulky body resting on solid, earth-bound legs and huge feet; a long neck gracefully tapers to a small head held high. One moa holds a leg cocked, as if ready to strike. Though we think of moas as slow, witless creatures, this cave drawing shows a bird capable of defending itself, either from human hunters or in the rigours of mate selection.

These cave depictions are at odds with the prevailing scientific feeling that moas carried their heads forward, with their necks in the more relaxed position of the emu and cassowary, rather than the more erect neck posture of the rhea and the ostrich. However, as National Museum scientist Robin Watt comments, "What's important about the neck of the moa was that it was capable of a vast number of movements," not a surprising development for a wingless, browsing bird.

Small brains

For their size, moas had quite small skulls, and some were also flattened in appearance. A plaster cast of the brain case of a *Dinornis*, on display in the Canterbury Museum, reveals an impressively small brain, about the size and shape of a small, green pepper. Comparative studies last century on moa skulls suggested a bird with relatively weak vision, but a strong sense of smell. The moa genera differ in the shape of their bills, and in their face muscles. These differences indicate the variety of feeding habits that one would expect, but little work appears to have been done from this approach.

The proportions of moa leg bones and the shape of the moa foot inspired their scientific champion, Sir Richard Owen, to believe that the birds fed largely on fern root, scratching about in the manner of domestic fowls. This was confirmed by Maori tradition, but perhaps in response to leading questions. One of Owen's contemporaries did find in tissue traces a strong case for a powerful middle toe on the moa foot, to support this contention. (Moas actually had four toes, but the first was a hind one, well off the ground.)

Research this century gives a more definite idea of moa diet. From the well-preserved gizzard contents found with individual moa skeletons in the Pyramid Valley swamp, North Canterbury, as well as other places, has come a clear picture of the moa as a bird with broad tastes, but a special preference for twigs. Gizzard samples from *Dinornis, Emeus* and *Euryapteryx* showed a predominance of twigs from a variety of woody plants, with some seeds, fruits and leaves. In one typical *Dinornis* gizzard, Colin Burrows, botanist at the University of Canterbury, found that short pieces of twig made up over 90% of the content: 'The twigs were not counted but it is estimated that there were several thousand pieces of *Olearia* stem and many hundred *Coprosma* twigs.'

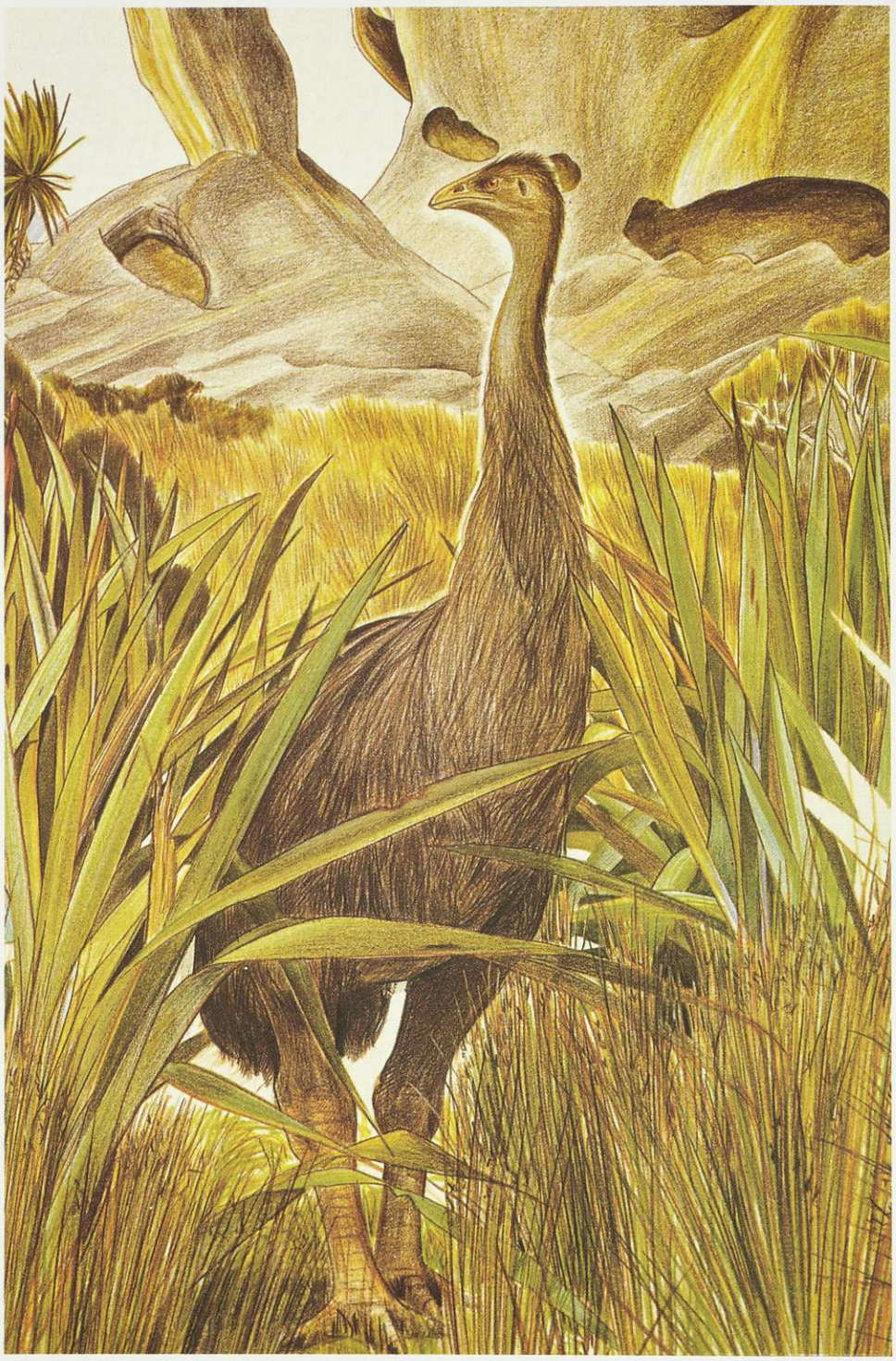
This interest in twigs is unusual among birds, but probably extended to the other moas as well. Under a limestone overhang in Takahe Valley, in Fiordland, in 1949, Dr Robert Falla and Ken Miers found moa dung preserved with the remains of *Megalapteryx*. "Falla thought this dung to be human at first," recalled Ken Miers in 1985. "But when he broke a piece of it in half, there was a big, characteristic coprosma twig in it, at least 1cm long and about the thickness of a glasses stem".

Despite the Pyramid Valley gizzard material, which came to light over 1939-1940, and although a twiggy matrix in gizzard residues had been noted as early as the 1880s, leading moa scientists of the 1940s and 50s (notably Duff, Oliver, Falla and Archey) placed a greater stress on the role of grasses in moa diet, and so located the birds on the grassy plains of New Zealand. These plains have been deforested for only a few centuries, but a whole generation of New Zealanders has grown up with the impression that the moas were restricted to a grassland habitat. The evidence suggests quite the contrary.

Not grassland birds

Moas were primarily birds of the forest and scrub. Only a thousand years ago virtually all of lowland New Zealand was forest-covered, or scrubland, and correspondingly moa remains have been found everywhere: from the dunes near Cape Reinga to Mason's Bay in Stewart Island. Though not common, moa relics have also been found on the volcanic plateau in the North Island. Bones have been discovered on Great Barrier Island, but on no other island. Off Wellington's western coast — an extensive lowland up until ten thousand years ago — moa bones have been dredged up twice in recent years.

European settlers last century often commented that in areas of inland Otago and Canterbury, moa bones were amazingly abundant on or near the surface of the ground, and that some bones were surprisingly fresh. In both islands, moa gizzard stones can still be found. These stones, often quartzose and sometimes semi-precious, remain after all other trace of the bird has decayed. Collectively, these gizzard stones can weigh up to 3kg, and because they usually relate to the local geology, scientists have supposed that the moa, unlike the emu, was not a migratory



Did the moa look like this depiction of a giant moa, *Dinornis*, the tallest bird ever to have lived? The illustration, by artist Chris Gaskin, is from the book *Moa, the story of a fabulous bird*, written by Philip Temple and reproduced with the kind permission of the authors and the publishers, Collins.

bird. However, gizzard stones and bones show that moas travelled to alpine areas in summer. J.C. Andersen, author and Turnbull librarian, saw moa stones at around 1660m in the Mt Cook area, in 1909, while in the 1860s Captain Fraser discovered enormous slaughter-heaps of moa bones at about 1500m on the Carrick tops in Central Otago.

A scientific report in 1971 gave an intriguing account of the excavation of at least five species of moa from a cave near Mt Owen, in the Murchison area, at an altitude of about 1305m, not far above the subalpine shrub belt. The moas, it seems, made summer forays to the tops to feed on the subalpine vegetation, and the authors wondered if 'the abundance of mountain plants bearing coloured and fleshy fruits in summer could be explained in part as a response to the presence of moas.' The implication is that moas aided seed dispersal of some alpine plants. No other scientist since appear to have taken up this challenge, while others have cautiously explained the remains of moas at higher altitudes in terms of refugees from forest fires, or declining bushlines. The Mt Owen report maintained that 'plant remains found with the bones indicate the vegetation of the area has been consistently subalpine to alpine throughout the period of deposition.' (Bell and Bell).

Browsing effects

Such speculation opens up a much broader, ecological perspective on the intimate association of moas with New Zealand's plant life over tens of millions of years. Such an approach came with the 1977 suggestion by two New Zealand scientists that moa browsing had influenced the growth patterns of our native flora, by encouraging the divaricating habit in many plants.

An unusual number of native plants (around 10%) have a close, thicket-like juvenile stage. Examples are weeping matipo, pokaka and coprosma species. The moa browsing theory has had some support from gizzard findings and nutrient analyses. Lancewood (*Pseudopanax*), for instance, has been shown to undergo a marked increase in protein content and soluble carbohydrates when the sapling reaches around 4m in height — just beyond reach of *Dinornis*, perhaps. However the moa browsing theory has since been rebutted by other arguments which favour a climatic explanation for the divaricating habit.

Dr Falla, with his view of moas as mainly grassland creatures, believed their affect on the New Zealand landscape would have been similar to that of sheep now, especially if — and this is doubtful — moas were gregarious. Certainly, moas with their heavy feet and prodigious digestive processes were long term soil conditioners. A more obvious role would be that of seed dispersal of such native trees as the miro, tawa, taraire and karaka. This important commission now rests with the wood pigeon, the only native bird which can swallow intact the large fruits of these trees. Passage through the pigeon gut has been shown to improve germination rates also, so it is likely that fruit-bearing native trees benefited in more than one way from the presence of moas.

Dr Phil Millener's doctoral thesis summarises extensive fieldwork in the dunelands of the Far North, and with cave deposits in the King Country. In the extreme north of the North Island, for example, he established that with the exception of the kaka, moas outnumbered all other birds, in total numbers. The most common moa of the four genera present was *Euryapteryx*; with 367 of the 530 individual remains identified to this genus. Ponderous *Pachyornis* was present in good numbers (118 individuals), and *Dinornis* reasonably so. Only five *Anomalopteryx* remains were found.

A similar sample (607 individuals) of the caves of the King Country revealed a different balance of species. Three times the number of *Dinornis* moas were discovered (126 vs 40 in the Far North), whereas *Euryapteryx* and *Pachyornis* were present in much reduced numbers (94 and 44 respectively). Dominating the field, as *Euryapteryx* had done in the Far North, was *Anomalopteryx*, with the remains of 343 individuals.

The weka was the next most common bird in the north, the kakapo in the King Country.

Rugged landscape

Two other points emerged from the King Country study: that this area had been deeply forested for the duration, and that

even in the difficult topography of this region, a variety of moas lived and flourished. The scientists who excavated the Mt Owen cave also commented on the rugged landscape of the surrounding country. Similarly, a very large collection of subfossil moa bones have been discovered in the last few years in caves in the jumbled limestone of the Oparara Valley, near Karamea. The remains were part of a special National Museum study, led by Dr Millener.

Moa enthusiast Bill Hartree discovered over 40 moa nesting sites in the steep hill country of the Wairarapa and Hawkes Bay, and was able to identify *Anomalopteryx* nests from bones adjacent. He found evidence for only a single egg, in scoop nests usually protected from the weather by an overhang or rock shelter. Dr Millener states in his Oparara report that some moa species probably nested in caves, and there is good evidence for this. Other records from last century indicate moas also nested out in the open. Geologist Alexander Mackay, as one example, briefly records his finding 'a moa's nest', in the 'western districts of Nelson', probably in 1879. The nest held the remains of a chick, and was open to the weather. In the open country of Marlborough, too, large quantities of eggshells have been noted.

Millener's doctorate suggests that *Pachyornis* used the dunes of the Far North as nesting sites. Moa eggshell fragments are common in many coastal dunes around New Zealand, but at Tokerau Beach they can be found in "phenomenal quantities", according to Brian Reeve, "with carpets of eggshell where the sand has blown out." Eggshells are usually cream coloured, although some bleaching is common when exposed to the weather. Some olive green pieces have been found in other localities. Half of a dark green egg, the first discovered, was recently excavated from a nesting site in the Upper Rakaia Valley, in Canterbury. Identification of eggshell to species is very rare, because a direct association with identifiable bone is required, but in single locations this has been accomplished with *Euryapteryx* and *Emeus*.

Over a dozen moa eggs have been uncovered whole, and sometimes in perfect condition. They have been found mainly in river silt or sand deposits, as well as in early Maori burials. Of course moa eggs are large — about 18 hens' eggs in average volume — but not proportionately larger than a kiwi egg. *Dinornis* eggs measure up to 27cm in length, but they in turn would be overshadowed by the egg of the elephant bird. A specimen in the British Museum is a colossal 75cm in girth, with an estimated liquid capacity of over nine litres.

Although Hartree uncovered mainly single-egg nests, other evidence points to moas also laying more. When one unbroken moa egg was discovered in a small cave at a Southland quarry in 1920, 'the others were broken in the nest' he wrote in a 1947 *Weekly News*. The bones of four chicks were found underneath a perfectly preserved *Dinornis* skeleton in alluvial deposits in Central Otago in 1864, but this intriguing fact was mentioned only in passing by the discoverers. Along with the bones of the parent, these relics were quickly dispatched to England.

Male on the nest

This adult moa was undoubtedly a male, as the task of incubation and care of the young is delegated to the male in all three surviving Australasian ratites, and is also the main domain of the male ostrich and rhea. Kiwi, cassowary and emu males are smaller than the females, and are dominated by them, so it seems likely that moas were similar. Kiwis usually lay two eggs, and cassowaries average three to four, but emus lay as many as nine eggs. These birds having evolved in a more competitive and predatory environment, we can assume that moas survived with smaller broods, perhaps not even reproducing every year.

Incubation times for the moa's living kin give a good idea of gestation in the extinct bird. As for emu and cassowary, eight weeks' gestation would be a likely length for the moa, with the male leaving the nest only occasionally, to feed or eliminate. The chicks would be mobile not long after hatching, as they would have to forage for themselves.

After their initial mobility, the development of young ratites can proceed at a more leisurely pace, relative to flighted birds, as there are not the same pressures to become airborne.

40-year life span

The life span of a moa may have been forty years or more, such longevity being common with large birds with low reproductive rates and few enemies. Not that life for the moa in primaeval New Zealand was without danger or hazards. The extinct NZ eagle *Harpagornis* and the extinct large NZ harrier *Circus* were quite possibly a threat to the unguarded young. It is also possible that the weka preyed upon moa eggs, as it is claimed to do on little spotted kiwi eggs on Kapiti Island. Moa eggs were relatively thin (2mm maximum) for their size, and unguarded no doubt presented an attractive meal to the opportunist weka.

Other hazards to moas were floods (although their ratite cousins are surprisingly competent swimmers), slips and fire, not to mention volcanic eruption. Hector counted thirty-seven moa skeletons on the surface of the ground, in a small area between a steep mountain side and Lake Wakatipu, in 1862. He attributed the find to the onslaught of fire, but a snowstorm could also be an explanation. Maori legend supports Hector's interpretation: the fires of Tamatea were an ancestral event held chiefly to blame for the decimation of the moas.

Despite their ability to negotiate very difficult terrain, moas were frequent victims to pot-holes, and had an amazing propensity for bogging themselves in swamps and mudsprings. "It would be hard to imagine a creature more beautifully adapted to becoming mired, than a moa," said Dr R. C. Murphy, an American scientist involved with the 1949 excavations at the Pyramid Valley swamp. Nineteenth century naturalists were staggered by the sheer numbers of bones that could be retrieved from a very small area of bog, and contrived all sorts of theories to explain them. In one deposit in the Maniatoto, 400 birds were estimated in 1874 to have been trapped in a crescent-shaped area measuring only 12m from point to point, and about 5m at the widest.

In many of these swamp deposits, the geography is strikingly similar, with the remains concentrated in particular spots, at the foot of ridges and spurs from higher ground. Over the years, moas had become bogged, either in crossing to the other side of the swamp, or while trying to drink. The chemistry of most of New Zealand's swamps is unfavourable for the preservation of moa bones, but in localities such as Pyramid Valley, the remains of a great variety and number of animals, not only moas, have been perfectly preserved.

Whose tracks?

The siting of these swamp discoveries corroborates other evidence from a few other locations that moas had their own tracks through the forest and fernlands. In the Taupo area (1975) and Hawkes Bay (1963) researchers reported the excavations of compacted paths of heavy footed creatures from long ago. Two of these former trackways were traced down slopes to watercourses, while a third wound its way through a former swamp. The cassowary is known to make habit paths, and it seems likely that moas were obliged to form and retain easy access through the forest and forest margins. The difficulties of making a way through such vegetation were quickly noted by New Zealand's early European explorers. Who knows if the old Maori tracks mentioned by European bushmen and surveyors were in fact first formed by human feet at all? Kakapo keep paths too, and the effect in an area where their populations were undisturbed was remarked on by the men of the survey ship *Acheron*, while exploring the southern sounds in 1852. From the many criss-cross trails they came upon, the *Acheron* men at first thought they were near a Maori village.

What is clear from this review of moa's ark is that in their heyday moas were a very tangible part of the New Zealand landscape. While the birds were perhaps well dispersed through the endless forest — population densities are very hard to reconstruct — we should imagine, from their remains, a country where the big birds were always somehow or somewhere in evidence. If not the birds themselves, then their calls, or their heavy footfalls in the litter of the forest floor, or their footprints on river banks and estuaries, or their abundant droppings. Their easy dominancy in the life of the forest continued for age after age, but what seemed for always was not forever.

This article summarises my moa research to date. I would be grateful for any unpublished material regarding the moa, such as manuscripts or old newspaper clippings, and these can be addressed to me at PO Box 602, Nelson.

Barney Brewster.

Restoring MANA

Legend has it that Maori navigator Kupe gave Wellington's offshore island its name Mana to commemorate his momentous achievement in journeying from Hawaiki to Aotearoa. Since then the prestige of the title has been eroded by centuries of misuse; today only a smattering of remnant vegetation and wildlife remains. Society Conservation Officer Terry Fitzgibbon outlines the way in which ***mana*** can be restored to Mana, by way of a huge replanting programme.

With a bellow and a snort the last Mana Island bull recently stomped down the jetty ramp onto the departing barge. The March muster this year marked the final chapter in the grazing saga of the 216-hectare island; sadly the bull-crammed barge left behind a largely denuded landscape thanks to over 150 years of intensive grazing and cultivation.

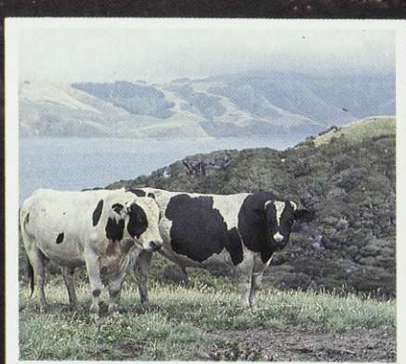
Mana's history is marked by exploitive events. Local tribes living on the island in the 1820s were swept off by the Waikato's Ngati Toa and Taranaki's Ngati Awa, led respectively by their chiefs Te Rauparaha and Te Rangihaeata. Much of the original vegetation was destroyed prior to European settlement in 1832, but the succeeding decades saw more disappear to make way for sheep and cattle.

The chequered history of control of the island continued to recent times. In 1973 the Ministry of Agriculture and Fisheries sank thousands of dollars into turning it into an exotic sheep quarantine and breeding research station. A scrapie outbreak in 1978 required all the island's stock to be slaughtered and put paid to the station.

Since then the Lands and Survey Department farming operation has lost a further $300,000 because of high transport costs. However now in a widely praised move, the Department has just recommended in a draft management plan, a rapid phasing out of farming and the refreshing idea of recreating the island as a haven for rare and endangered species. This will be done by re-clothing the island with plants representative of the region, and opening it up to the public so all Mana's history — natural and cultural — can be enjoyed.

The project is about to get underway and deserves full Society support — not finance but a lot of spadework and public enthusiasm.

The worldwide native re-afforestation trend has reached New Zealand's shores in recent years, with Tiritiri Matangi near Auckland providing a successful example of what can be achieved on Mana. Since 1983 this Hauraki Gulf 'open sanctuary' has been carpeted with 90,000 trees and shrubs, all of which have been raised from locally gathered seed. In three months alone, some 600 people planted 19,000 trees, pricked out 9000 pohutukawa seedlings and built 130 roosting boxes for the island's newest inhabitants, saddlebacks.



Mana Island lies 2.5 km off the west coast just north of Wellington. Long stripped of virtually all its native vegetation, a replanting programme is being proposed which is likely to be followed by introductions of some of our endangered wildlife.

Inset: Mana's bulls, havoc on the hoof for the island's remnant forest. *Photo: T. Fitzgibbon*

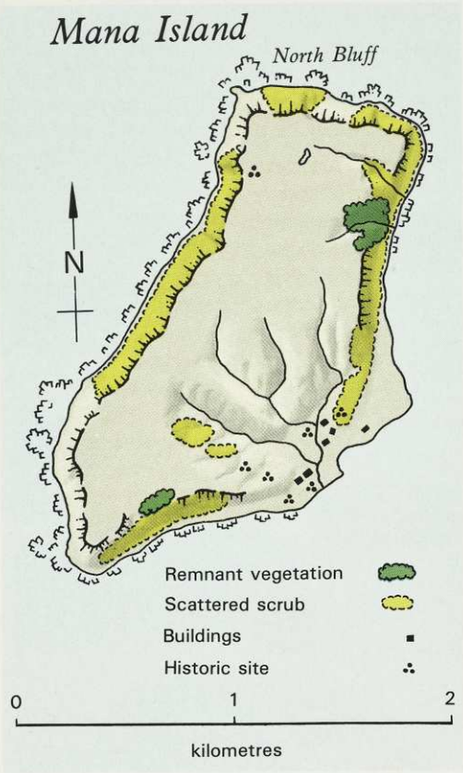
Still surviving under the skirts of Mana's tauwhinu bush, the giant weta *Deinacrida rugosa* is one of the heaviest insects in the world. *Photo: T. Fitzgibbon*

Mana, a similar sized island, provides an even greater challenge for Wellingtonians as it has only a one hectare gully of coastal forest as well as five hectares of manuka/kanuka clinging against its eastern coastal bluffs. Tiritiri had five times more forest in 1983 and grass covered only 57 percent of the island.

Research on Tiritiri has shown that the natural process of regeneration is not enough to suppress invading exotic grasses; hence the need for human intervention. Otherwise regeneration would be extremely slow, the fire risk would be high, and furthermore suitable habitats could not be tailored for introduced endangered species.

Already Mana hosts at least five threatened native species: three animals and two plants. They are McGregor's skink, the gold striped gecko, the giant weta, a fern *Anogramma leptophylla* and Cook's scurvy grass. Perhaps even more importantly, because it is predator-free (except for mice) and is 2.5 km from the mainland, the island has tremendous potential as a refuge for rare species. There are now very few large rat-free islands around New Zealand's coast. Takahe, little spotted kiwi, saddlebacks, shore plover, tuatara and flax snails are examples which could be introduced in due course.

Mana's seemingly flat appearance from the mainland disguises the fact that there are several steep, east-west running gullies — sheltered catchments suitable for starting to plant nursery trees such as taupata,



ngaio and manuka. Areas still in grass will pose a problem and it has been suggested that small, young cattle might be used as "lawnmowers" because they will not break through fences. Spraying and controlled burning might also be required.

Biologists Ian Atkinson and Colin Ogle, both Mana enthusiasts, believe a mixed broadleaf forest of kohekohe, milk tree and kaikomako originally covered the island. This was borne out in a survey by the Wellington Botanical Society which also wants to be involved in the replanting programme.

Several Forest and Bird branches have already expressed interest in helping out and because our Pauatahanui project is only a few kilometres distant, the two projects are complementary. What better way to appreciate Wellington's coastal diversity than a visit to Pauatahanui followed by a boat ride to Mana — still with spade in hand!

The new Department of Conservation will be the obvious agency to look after the island which should be classed under the Reserves Act — not administered as Crown land as is proposed in Mana's draft management plan. Controls will have to be placed on landings to prevent rat infestation, which spell doom to any endangered species.

As I left Mana recently while hundreds of black-backed gulls wheeled overhead; two impressions remained:

— first, that lots of people had to become involved in revitalising the island
— second, the wonderment at discovering an ancient giant weta clinging to shrubland vestiges on an island decimated by decades of misdirected effort. Obviously the wonderment can be extended to many more species for many more people if future efforts are directed towards restoring Mana.

Good news for the rare takahe

The flightless takahe, thought to have been extinct until their re-discovery in Fiordland's Murchison Mountains 38 years ago, have increased in numbers for the second year in succession. In December 1985, 181 takahe were counted at the end of the breeding season compared to 153 the year before and a mere 120 birds for the three years prior to that.

Intensive control of deer which compete with the takahe for their favoured tussock food has clearly improved takahe breeding. Captive-bred takahe are also being reared at the Burwood Bush red tussock reserve near Te Anau.

In October, the Wildlife Service will now establish the second major wild population of takahe in Fiordland's Stuart mountains. This should allow for continued expansion of takahe range and numbers. It will also provide insurance against any catastrophe in the Murchison Mountain's takahe population.

The Southland National Parks and Reserves Board deserves praise for approving this move in the face of major regional opposition from deerstalkers.

Letters to MPs exempt postage

Postal charges are not all bad news. . . . It is no longer necessary to put a stamp on a letter to an MP, or to Ministers of the Crown, the Governor General, High Court judges or on petitions to Parliament weighing up to 1kg. The decision to extend free Ministerial postage to cover all MPs was made by the Postmaster-General 18 months ago but little publicised since.

A marine reserve for the Kermadec Islands?

The volcanic Kermadec Islands, halfway between New Zealand and Tonga, are uninhabited apart from a weather station on Raoul, the largest island. The land of the islands is a reserve. Lands and Survey Department have just invited public comment to help it prepare a management plan to protect the Kermadecs' special plants and animals.

However perhaps the most outstanding natural features of the Kermadecs are to be found in their surrounding seas. These host the world's only unfished population of huge spotted black grouper and bass which are virtually tame. There is also a great mixture of tropical and sub-tropical fish.

The Government's Fisheries Research Division recently proposed the Kermadec Islands as a marine reserve. Their proposal will shortly be circulated for public comment and deserves wide support. The August issue of our Journal looks at the conservation of New Zealand's marine ecosystems and focusses in particular on the Kermadecs and Fiordland.

Hopes high to save Karamea's Oparara forests

Great limestone arches; the Honeycomb limestone caves hosting bones of moas and extinct birds; giant land snails; the nation's most extensive remaining alluvial beech-podocarp (Type PB1) forests and a fascinating mosaic of virgin forest on many different rock types — the Oparara valley near Karamea lies within the North West Nelson Forest. Since 1976 it has been the focus of national conservation campaigns to stop logging and widespread bush burnoffs to plant pines.

Since then, scientific studies have revealed an amazing array of rare and special plants and animals in the valley. However the Oparara isn't just important for science. Its limestone arches and caves are now Karamea's premier tourist attraction and walking tracks in the valley are increasingly popular both with visitors and the local school. Forest Service Ranger, Norm Stopforth, recently proposed linking existing tracks to provide a superb 2–3 day walk through the Oparara from the Karamea end of the Heaphy Track.

The future of the Oparara will be decided on 12–15 May when the Government's scientific committee on reserves visits the valley to consider preservation pleas from DSIR, the Wildlife Service and our joint Forestry Campaign.

Whakatane farmers back bush protection campaign

Whakatane farmers have backed the young Maori leaders who recently seized control of Taiarahia mountain near Ruatoki to stop its Maori-owned forests being cleared for pines by Tasman Forestry Ltd.

35 dairy, drystock and maize farmers along the banks and the valley of the Whakatane river have petitioned Parliament to offer development alternatives to the Tuhoe-Waikaremoana Trust Board and Tasman Forestry. They fear that continued bush clearance will increase water runoff leading to disastrous floods.

Water exports evaporate?

Proposals to export water from Deep Cove appear to have sunk, with the news that likely Triune Resources buyer, the Goodman Group Ltd, has decided not to enter the water export business. The move by Goodmans to buy out Triune appears to have been designed to allay New Zealanders' fears that an American company would own a New Zealand asset. Ever since Triune mooted the idea of exporting water from the Deep Cove tail race, there has been both tourism and environmental opposition.

Our Society criticised both the Deep Cove concept and its technical proposals. Giant supertankers' daily visits to the fiord would detract from the integrity and wilderness quality of our largest park. It would be disastrous for tourism and outdoor education activities in the fiord. Major pollution and shipwreck risks were also identified in Triune's scheme.

Meanwhile a proposal for a black coral underwater observatory in Milford Sound has been welcomed by our Society's Southland branch. Visitors could then discover the world's most extensive and accessible black coral. This would increase public support for extension of Fiordland National Park to include the fiords and ultimately protection in the South West New Zealand World Heritage area.

Kini swamp next doomed West Coast wetland

We were sceptical about the Government's January announcement that West Coast Wetlands Drainage Subsidies would no longer be available for draining fertile flax swamps but only for improving existing farmland. Government recently extended the subsidies for five years despite strong conservation opposition. (See *Forest and Bird* February 1985) Our concern was warranted. On 25 February, the Westland Catchment Board, despite the new policy, approved drainage of the flax-dominant Kini swamp near Bruce Bay in South Westland. Our Society and the Wildlife Service are appealing to the Planning Tribunal against the decision. The credibility of the Government's new National Wetland policy and of Works Minister Fraser Colman and his officials is in tatters unless they too take action.

Gerry McSweeney,
Conservation Director

A postcard of a certain chimney belching black smoke bearing the above postmark was recently received from Forest and Bird's Taranaki branch.

BIRDS CAMPAIGN *in flight*

The kea and yellow-eyed penguin posters launched by Dr Tapsell, and available from Forest and Bird's mail order service.

Nationwide attention was drawn in March to the plight of the kea and the yellow-eyed penguin when the Minister of Internal Affairs, Dr Tapsell, launched the Society's campaign to protect these increasingly threatened birds.

The result of the special ministerial launching was a commitment from Dr Tapsell that later this year he would introduce legislation to gain full protection for the kea, and a commitment from the Wildlife Service to work with Forest and Bird and other interested parties in putting together a yellow-eyed penguin rescue strategy.

Dr Tapsell's announcement that six keas had been returned to Otago's Remarkable Ranges was also welcomed. Since November 1985 members and the Otago public had expressed outrage at the removal to cages of five male keas found on the Mt Cook Company's Remarkables skifield. Dr Tapsell said he was concerned about the decline of native birds, and quoted a comment made to him recently by a Maori in his 80s. The man said that when he was a boy native birds had "filled the sky."

Society President Dr Alan Edmonds said now was the time to rescue uncommon and declining bird species rather than wait until they reached the brink of extinction. The little spotted kiwi was a striking example of a bird which had once been considered widespread throughout the forested South Island. However, to everyone's dismay a late 1970s survey confirmed worst fears: this unique ancient species was now confined to a handful of birds on D'Urville Island and a significant population on Kapiti.

Although both the kea and yellow-eyed penguin are not classified as rare and endangered, they are both in trouble.

Kea — reduced to between 1000 and 5000 birds, they have been maligned ever since Europeans pushed sheep into the high country. Bounty records allow us to accurately estimate that at least 150,000 have been killed by humans. Today, this magnificent mountain monarch, the world's only alpine parrot, is under pressure from skifield operators and the perils of parrot poachers.

The following steps need to be taken for the kea: immediate full protection, an education programme to convince farmers and skifield operators that keas should be accommodated, a major crackdown on poaching and an end to captive rearing. The sight of a caged kea is not an edifying one.

Hoiho, the **yellow-eyed penguin**, the world's rarest, needs forested coastlines near deep water to breed. Now reduced to between 2000 and 4000, this solitary breeder lives on the south-east coast of the South Island or on a few southern offshore islands.

New Zealand is a penguin paradise, with no fewer than six of the world's 18 species finding a home here. However, over the last 100 years this country has become less and less of a paradise for hoiho, principally because its coastal forest home has been progressively destroyed. Only six small areas on the mainland are adequately protected.

New Zealand owes it to the birds and to the world to safeguard the wonderful wildlife it has. The launching of the posters is the beginning of a co-operative effort between the Society, Government agencies, farmers and the public — showing the birds and the world that we do care.

Hoiho Campaign Fund

Since we started our yellow-eyed penguin campaign with the February magazine, donations have been steadily coming in, proving once again that our members are part of one of the most generous groups in the country. Your donations are extremely important. The world's rarest penguin is threatened by clearance of its coastal forest breeding areas, predators as well as damage and penguin disturbance by domestic stock. To solve these problems requires a major co-ordinated effort and a large amount of money. The Wildlife Service is now preparing a Conservation Plan for the penguin to set priorities for action.

- A full-time co-ordinator for rescue work is needed.
- The Society is helping fund University research work.
- We are negotiating to acquire key coastal forest breeding areas imminently threatened by woodchipping.
- Conservation covenants are needed to protect other important forest areas.
- Fencing of bush remnants is vital to secure their value as breeding habitat against stock, especially on the Otago Peninsula.
- Replanting and restoration of crucial seashore areas is also needed to encourage penguins to forest areas further inland.

All this costs money. Your help is therefore essential to give the world's rarest penguin a future — please give generously.

Campaign total to date: $2,484.00

MEMBERSHIP APPLICATION

TO: THE NATIONAL SECRETARY
ROYAL FOREST & BIRD PROTECTION SOCIETY OF NZ INC
P.O. BOX 631, WELLINGTON

YES, I want to join the Royal Forest and Bird Protection Society. Start my subscription to *Forest and Bird* magazine immediately.

Please tick the appropriate category:

Subscriptions	1985
☐ Junior (under 17 or at school) Age	$10.00
☐ Ordinary	$20.00
☐ Family (Partners with or without children) No. of children under 17	$20.00
☐ Senior Citizen (Over 60) partners or single	$15.00
☐ Life	$250.00

Name: _____

Address: _____

_____

_____ Telephone _____

FOR OFFICE USE ONLY

Membership No. _____

Postal Code _____

Branch _____

Date Received _____

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Name: _____

Address: _____

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_____ Telephone _____

FOR OFFICE USE ONLY

Membership No. _____

Postal Code _____

Branch _____

Date Received _____

James Sharon Watson Conservation Trust Applications for 1986 Grant

The Royal Forest and Bird Protection Society of New Zealand Inc., as trustees for the J. S. Watson Conservation Trust, invites applications from individuals or groups for financial assistance for conservation projects starting or current during the year ending **31 May 1987**.

The Trust was established to support "the conservation of the flora and fauna and natural features of New Zealand, the advancement of knowledge in these matters by way of research, literary contribution, essay, articles or other effort and generally the education of the public to give them an understanding and a love of the earth on which they live."

The total funds available for distribution in 1986 amount to $5000 and, at the sole discretion of the Trustee, this sum may be awarded in whole or in part to one or more applicants, or held over for distribution in a subsequent year. In deciding grants for 1986, the selection committee will give priority to projects in the field of ornithology.

Further details and application forms may be obtained from the Secretary, Royal Forest and Bird Protection Society, P.O. Box 631, Wellington. Applications close 31 June 1986.

***Kea** . . . Clifftop King*

Mountain monarch . . . regal bird,
Jester . . . (to the common herd),
In your lofty alpine home,
Where humans seldom dare to roam.

Mountain monarch . . . regal bird,
The wrath of man you have incurred.
They swear you swoop to slaughter sheep,
Yonder in the snowdrifts deep.

Mountain monarch . . . regal bird,
Though your reputation has been slurred,
Shepherds really have no claim.
The snowy-tors are your domain.

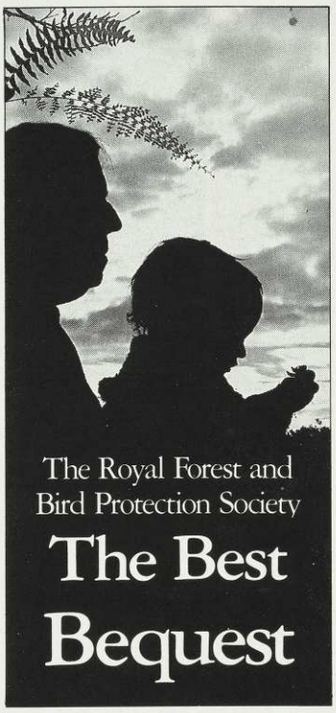
Mountain monarch . . . regal bird,
You are at risk, (or so I've heard).
A hex on those with peanut-brains!
A pox on them with guns and chains!

Mountain monarch . . . regal bird,
Protectionists have lately stirred.
They hope to vouchsafe legal-cover,
For you and your green-plumaged lover.

Mountain monarch . . . regal bird,
I'll stand by you. You have my word.
Thus . . . my full support I offer thee.
May you and yours fly ever . . . free.

Free . . . the tussocklands to roam,
Free . . . to fly your mountain home,
Flaunting all your feathered-charms,
Secure . . . within the legal-arms.

One of our readers has been moved to compose this poem dedicated to the kea. It is by Marlborough member Mrs Von Murrell.



The best bequest

Give your children and grandchildren the best bequest of them all: the preservation of New Zealand's native plants and animals.

Bequests to the Society are one of the best methods of support it has had. Now, to make it easy to find out how to give a donation or gift in your will, the Society has prepared a clear and concise pamphlet. *Write to the Secretary, RF & BPS, PO Box 631, for your free copy.*

STEWARDSHIP *an idea whose time has come*

by Gwenny Davis, President, Native Forest Action Council

The fine concept of stewardship expresses the aspiration of a community to retain resources unimpaired for future generations.

As originally intended, the new Government's proposed Department of Conservation was to exercise a stewardship function over large areas of natural New Zealand — especially native forests, shrublands and tussock grasslands. The idea was that these lands (most of which lie outside existing parks and reserves) would be managed as a "holding category", offering choices for the future, and protection from modification for the time being.

To draw a line around the "stewardship lands" and safeguard them from piecemeal encroachment and development was the most important idea behind the environmental reorganisation. It was a major departure from the frontier policies of the existing departments of Forest Service and Lands and Survey, which recognized only two land uses, preservation and production, and zoned for the latter whenever possible.

A vast expanse of broken bush country extends from the Matemateonga walkway east to Mt Ruapehu. Apart from a narrow reserve strip along the Wanganui River, much of this forest is unoccupied Crown land needing stewardship. *Photo: A Nicholl*

Halfway house

Stewardship represents a halfway house, protecting land and resources **for the time being**, and placing a high value on the protection of choices for future generations as to how they use natural resources. It is a concept which conservationists have always upheld strongly.

Sadly, the original intention to promote stewardship has been eaten away by officials within the government. When the legislation establishing the Department of Conservation is introduced into Parliament — after this issue of *Forest and Bird* goes to press — it seems likely that the concept of stewardship will have disappeared entirely.

That will mean that conservation leaders have failed in their behind-the-scenes efforts to improve the draft legislation. There will then be no choice for us but to take our case to the public in a bid to raise hundreds of submissions to Parliament, seeking the restoration of the original vision.

Make no mistake: the philosophical base on which the new Department of Conservation is established will be crucial. Nothing else will have so much influence on the management of natural public lands for the remainder of this century. If we can get it right, the Department of Conservation will be a powerful force for good, a bastion of hope for all those who care about the relationship of human beings to nature on these islands.

The original thinking for the environmental reorganization was expressed in the *Environment 1986* report, published in June 1985. This report proposed two central but distinct functions for the new department: **protection** (for existing national parks and reserves) and **stewardship** (defined as management for the time being of public lands for which no end use has been determined). Included in the stewardship category were the Crown lease lands, under which heading the report's authors had in mind mainly the leased tussock grasslands of the South Island high country.

Stewardship under attack

It is in the nature of things that a concept like stewardship for the future will come under attack from those in the present who want commodity production, and want it now. And that is what has been happening to the *Environment 1986* proposals.

The first setback came in the initial package of Government decisions on the Department of Conservation, announced on 16 September 1985. The Cabinet seemed clear in its intention to endorse the stewardship concept, for besides the national parks and reserves it decided to include in the new Department a range of public lands not being used for wood production, nor being used "mainly" for agriculture, and whose long term future use has really not been decided. Forest parks were a specifically mentioned example.

But in that same announcement, the Government — influenced by Treasury argument — decided that Crown leasehold land should be the responsibility of the Land Development and Management Corporation.

This cut across the stewardship concept and created an implication that the fragile and dearly-loved landscapes of the South Island high country would be managed with single-minded commercial intent. Understandably, that is a notion that has been roundly criticised by conservationists.

Yet if lasting solutions are to be found, it will be important to understand the concerns of the Treasury — of which more below.

A second setback for the concept of stewardship came when committees of officials began drafting briefs for the legislation which will establish the Department of Conservation. The announced mission statement for the new department is to be:

> "the promotion of conservation values in the management of New Zealand's natural resources and historic places together with the application of those values to the management of the protected and other resources entrusted to it."

That sounds fine until one looks up the definition given for "conservation values" and finds that these include the **utilization** of resources. And to reinforce this, one of the specifically drafted functions for the new department is to be "conservation management", defined in this phrase —

> "consistent with the principles of conservation and any legal protection status, **to manage for productive purposes the resources vested in the department"**

What that means is that any land or resources not legally protected in reserves or national parks will be managed for productive purposes. Examples given in official documents include the production of wood and minerals. Under these definitions, the "promotion of conservation values" which the department is to undertake must mean the promotion of commodity production — presumably on a sustainable basis where possible, although this is hardly possible with minerals. Under these

definitions, the Department of Conservation's mission is little different from that of the Ministry of Agriculture and Fisheries or the Forest Service.

The intentions behind the ditching of "stewardship" and its replacement by concepts such as "conservation management" and "utilisation" may be illuminated at two levels, political and philosophical.

Guarded jealously

The politics of the situation within the government is clear enough. The Department of Conservation has no official employees at this date, and the officials who are advising the government on its constitution are the same resource managers who last year fought so tenaciously to retain Lands and Survey and the Forest Service in their original forms. Charged now with designing the Department of Conservation, these powerful managers seek to reincarnate the old form of the old departments they know and like so well. The *de facto* power to decide the balance between production and protection over vast tracts of their public land empires is a power they have always guarded jealously, and will not voluntarily give up.

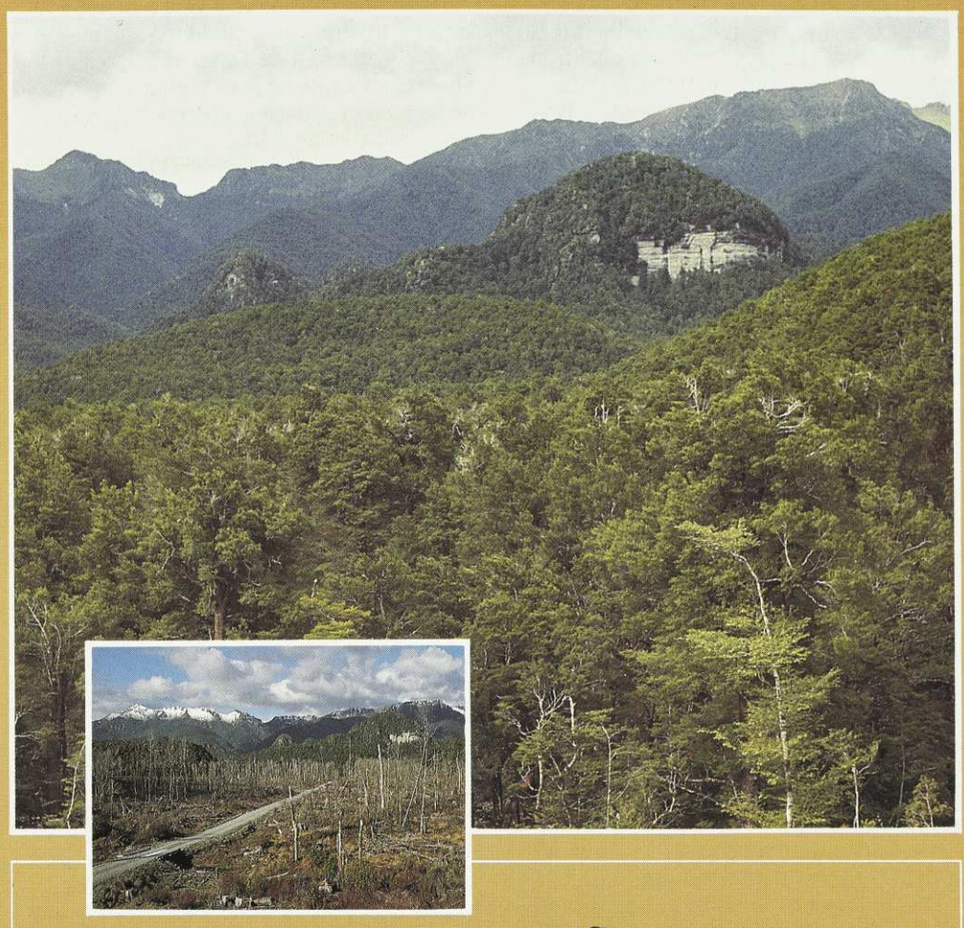
Another potent factor here is the fervent commitment of many Forest Service hands to indigenous production forestry. Their operations have always run at a loss: New Zealand spends two to three times as much per year on subsidizing the logging of indigenous State forests as it spends on acquiring land for protected natural areas and coastal reserves combined.

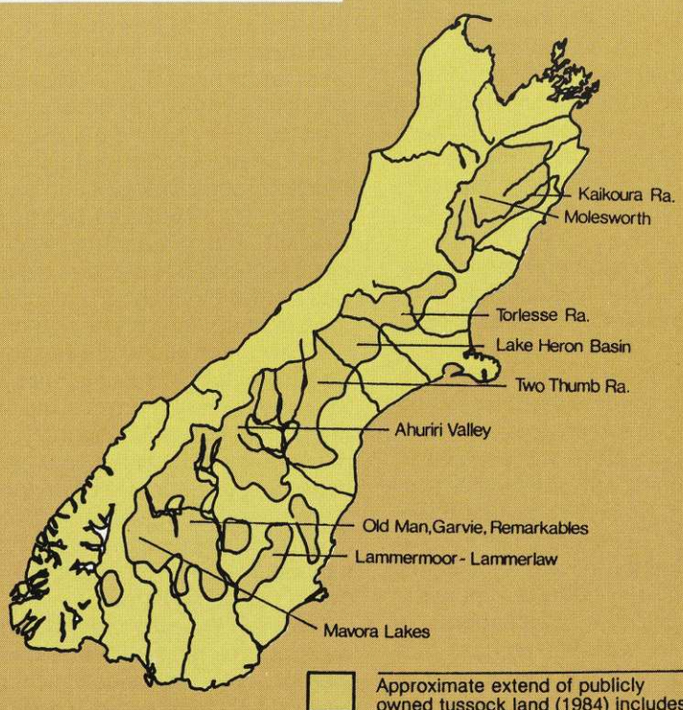
Indigenous forestry would continue in some limited areas under the Forestry Corporation, but for those foresters who are zealous to maximize the area brought into production, it is undoubtedly essential to take over the Department of Conservation as well. By subverting the original concept of this department, they can neutralize what would have been an advocate for preservation and at the same time establish a departmental platform and even a nebulous rationale ("conservation management") for extensive wood production activities.

Not much further down this doublethink trail is the idea, already being discussed, of remaking the Department of Conservation in the image of a self-funding "conservation corporation". Under this concept, income earned from timber production, grazing, mining, hydroelectricity and other "conservation management" activities could be used to pay for recreation development facilities, reserve acquisitions, and wild animal control, thus reducing or even eliminating dependence on government funding. The controversial idea of entry fees for national parks is part of this concept. The trade-offs which would regularly have to be made between protection and production are no doubt challenging and attractive to the departmental resource managers who would run the show. But the dangers are surely obvious:

- lack of accountability of the resource managers
- undermining the New Zealanders birthright of free access to public land for recreation
- government pressure to produce revenue from mining, logging etc, leading to active erosion of the national heritage by the very department charged with safeguarding it.
- conservation expenditure would follow not so much conservation needs as the availability of natural resources for trading away.

Red beech forests at Station Creek, Maruia Valley, the summer before woodchip logging and the winter after (inset). Under the "conservation management" concept, the Department of Conservation could end up running its own woodchip schemes as a source of revenue. *Photo: Guy Salmon*





The huge extent of the South Island high country, 10 percent of New Zealand's land area. This pastoral lease land should be placed under a neutral stewardship agency.

Mission corrupted

Any move to make the Department of Conservation a resource trading department would open the way to corruption of its fundamental mission. That is why the "conservation management" concept is such a sinister intrusion into the draft legislation.

Where does "conservation management" as a production-oriented concept, come from? Its emergence may be traced to a fundamental schism which occurred in the American conservation movement just before the turn of the century. Obviously the origins of conservationist concepts reach back a lot further in both European and Polynesian cultures, where they are deeply entwined in myths and tender feelings about the human/nature relationship. But the word "conservation" was stripped of such emotional subtleties and rocketed into mass public consciousness as a simple scientific-mechanistic concept by the American philosopher-forester-publicist Gifford Pinchot, founding father of the US Forest Service.

Pinchot was undeniably a conservationist of sorts, inasmuch as he crusaded against the waste and depletion of resources associated with America's reckless westward expansion. But he expressed little understanding of non-material resource values, insisting as virtually a moral principle that renewable resources must be used, not "locked up". His advocacy of dams, grazing and logging in areas that others felt should not be touched led to a deep and bitter conflict with leading conservationists of an older school and spirit, people such as John Muir, founder of the Sierra Club and Stephen Mather, founder of the US national park system.

This philosophical division has strongly marked the conservation movements of most western-influenced countries. It is Pinchot's essentially utilitarian notions of conservation that dominate the thinking of departmental resource managers in New Zealand today, reaching their highest practical expression in the sustained management for the industry of serried ranks of radiata pine.

Pinchot's conservation philosophy was infused with the social and political themes of US President Theodore Roosevelt's Progressive Era — a reverence for scientific management and technical competence, and a boundless optimism about the benefits of material progress. Conservationists today are much less ebullient about the benefits of advances in science and materialism; we search beyond these realms for deeper understandings and harmonies, in the human/nature relationship. The humility reawakened by our modern experience has given renewed impetus to the old ideal of stewardship: the idea that there is a good part of this country which we can and should largely leave alone, at least until we are an older and wiser nation.

"Wise" resource manager

The departmental resource managers claim already, of course, to be "wise" on our behalf. From the truism that most resources have multiple values they have derived the self-serving concept of the professional, multiple use resource manager who should be given wide powers over our public lands. But it is a profound disillusionment with both the responsiveness and the effectiveness of management by the multiple-use bureaucracies that has led to the recent reform which split up those institutions.

Underlying the reform was a belief that smaller institutions with simple, non-conflicting goals will make for more accountable managements. A dominant use was to be recognized on each area of public land, and the land allocated accordingly to the appropriate institution. The political sensitivity of the allocation process was to be recognized through the establishment of a Crown Estate Commission making careful recommendations to the Cabinet. This new system for accountability in public land management seemed to offer a new clarity, transparency and responsiveness. It is these qualities that will immediately come under threat if the Department of Conservation is to become a reincarnation of the old multiple use bureaucracies, allowing resource managers once again to play god with the conflicting goals of production and protection.

Make no mistake: the philosophical base on which the new Department of Conservation is established will be crucial.

The impetus for more accountability came from two quarters, the Treasury and the conservation movement. The conservationists found that resource managers were rarely neutral. In a situation in which politicians could only be sporadically interested in environmental issues, the resource managers pursued their own Pinchotesque ideologies and did fairly much as they liked. The Treasury saw a similar failure of accountability. For example, commercial analyses were never carried out for the high pine planting investments, since resource managers had their own inscrutable reasons for what they were doing. The result has been a very poor rate of return on the taxpayers' investment in production forestry, while much of the State resource available for harvesting in future is poorly located on steep remote land whose high production costs seriously undermine the future international competitiveness of New Zealand's export forest industries.

From the Treasury viewpoint, management of Crown pastoral leases under a multiple-objective management regime is just as likely to miss vitally important opportunities for improved economic performance. Parts of the leased land are capable of much higher returns if subdivided or turned over to new land uses. The Treasury recognizes that much of the land is not suitable for intensive use and agrees there should be a process of evaluation leading to sieving out of land whose special non-productive values require protection, either by preservation of such land in the Department of Conservation or by imposition of covenants. It is on the question of where the leases should be administered in the meantime that the Treasury and the conservation movement are in disagreement. The Treasury fears that if the leases are given to the Department of Conservation they will never come out again, and no real reform will result.

That fear is given some substance by the establishment of the "conservation management" concept, since that implies the positive management of leased lands for production, and will clearly strengthen the political claim of resource managers to retain control of leased land in the department permanently.

Key to resolution

The key to resolving the pastoral lands impasse is for the Department of Conservation to eschew any claim to be a production land management agency. The "conservation management" concept should be discarded in favour of the stewardship concept, under which it would be explicitly recognized that the pastoral lands were being held in their existing state for the time being. The job of the Department of Conservation would then be to rapidly identify those portions of the leased lands which should be withdrawn permanently from intensified commercial use, for scientific, recreational or national heritage reasons. After consideration by the Crown Estate Commission, the balance of leased land could then be released to the Land Development and Management Corporation, to meet the goals espoused by the Treasury.

This example, and that of wood production, both illustrate the point that the expected benefits of the environmental reform — greater transparency and accountability, a strengthened environmental protection system and enhanced economic performance — could all be placed at risk if the Department of Conservation is mandated as a production agency. The alternative concept of stewardship would overcome these problems. There will of course be a need for the legislation to allow for various kinds of development on public land, from construction of television transmitters to the removal of timber from roadlines. But such provisions belong — as they do in the National Parks Act — in the subsidiary fine print, not in the central purposes of the statute.

It is the stewardship role that must be recognized among the central purposes of the statute, if our public land allocation decisions are to be orderly and transparent, and are not to become once again the private affair of powerful departmental resource managers. Most important of all, a stewardship role would formally recognize that not all our land allocation decisions need to be made or biased right now, using only the limited information and technologies we presently have and the values of the present generation of powerholders.

Stewardship is a mark of respect for generations to come, and a reserving of certain powers of decision to them.

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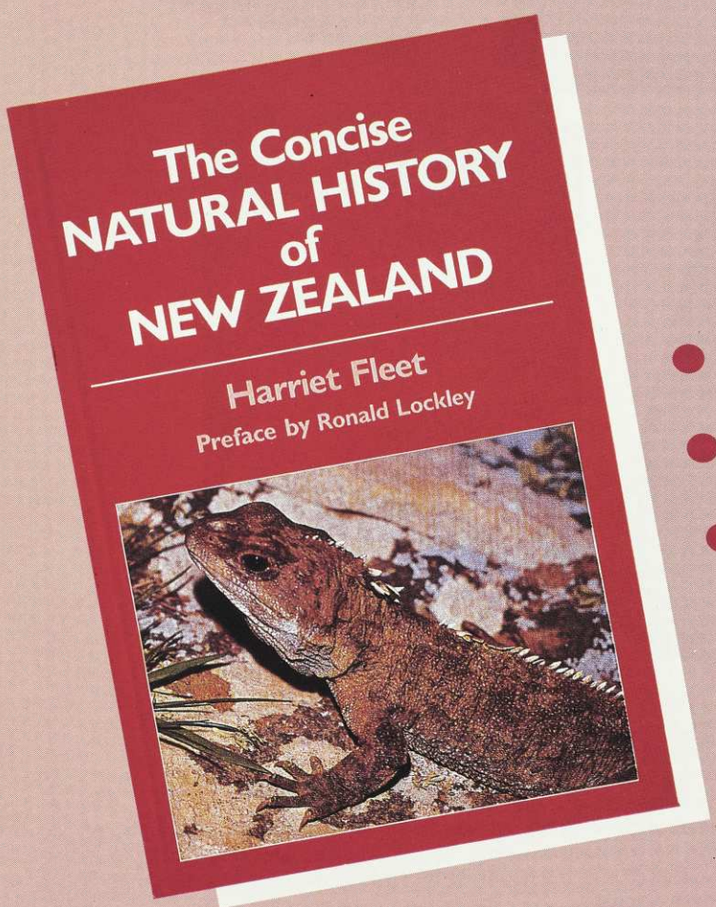
Harriet Fleet



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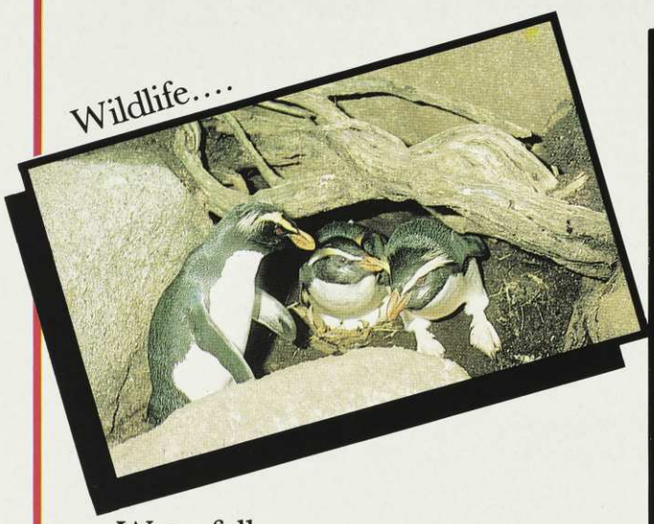

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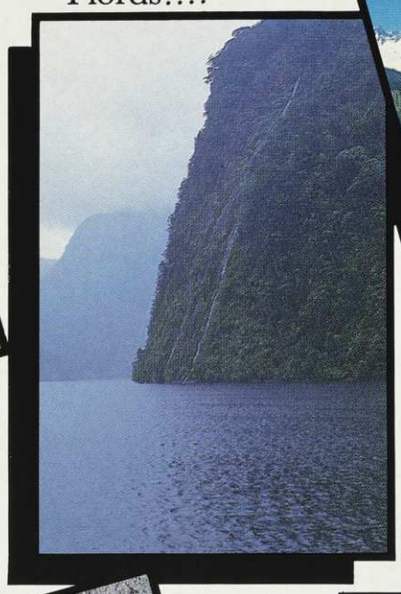
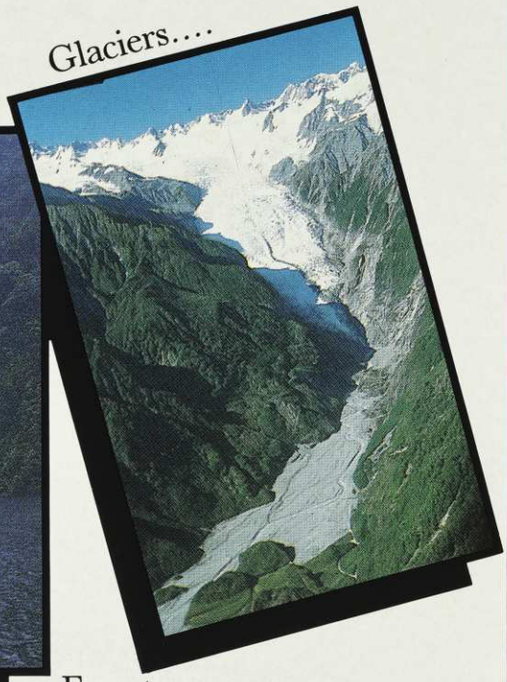
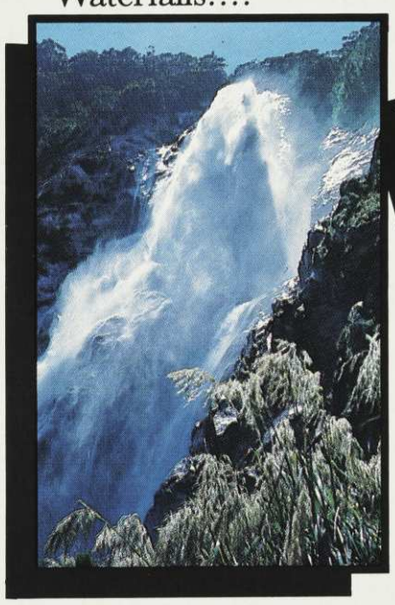


Glaciers....

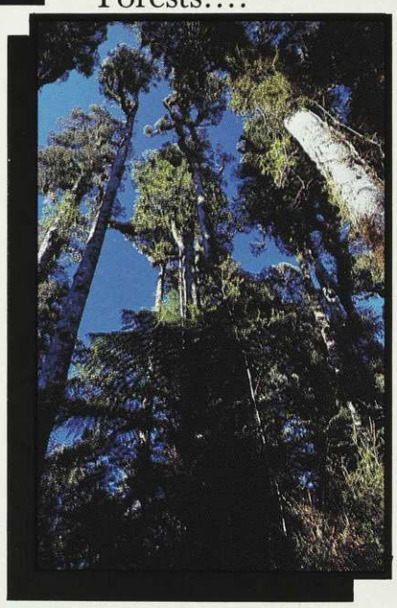


Waterfalls....



People....

Forests....



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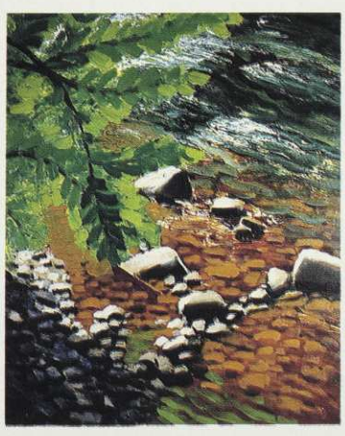


Huatoki — Michael Smither Greeting Card

Artist and conservationist Michael Smither has generously offered the Society reproduction rights to one of his latest paintings **Huatoki**, depicting a stream near New Plymouth. This delightful painting is now available in the form of a greeting card to members at $1.00 each, or five cards for $4.00. Remember: all the funds from sale of the card go towards the Society's conservation work. Available through the Society's mail order service, PO Box 631, Wellington.

Society's Lodges and Houses

Bushy Park Lodge

Kai Iwi, 24km north of Wanganui on sealed road.

Historic homestead, fine grounds and view. 89 ha of virgin bush with tracks and trees identified.

Accommodation: for 15 in six bedrooms, single and double beds, electric blankets, heater and vanity units. Sleeps 24 with mattresses. Bedding, linen and towels supplied. Showers, drying cupboard, kitchen with electric stoves, refrigerator, deep freeze, cutlery and crockery. Bring own rations. Milk may be ordered.

Fees: (House Guests) Members $14 single, $18 double, Non-members $20 single, $25 double. Children 5-12 $6. Continental breakfast available. $4. (Day Visitors) All adults $2, children 5-15 $1, Family $3 or $5. Closed to day visitors but not House Guests Mon & Tues.

Bookings and Information Leaflet: Custodian, Bushy Park Lodge, Kai Iwi, RD8 Wanganui. Telephone Kai Iwi 879.

Okarito Beach NFAC Cottage

Sleeps 4–6 in basic but comfortable facilities, water, wood stove, 2 rooms. Sited in historic township, coastal and bush walks, Okarito lagoon, Westland National Park and glaciers. $3 per person per night. Bookings: Bill Minehan, Private Bag, Hokitika, Ph 734 Whataroa.

Patoka Lodge, Hawke's Bay

The lodge is situated 48km from Napier on the Puketitiri Road and 8km past Patoka, amid the 14ha William Hartree Memorial Scenic Reserve.

The Lodge accommodates 10 people. Extra mattresses and pillows are available to sleep up to 20. The lodge has a full equipped kitchen, including refrigerator.

Visitors supply their own linen and cutlery. The nearest store is 8km away. No animals are permitted.

For rates send a stamped addressed envelope to the Booking Officer, June Norther, 212 Kennedy Road, Napier, Telephone Napier 438 193.

Ruapehu Lodge, Whakapapa Village, Tongariro National Park

Ruapehu Lodge is now available for MEMBERS ONLY, and all bookings must be made with the Society's head office, P.O. Box 631, Wellington.

Fees: Winter Season (1 June to 31 October and Christmas and Easter holidays $10.00 per night. Summer Season 1 November to 31 May) Adults $7.00 per night Children $4.00 per night.

Full payment must be paid four weeks before occupation, (otherwise bookings may be forfeited) after which time there is no refund for cancellation.

No animals or pets are allowed in the lodge or the National Park.

There is no key at the lodge, but one will be posted ten days before occupancy. No member may occupy the lodge without first booking through Head Office, Wellington.

Tautuku Lodge, Coastal Otago

Situated 72km from Balclutha on State Highway 92, Tautuku Lodge on the Society's 550ha bush-clad Lenz Reserve in coastal south-east Otago.

The lodge is fully equipped and accommodates eight or nine people. Bring with you food supplies, bed linen, blankets, towels, tea towels etc.

For rates apply to the Booking Officer Miss M. Roy, Papatowai, Waipati, RD, Owaka, enclosing a stamped addressed envelope.

Turner Cottage, Stewart Island

Turner Cottage, is on Stewart Island and is a two-roomed dwelling furnished for three people.

For details write, enclosing a stamped, addressed envelope, to: "Turner Cottage", C/o Mrs N. Fife, P.O. Box 67, Halfmoon Bay, Stewart Island.

Tai Haruru Lodge, Piha, West Auckland

A seaside home situated in Garden Road, Piha, 38km from central Auckland. Eight minutes' walk from the Piha store, with right-of-way access to the surfbeach and close to bush reserves and walking tracks in the Waitakere Ranges.

The lodge is fully equipped and sleeps six to eight persons. It has a large lounge with open fire, dining area, and modern kitchen.

You will need food supplies, bed line, towels, and tea-towels.

Different rates apply for winter and summer, for rates send a stamped, addressed envelope to the Booking Officer, Mrs B. Marshall, 160 Valley Road, Henderson, Auckland. Telephone 836-5859.

Waiheke Island Cottage, Onetangi, Waiheke Island

The cottage has comfortable bunk accommodation for eight people and has a stove, refrigerator, and hot water. Adjacent to a 49ha wildlife reserve, belonging to the Society it is in easy walking distance from shops and beach. It is reached by ferry from Auckland City (two or three returns daily) and by bus or taxi from the island ferry wharf. Everything is supplied except linen and food. No animals are permitted.

Different rates apply for winter and summer. For rates send an addressed envelope to the Booking Officer, Mrs R. Roley, 23 Stoddard Street, Mr Roskill, Auckland. Telephone Auckland 696-769 (evenings).

Books Received

Concise Encyclopaedia of Natural History, *By Harriet Fleet (Heinemann, $27,95).*

A small format book crammed with information, outlining a full range of NZ's flora and fauna in relation to their physical environments. Birds, trees, insects, coastal life, wetlands, tussocklands and alpine world are all covered. Less well illustrated than is fashionable in natural history books, but clearly written in a straightforward style. A good value, handy reference for the general reader market it is aimed at.

A Field Guide to the Lizards of NZ, *by D.R. Towns (Wildlife Service, $4.95, available through the Information Section, Wildlife Service).*

This 28-page booklet by NZ's leading lizard expert provides a clear key illustrated with line drawings to the 37 species of geckos and skinks in New Zealand. Valuable for the keen naturalist.

The New Zealand Whale and Dolphin Digest, *by Stephen Dawson (Brick Row, $19.95).*

A complete guide to the cetaceans of our seas, providing a wealth of information to the casual observer and ardent whale watcher alike. Three main sections, the first on natural history, the second on the stranding phenomenon and advice on what to do in such events,the remainder and bulk of the book an identification outline of species found in NZ waters. Liberally illustrated in colour and black and white, this Project Jonah guidebook is excellent value for money.

Kokako, *by Rod Hay, Hugh Best and Ralph Powlesland (McIndoes, $4.95).*

The latest in a series of monographs on rare NZ birds, this will be of special interest to Forest and Bird members as it reports results obtained during studies which the Society funded from 1978–81. An outline of the history of the kokako and its relatives is complemented by a detailed account of its biology and the factors affecting its survival. An important section shows which measures are needed and which are being taken to protect the bird. 24 colour pics help to make this an attractive, up-to-the-minute account of one of our most zealously guarded birds.

Moa, the story of a fabulous bird, *by Philip Temple and Chris Gaskin (Collins, $14.95).*

Imaginatively written and illustrated, this book is aimed at two categories of younger readers: there are two texts, one the tale of Pouakai the moa, the other filled with facts on moa life.

Remote the Land's Heart, *by Chris Gaskin (McIndoes, $34.95).*

Dunedin artist Gaskin takes the reader and viewer through the South Island on a personal voyage of discovery. Sixteen colour illustrations, 100 black and white.

Field Guide to New Zealand Geology, *by Jocelyn Thornton (Reed Methuen, $27.95).*

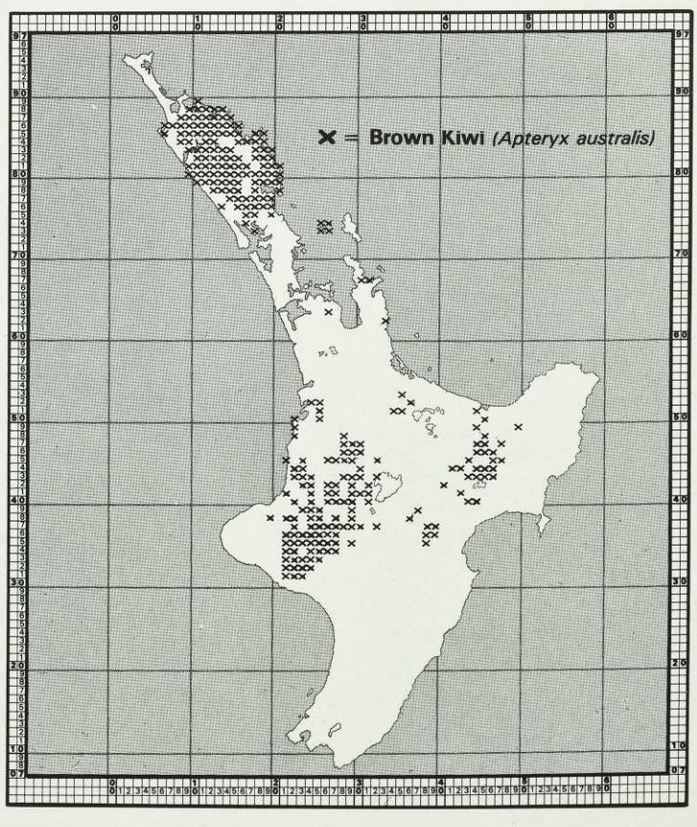
Lands in Collison, *by Graeme Stevens (Science Information Publishing Centre, $18.95).*

Two books for the non-specialist interested in NZ's changing landscape over the past 600 million years. The former is especially useful for the traveller, containing reference maps of New Zealand. *Land in Collision* depicts NZ's development through geological time clearly and concisely, with dramatic reconstructions of NZ's only dinosaur, hapagornis and various moa.

The Atlas of Bird Distribution in New Zealand, *by P.C. Bull, P.D. Gaze, and C.J.R. Robertson (Ornithological Society of NZ, $33.00).*

The *Atlas* is the result of 10 years of data collection, jointly undertaken by the Wildlife Service, Ornithological Society and DSIR Ecology Division. More than 800 field observers were involved, covering 3675 (10,000 yard) mapping squares in what was a mammoth statistical task. The 296-page *Atlas* will be useful to the amateur bird watcher, professional ornithologists, wildlife managers and land use planners. A huge amount of additional information has been stored on just 16 microfiches at the back — equal to 4000 printed pages.

The Atlas of Bird Distribution in New Zealand — a selected page.



THIS BIRD NEEDS PROTECTION

Photo by courtesy of Wildlife Service

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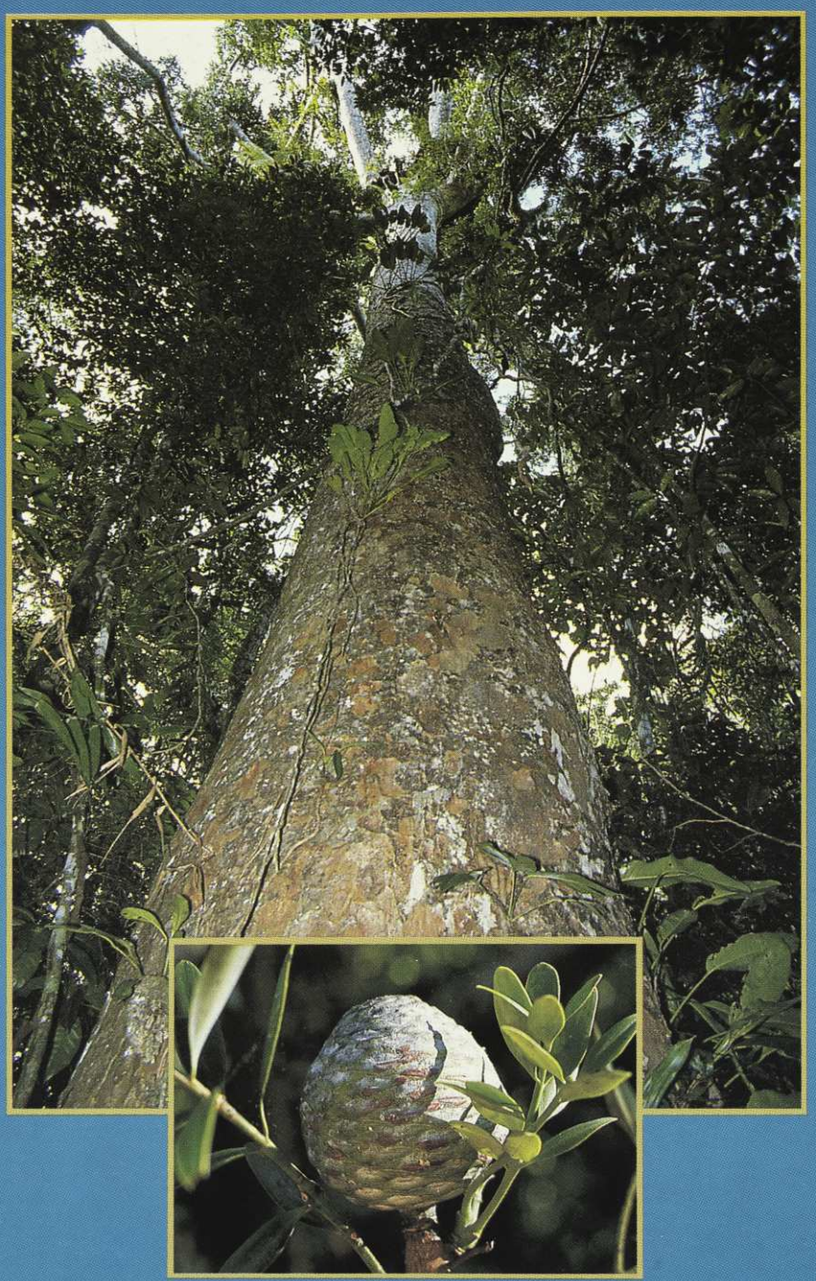

A Pacific kauri species *Agathis macrophylla*, a huge tree known in Fiji as *dakua*, is the subject of heavy and extensive logging for the timber export trade to Australia and New Zealand.
Photo: Guy Salmon