NEWS LETTER No. 48 JULY 1987

Registered at P.O. Headquarters, Wellington, as a magazine.

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The New Zealand Ecological Society was formed in 1951 and promotes the study of all aspects of ecology. Membership is open to any person interested in ecology. There are four classes of members who pay:

(1) $25 for ordinary members,
(2) $15 for student members,
(3) $5 for introductory members, and
(4) $5 for retired members.

Ordinary and student members receive the N.Z. Journal of Ecology plus the quarterly newsletter. Introductory and retired members receive only the newsletter.

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NEWSLETTER: The editors welcome correspondence, interim reports of current research, news items, and other articles. Unless specifically indicated otherwise, views expressed in this Newsletter are not necessarily those of the Ecological Society or its Council.

Deadline for next edition: JULY 15, 1987
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SOCIETY NEWS

A LIST OF PRIORITIES FOR FUTURE ECOLOGICAL RESEARCH IN NEW ZEALAND

During 1986 our Society identified priorities for future ecological research. We achieved this through discussion groups in Auckland, Rotorua, Palmerston North, Wellington, Lower Hutt, Nelson, Lincoln and Dunedin and we involved both members and non-members of the Society. The resulting list was collated and condensed earlier this year and has now been circulated widely to officials in appropriate government and university departments. It is printed below with its introductory statement. On behalf of Council, I thank all who took part in these discussions and particularly the efforts of the group convenors.

Ian Atkinson

NEW ZEALAND ECOLOGICAL SOCIETY

PRIORITIES FOR FUTURE ECOLOGICAL RESEARCH IN NEW ZEALAND - MARCH 1987

Introduction

This statement lists priority topics for ecological research in New Zealand. The statement summarises and represents the views of the New Zealand Ecological Society. The society's membership ranges widely in ecological interests and this is reflected in the list. No distinction is made between basic and applied ecological research since the two activities form a continuum.

An emphasis is placed on natural environments in the list, reflecting a majority view of members that protection of what is uniquely New Zealand is in the national interest.

Notwithstanding this emphasis, there is still an urgent need for ecological research that is linked to specific management questions associated with many kinds of managed ecosystems in rural and urban environments. There is also a need in New Zealand for greater emphasis on theoretical ecology involving modelling and the use of systems techniques, to enhance understanding of ecosystem processes in different types of environment.

The assumptions implicit in this priority list are:

(i) That ecological research can contribute significantly to the wellbeing of New Zealand society.

(ii) That knowledge of a natural resource is required before either sustainable use, or effective protection, of that resource can be achieved.
(iii) Because this is a national priorities list, the research needed is seen as primarily the responsibility of public-funded organisations, either government departments or universities.

(iv) The priorities identified relate mainly to terrestrial environments. We hope that priorities for ecological research in marine and freshwater environments will be listed by the appropriate Societies.

(v) The list is not a checklist of all the worthwhile ecological studies that could or should be carried out in New Zealand. The list is the 10 topics we consider most urgent. An order of priority is implied by the numbering within sections, but there is little difference in urgency between many of the studies listed.

The Priority List

(A) NATURAL AND SEMI-NATURAL AREAS

1 Basic inventory of remaining natural and semi-natural areas in all ecological districts for which comprehensive inventories or surveys do not already exist.

The inventory will lead to an assessment of the adequacy of the reserves system in (i) protecting a representative range of natural ecosystems and (ii) maximising genetic diversity. From this assessment, priority areas for protection, where development would be inappropriate, can be identified.

The inventory must include preparation of a register of important plant and wildlife habitats, designed to allow quick and site-specific assessment of the impact of proposed developments.

2 Dynamics Understanding the instability of biological systems in natural and semi-natural areas.

This will involve long-term research into ecosystem processes. Without this understanding, it will be difficult or impossible to manage and protect natural or semi-natural areas on a scientific basis. The work would include studies of:

(a) relative influence of climatic, edaphic and biotic effects on system function and stability; (see also C3, pg 5)

(b) long-term effects of browsing animals and human-related effects such as trampling, fertiliser drift, and drainage;

(c) edge effects, and the functioning of buffer zones and biological corridors associated with isolated natural areas.

It is only with an understanding of the dynamics of natural systems that realistic management objectives can be identified for protected areas. Management should aim to be pre-emptive rather than a response to crisis.
3 Developing management techniques to maintain or enhance biological values in protected natural areas, and elsewhere to better provide for defined levels of compromise between maintaining indigenous biological values on the one hand, and sustaining yields of specific resources (e.g., timber) on the other.

Associated with this priority is a need for ecological/economic studies of the predicted effects of excluding certain natural and semi-natural areas from commercial development.

4 Study of erosion processes as they affect landscape stability, including the relative impact of climate and introduced animals on erosion.

(B) URBAN AND RURAL AREAS

1 Ecological effects in New Zealand of a "limited" nuclear war in the northern hemisphere.

2 Impact of agriculture, mining, industrial processing, horticulture and forestry on soil and water properties:

These impacts require studies of:

(a) erosion effects
(b) nitrate pollution of ground-water
(c) eutrophication of streams and lakes
(d) effects of particular poisons, insecticides and herbicides.

3 Restoration ecology: restoration of degraded communities and habitats; mitigation of the impacts of recreational, agricultural and industrial developments; identification of indigenous species potentially useful for restoration.

This topic should be associated with the identification of distinctive and desirable elements in our various rural landscapes, and the development of management techniques to retain these distinctive landscapes.

(C) SPECIES

Long term population studies are required of:

1 Threatened and potentially threatened species, including those of little-known groups such as invertebrates, with particular emphasis on:

(a) habitat requirements
(b) minimum viable population size
2. **Species of economic or conservation importance**, either problem plants and animals (e.g., certain weeds, introduced animals as disease vectors) or plants and animals that can be managed on a sustainable basis for recreational or economic reasons.

3. **Major species**, those plants and animals perceived to have the greatest influence on successional trends in ecological communities.
ANNUAL CONFERENCE - TURANGI 1987

Explanatory notes

VENUE

The Tongariro Out Door (sic) Centre is the hugely revamped staff quarters from MWD halcyon Turangi days. It is adjacent to the main road, but the access is from the other side. We are competing with skiers and tourists for accommodation. There is therefore little leeway for late bookings or casual attendance. PLEASE REGISTER PROMPTLY! Casual meals are not available at the Out Door Centre.

Accommodation and all meals are provided by the Out Door Centre. Most rooms take three persons. Linen and tea/coffee etc. are supplied. Some double beds are available.

The venue for Conference sessions is the Turangi Senior Citizens Club, "downtown", ten minutes walk from the accommodation.

SYMPOSIUM AND GUEST SPEAKERS

The Symposium this year lasts a day-and-a-quarter and is entitled "DISTURBANCE IN NZ ECOSYSTEMS". Guest speakers are Dr Phil Tonkin, Soil Science Dept, Lincoln College who will speak on abiotic disturbance, and Dr Tom Vebelen, Geography Dept, University of Colorado, Boulder, Colorado, USA who will speak on biotic disturbance.

Dr PHIL TONKIN is a pedologist, currently a Senior Lecturer at Lincoln College. After graduating B.Sc (Hons) and MSc in geology/pedology from Victoria University, he took up a position in the Hamilton office of the Soil Bureau, DSIR, where for three years until joining Lincoln he undertook soil survey in the Waikato and King Country. Since 1969 Phil has participated in soil survey and research on Stewart Island, Chatham Island and especially in the mountain soils of Canterbury and Westland. He has also made study forays to United Kingdom, Canada, USA and (in 1980) China.

He is immediate past president of the New Zealand Society of Soil Science and currently serves on the Protected Areas Scientific Advisory Committee.

Dr TOM VEBLEN is currently Associate Professor in the Dept of Geography, University of Colorado, Boulder, Colorado, USA.

PhD topic: Forest changes in the Western Highlands of Guatemala.
1975-1979: Visiting professor of Plant Ecology, Forestry School, Universidad Austral de Chile, Valdivia, Chile. Carried out extensive research on forest dynamics in the Chilean Lake District.
1979-1981: Postdoctoral Research Fellow, Plant Ecology Section,
FRI, Ilam. Worked on population dynamics of Libocedrus bidwillii in relation to the 'conifer regeneration gap; effects of introduced animals on NZ forests (whitetailed deer on Stewart Island, possums in Westland) and redsilver beech forest dynamics.

1981-present: Associate Professor, Dept Geography, Univ. of Colorado, Boulder, Colorado. Has continued to work in South America (in Chile and Argentina) and also initiated several research projects in the subalpine forests of the Colorado Front Range. Supervises numerous graduate students who have worked in diverse topics and places from bamboo ecology in China to forest dynamics in montana areas of eastern Peru.

Publications: Numerous scientific articles (more than 40?) in both local and international journals on disturbance/forest dynamics and conservation.

Major contribution: Probably in role of disturbances in Nothofagus ecology of South America.

He also has, says Glenn Stewart, a keen eye for a game of pool. So place no bets, folks.

A further twelve speakers will present papers on the disturbance theme. Half are especially relevant to the central North Island.

TRAVEL

After some fluffing around with charter flights, we are back into charter coaches. We can meet people off any flight arriving at Wellington by 10.30 am on Monday 24 August, and then take them to Turangi via Wellington Railway Station (for other Wellingtonians) and Palmerston North Railway Station (for Masseyites and the Hon. Editor). We will also meet flights NZ 313 from Auckland and NZ 324 from Wellington, at Taupo Airport.

In the reverse direction, we will do the backwards trip on Friday 28 August, to reach Wellington in time for flight NZ 591 to Christchurch, and we will service flight NZ 324 to Auckland, leaving from Taupo.

Our only problem lay with Dunedinites. This was resolved by having a special minibus leaving somewhat early on Friday to service flight NZ 887 which leaves Palmerston North for Dunedin via Christchurch at 2.05 pm.

It has not been easy getting costs for these trips without knowing numbers. If our predictions are very wrong, costs may change a little or we may revert to commercial bus services.

Anyone flying to Conference should try for Epic or Thrifty fares; otherwise the organiser has 10% discount vouchers.

FIELD TRIPS

WARM CLOTHING IS A MUST FOR ALL TRIPS, INCLUDING A WINDCHEATER.

OPTION 1: AQUATIC FIELD TRIP

Led by Dr Theo Stephens, Dept Conservation, Taupo. A full day
coach excursion focussing on the impact of hydro electric development on the ecology of the Tongariro River and its fishery. Visits are planned to the Power Scheme Information Centre; to the DOC trout hatchery; to Tongariro River fishing pools and to the Poutu canal intake. Then the bus sides west between Lake Rotoaira and Tongariro National Park to stop at Lake Otamangakau, the artificial lake created by hydro impoundment, and at the Whakapapa River intake.

Sandshoes or similar comfortable footwear will suffice. (And no, Peter Williams, there probably won't be enough time for you to wet a line, although Theo may electric fish if time and conditions permit).

Option 2: Muddy Boots Trip

Real field ecologists (as opposed to armchair ecologists) have the opportunity on this trip to collect valuable data on changes in vegetation composition and structure in Tongariro National Park over the last 20 years. Between 1960 and 1966 Ian Atkinson and his many helpers measured vegetation at 1472 samples along 154 traverses in Tongariro National Park. This data formed the basis of the publication "Vegetation Map of Tongariro National Park". You are not expected to remeasure all of these samples in a day! Rather, a small number in accessible areas has been selected for your enjoyment. All are reached via the Mangatepopo Valley Road, Bruce Road or SH.4 and are mainly through red-tussockland, sedgeland or fernland. You will be driven to the start of each pre-marked traverse. Significant changes, including heather invasion, are confidently expected to be quantified and reported on in a later edition of the Ecological Society Newsletter at least.

Option 3: Tiki tour

This tour will illustrate some of the main features of the landscape and vegetation of part of the Tongariro Ecological Region. Expert comment will be provided along the way and there will be opportunity for discussion.

Starting at the Te Ponanga Saddle you will be introduced to the complex history of the volcanoes of the Tongariro Volcanic Centre, many different tephra layers which mantle the landscape, and the plants and animals which inhabit the area. On the northern slopes of Tongariro we visit the secondary, thin-barked totara forest of Okahukura Bush. Then on to Mangatepopo Valley with its fire-induced red-tussocklands, infestations of heather, cinder cone (Pukenake) and nearby recent Ngauruhoe lava flows. Later in the afternoon we travel on the Bruce Road, up the slopes of Ruapehu, to the park headquarters at Whakapapa Village. Management issues will be to the fore here including the question of mountain beech die-back in the vicinity.
REGISTRATION FEE

The conference registration fee is moderately high this year, since it partly (about \( \frac{1}{3} \)) covers travel expenses for our Symposium guest speakers, and totally covers the emolument being given to this years' Conference Organiser. It also pays for morning and afternoon teas.

See you there! Turangi, 1987!
MONDAY 24 AUGUST
Registration 2pm .......
Dinner

TUESDAY 25 AUGUST
8.00 - 8.30 am  Registration
8.30 - 8.45  Conference opening by an Elder of Ngati Tuwharetoa

SYMPOSIUM: DISTURBANCE IN NZ ECOSYSTEMS:

SESSION 1: Chair - Dr I.A.E. Atkinson
8.45 - 9.30  Keynote address on abiotic disturbance by
DR PHILIP TONKIN (Lincoln College)

9.30 - 10.00  Neall - The impact of vulcanism on ecosystems of
the Central Volcanic Plateau.

10.00 - 10.30  Clarkson - Vegetation succession following recent
(<450 years) volcanic disturbance in
North Island, New Zealand.

10.30 - 11.00  Morning tea

11.00 - 11.30  Burrows - The importance of snow avalanches as a
disturbing influence in South Island
mountain vegetation.

11.30 - 12.15 pm  Keynote address on biotic disturbance by
DR THOMAS VEBLER (University of Colorado):
Biotic disturbance and vegetation dynamics.

12.15 - 12.45  Shaw - Disturbance and the vegetation of Urewera
National Park: An overview.

12.45 - 1.45  Lunch

SESSION 2: Chair - Mr J.R. Leathwick

1.45 - 2.15  Stewart & Rose -
Techniques for analysing forest
disturbance history.

2.15 - 2.45  Steele - Disturbance and mountain beech forest in
Tongariro National Park.
<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Title</th>
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<tbody>
<tr>
<td>2.45-3.15</td>
<td>Jane</td>
<td>Can natural disturbance be distinguished from red deer impact in simple mountain beech forest?</td>
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<tr>
<td>3.15-3.45</td>
<td>Afternoon tea</td>
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<tr>
<td>3.45-4.15</td>
<td>White</td>
<td>A systems perspective on disturbance.</td>
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<tr>
<td>4.15-4.45</td>
<td>O'Connor &amp; Swaffield</td>
<td>How is anthropic disturbance to be accommodated in landscape ecology and nature conservation.</td>
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<td>Dinner</td>
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<td>Wine and Cheese / Debate between North Island and South Island teams: That the most disturbed ecosystem in this region is in the minds of the ecologists.</td>
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**WEDNESDAY 26 AUGUST**

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<tr>
<th>Time</th>
<th>Speaker</th>
<th>Title</th>
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<tr>
<td>8.30 - 9.00 am</td>
<td>Howard-Williams</td>
<td>Invasion of Lake Taupo by the submerged waterweed <em>Lagarosiphon major</em>: Implications for the native flora.</td>
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<td>9.30 - 10.00</td>
<td>West</td>
<td><em>Clematis vitalba</em>: An invader of disturbed ecosystems.</td>
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<td>10.00 - 10.30</td>
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<td>SUMMING UP OF SYMPOSIUM BY KEYNOTE SPEAKERS.</td>
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<td>10.30 - 11.00</td>
<td>Morning tea</td>
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<td>CONTRIBUTED PAPERS I</td>
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<tr>
<td>11.00 - 11.25</td>
<td>Dickinson</td>
<td>The Waikaha Ecological Region - Results of FNA surveys of the Umbrella and Nokomai Ecological districts.</td>
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<tr>
<td>11.25 - 11.50</td>
<td>Burns &amp; Shaw</td>
<td>Ecology of wild populations of kaka beak (<em>Clianthus puniceus</em>) at Lake Waikaremoana.</td>
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<td>11.50 - 12.15 pm</td>
<td>Williams, Courtney, Glenny &amp; Hall</td>
<td>The diversity and conservation status of pakihi vegetation in North Westland.</td>
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<tr>
<td>12.15 - 12.40</td>
<td>Timmins &amp; Williams</td>
<td>Permeability of PNAS to problem plants.</td>
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<td>12.40 - 1.40</td>
<td>Lunch</td>
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1.40 - 2.40 POSTER SESSION

Hitchmough - The relevance to ecologists of a systematic revision of Gekkonidae.

Nugent & Sweetapple - The relative impact of three hunting regimes in Northeast Fiordland.

Fordham & Ogden - Some features of kaikawaka seedlings and their sites in Tongariro National Park.

Young - Effects of fragmentation on forest communities and the relevance of fragment area to reserve design.

Innes - Do 1080 aerial poisoning operations kill North Island kokako?

Parkes - Condition of hares according to age, sex, and reproductive state.

Clarkson & Johnson - Recent Botany Division publications.

Leathwick - National Forest Survey data computerisation.

Shaw & Steward - Forest Research Institute PNA database catalogue.

CONTRIBUTED PAPERS II

2.40 - 3.05 Hollinger - Effect of overstorey dieback on understorey light environment and seedling photosynthesis in mountain beech.

3.05 - 3.30 pm Clarkson, Clarkson & Patel - The structure and composition of two forests buried by the Taupo eruption.

3.30 - 4.00 Afternoon tea

4.00 - 4.25 Beggs & Wilson - Feeding energetics of kaka in South Island beech forest.

4.25 - 4.50 Clout, Gaze & Karl - Movements, diet, and breeding of the New Zealand pigeon.

4.50 - 5.15 Craig & Mitchell - Vegetation qualities and whitehead stock size.

ANNUAL DINNER
THURSDAY 27 AUGUST

FIELD TRIPS - AGM

FRIDAY 28 AUGUST

8.30 - 9.00 am  Presidential address - DR. I.A.E. ATKINSON
OPPORTUNITIES FOR BIOLOGICAL RESTORATION
IN NEW ZEALAND

CONTRIBUTED PAPERS II

9.00 - 9.25  Nugent & Challies -
Deer diet on Stewart Island and its
significance in relation to the impact of
deer on New Zealand forests.

9.25 - 9.50  Trigg -
Population genetics of the bush-tailed
possum.

9.50 - 10.15  Clapperton, Sandlant & Moller -
The distribution and abundance of Vespula
wasps in New Zealand.

10.15 - 10.45  Morning tea

10.45 - 11.10  Gaze, Moller, Thomas & Tilley -
Effects of feral honey bees and wasps on
honeydew.

11.10 - 11.35  Halloy -
A comparison of lifeforms of New Zealand
alpine plants with Andean ones.

11.35 - 12.00  Harris, Percy & Purdie -
Genotypic variation of flowering pattern
and seed retention in manuka.

12.00 - 12.25  Lee -
Fruit features of New Zealand Coprosma
species in relation to their ecology.

12.25 - 12.50  Norton & Kelly -
Mast seeding by the dioecious forest tree
rimu in New Zealand.

12.50 -  Lunch
ENVIRONMENT/CONSERVATION

WORLD WILDLIFE FUND PROJECT 3329 : PRINCIPLES AND PRACTICE OF PLANT CONSERVATION

In March 1986 I was approached by Dr Peter Raven on behalf of the IUCN Plant Advisory Group, to consider writing a state of the art book on the conservation of plant species worldwide. This offer was accepted and was followed up by a two-week trip to USA, UK and Switzerland to discuss the project in detail, and a meeting in July last year, at Quirama, Colombia, to discuss final details with the Plant Advisory Group. I also visited cloud forest, and met many botanists at the Latin America Botanical Congress. Subsequently, I have had two extensive tours overseas to research the book: USA, UK, Italy, Australia (November-December 1986), and Latin America (March-April 1987). Contact has been established with a wide range of experts worldwide (not all botanists!), many of whom have generously contributed reports, critiques and pre-publication materials.

The book will be primarily directed towards:-

(a) decision makers charged with land-use planning and allocation, and regional allocation of resources.

(b) managers of both in situ and ex situ resources such protected natural areas, national parks, botanic gardens and gene banks.

(c) environmental and development consultants, and people involved in environmental impact assessment or environmental restoration.

(d) informed and concerned members of the public (many of whom are linked into conservation NGO's) and plant nurserymen.

A potential audience probably exists among some politicians, research organisations and libraries, and educational institutions.

A key issue is to present conservation of biological diversity to the decision makers. What is said must be said in their language, assuming that many of the readers will not have a formal training in biology. Stress must be on practicalities and I am looking to a proportion of about 1/3 principles to 2/3 practice. The book should have a core from which to go to both theory on the one hand and practice (especially in critical regions and habitats) on the other. It might well be described as a recipe or blue-print, showing how to proceed. Translation into Spanish is planned.

Chapter topics are: (1) why conserve, (2) evolution and diversity in plants, (3) geography of plants, (4) population biology, (5) ecosystems and communities, (6) threats to plant life, (7) documentation, (8) population conservation, (9) protecting natural areas, (10) ex situ conservation, (11) plant conservation in disturbed habitats, (12) conservation legislation, (13) ethnobotany, (14) education and awareness,
(15) who conserves, (16) who pays for conservation - conservation economics, (17) putting it together.

Further information and more detailed project outlines are available from David Given, Botany Division, DSIR, Private Bag, Christchurch.

FROM OUR FAR-FLUNG CORRESPONDENTS

A VISIT TO THE ENCHANTED ISLANDS

It was thirst-tormented sailors of past centuries, becalmed for days in the tropical sun in sight of the Galapagos Islands who described them as enchanted. Unfortunately such enchantment did not prevent sailors, when they did reach shore, from carrying off thousands of the giant tortoises from which came the name Galapagos. Relished as a source of succulent fresh meat on long voyages, exploited for smooth-tasting oil, and collected by misguided scientists with no understanding of conservation, 4 of the archipelago's original 15 subspecies of giant tortoise are extinct, one represented by a single male has no future, and half of the remaining 10 subspecies survive only through the continuing efforts of the Charles Darwin Research Station and the Galapagos National Park Service.

I was able to spend 22 days in these islands during April, visiting 7 of them, and getting a feeling for the place. One feeling is the way in which one's clothes stick to one's body after only an hour or so in the field - proximity to the equator is not comfortable and a New Zealander needs to get above 600 m to feel 'normal'. That is possible on the six largest islands, four of which are inhabited; in fact Isabela, the largest island, has huge basaltic shield-shaped volcanoes that rise to over 1700 m (5600 ft). This island, at 4588 km², is more than two and a half times the size of Stewart Island. Don't look at a map of the world if you want to get a feeling for the size of the Galapagos archipelago.

Ecological and evolutionary research in the Galapagos is organised from the Charles Darwin Research Station on Santa Cruz Island (966 km²). The station is funded partly by international agencies (through the Charles Darwin Foundation) and partly by Ecuador to which the Galapagos Islands belong. The most frequently used language is Spanish and most Galapagos Islanders (population 5200) speak nothing else.

Over 800 km of sea separate the Galapagos from the nearest part of South America. In common with so many isolated oceanic islands, native plants and animals and the communities they form have been greatly disrupted by man's arrival. Animals threatened with extinction have had greatest publicity. Apart from the giant tortoises already mentioned, some island races of land iguana are threatened, the mockingbird and large ground finch of Floreana Island are in very low numbers, and only protective measures taken by a dedicated few at Charles Darwin Research Station is preventing the Galapagos dark-rumped petrel from slipping into oblivion. But many plants species are also threatened with extinction, if not already lost, if present trends continue.
The flora and fauna of these islands is largely derived from tropical America. About 42% of the flora is endemic with much higher percentage of endemic animals. Living in an environment where annual rainfall in the lowlands can vary from 80 to 2800 mm, where seasonal changes from very wet to a drought are commonplace, and where the landscape is completely shaped form basaltic lava and ash, it is apparent that selection pressures on Galapagos organisms have been enormous. It is no surprise to find that the resulting communities are sometimes as strange as the plants and animals.

The marine biota includes two species of eared seal, humpback, sperm and killer whales, as well as pilot whales and two species of dolphin. Seabirds include an endemic penguin, an endemic albatross, two species of shearwater, two species of storm petrel, a tropic bird, the brown pelican, three species of booby and two species of frigate-bird. Some are shallow-water inshore feeders whereas others travel far out into the ocean. But the way in which these various vertebrates co-exist on a spatially variable and continually changing marine food supply is still a topic with many unanswered questions.

Along the coast the famous marine iguanas bask in the sun during the day and feed on marine algae at night. An endemic flightless cormorant occurs in the western part of the archipelago, a black bird that dives and pursues bottom-living fish and octopus within 100 m of the coast. On the shore itself, insectivorous laval lizarus scuttle and bob vigorously in territorial displays while two endemic species of gull, the nocturnal-feeding swallowtail gull and the black and grey coloured lava gull, give further evidence of the power of natural selection. It is thought that both the nocturnal feeding and the dark-coloured plumage are adaptations to reduce attacks by frigate-birds.

Inland the lowland vegetation is a strange mixture of tree-forming caoti (Opuntia spp. and Jasminocereus thouarsii), shrubs with leaves mostly of medium size, and deciduous trees. There are a few spiny and a few small-leaved shrubs but nothing that one would mistake for a New Zealand divaricating shrub. Land iguanas, although rare, are most frequently found in these seasonally dry habitats where they feed on various herbs and the spiny pods of Opuntia.

Above 150 m there is a zone of mixed forest which, however, contains few tree species and is seldom taller than 10 m. It is here that the giant tortoises may once have been most abundant although only remnant populations now occur. At higher altitudes, above 500 m, forests formed by a tree composite in the genus Scalesia are dominant but much of this forest, as well as that of lower altitudes has been destroyed by fire or by introduced animals and alien plants. The upper parts of the older islands such as Santa Cruz are a patchwork of scrub, bracken fernland and grassland. Where young volcanoes are present, as on Isabela and Fernandina islands, there are extensive lava flows and ashfields.

Of the major threats to the biotic communities of the Galapagos Islands, alien plants and alien animals are the most obvious. Guava (Psidium guajava), Lantana (Lantana camara), Cinchona succirubra (Equador's national plant introduced to the Galapagos for quinine) and elephant grass (Pennisetum purpureum) have each covered thousands of hectares on some islands and a newly arrived species of Rubus is spreading at an incredible
rate on San Cristobol. The introduced mammals include goats, pigs, cattle, donkeys, horses, sheep, dogs, cats, ship rats, Norway rats and mice. Goats have been eliminated from several of the smaller islands but an outstanding imperative is to eliminate them from Santiago together with pigs and donkeys. This island of 565 km² was first colonized in the late 18th century by English buccaneers but is now uninhabited. From what I saw of the island, the population of 80 000 or more goats has completely stopped regeneration of the canopy trees, and parts of the island’s summit region are beginning to look like St Helena Island. Several of the rarer plants, some of them endemic to this island only, are down to a few hundred individuals. But the island is without cats or dogs and none of the real problem weeds have established. Thus the potential contribution that a Santiago free of goats and pigs can make to securing the future of the Galapagos biota is enormous.

National Park land in the Galapagos is zoned separately from the agricultural zone where the inhabitants live but the boundaries are not always clear, or always respected. If the human populations continues to grow at its present rate, increasing pressure will be placed on the islands' natural resources. However there is a general realization among the Galapagos Islanders that damage or loss of the islands' natural values will result in damage or loss of their most important source of income: nature tourism. International financial support for conservation in the Galapagos Islands has been considerable, but more is needed if the islands' problems are to be overcome.

Ian Atkinson

ECOLOGICAL NEWS FROM VICTORIA UNIVERSITY

An update on ecological activity in the Botany and Zoology Department at Victoria University of Wellington is long overdue. In fact there has been plenty of activity over the last few months. A few highlights: Four Ph.D. theses have been submitted so far this year, and by our count there are in progress a further 21 theses and Honours projects with substantial ecological content. There are 3 post-doctoral fellows at present in the Zoology Department, 2 of whom are working in a well-publicised project on tuatara biology on Stephens Island. A recent 200-level course called "Biology and Society", designed to analyse various aspects of the ethical questions arising from the rapid pace of developments in contemporary biology, has been well attended and received in its first 2 years. Ross McQueen recently attended an international symposium on Nothofagus in Argentina and then chased di-variating shrubs across a precipitation gradient in Patagonia. Ben Bell has recently established a sound-analysis facility which includes the Uniscan II spectral analyser and sonographic software using the Macintosh computer. Ben also has his hands full as Secretary-General of the 20th International Ornithological Conference, to be held in Christchurch in December 1990.
Perhaps even more significantly, botanists and zoologists are reliably reported to have been observed on several occasions talking to each other. In fact, following a review at the end of 1985, an amalgamation of the Botany, Zoology, Physiology and Biochemistry Departments into a single School of Biology under the chairmanship of Prof. John Wells, is due to take place next year. Latest news, however, is that this is conditional on UGC approval for renovations in the Kirk Building to accommodate the new structure.

Theses submitted in the last year (all Ph.D. except the last) are:

- John Grehan: An evolutionary study of the feeding biology of Anetus virescens larvae (Lepidoptera : Hepialidae).
- Tony Beauchamp: A population study of the weka Gallirallus australis on Kapiti Island, with particular emphasis on its ecology, behaviour and flightless morphology.
- Mary McIntyre: Ecological and behavioural relationships of some native cockroaches (Blattodea : Blattidae).
- Geoff Rogers: Landscape history of the Maowhango Ecological District.
- Susan Triggs (now working at DOC): Genetic variation and management of the brush-tail possum.

Other post-graduate students are as follows:

- Sarah Adams (Ph.D.), ecology of monoao in the central North Island.
- Paul Blaschke (Ph.D.), vegetation and landscape dynamics in eastern Taranaki hill country.
- Graeme Elliott (Ph.D.), breeding biology and habitat use of the yellowhead.
- Stephen Fuller (Ph.D.), vegetation of Kapiti Island.
- Brenda Green (M.Sc.), genetic variation and management of black and pied stilts.
- Lee Gutterson (M.Sc.), life history, feeding and distribution of the New Zealand mole cricket.
- Rod Hitchmough (Ph.D.), systematic review of the New Zealand Gekkonidae, including ecological differences between taxa.
- Fran Hyland (B.Sc. Hons.), forest dynamics of miro in the Akatarawa Ranges.
- Paul Kennedy (Ph.D.), heavy metals in estuarine ecosystems.
- Brian Lloyd (M.Sc.), analysis of the radio-tracking system used to study kakapo on Stewart Island.

- Ian MacDonald and Sean Weaver (D.Sc. Hons.), ecology of kauri forest in northern Viti Levu, Fiji, and regeneration after logging. (They got back before the coup).

- Bill McLea (M.Sc., Geology Dept.), late Quaternary palynology of a site in northwestern Wairarapa.

- Lesley Milicich (Ph.D.), genetics of Bulbinella species in New Zealand.

- Elaine Murphy (Ph.D.), demography of island and mainland mice in the Marlborough Sounds.

- Marie Nonweiler (M.Sc.), activity and time use of the pied stilt at Pauatahanui Inlet.

- Geoff Palmer (M.Sc.), activity and distribution of the black swan on Lake Pounui.

- Geoff Ridley (Ph.D.), phenology and taxonomy of agarics under hard beech forest.

- Kathy Schofield (B.Sc. Hons.), optimal foraging in paddle crabs.

- Jean-Claude Stahl (Ph.D., formerly from France), behavioural response of seabirds to weather in the southern Ocean.

- Peter Weekes (Ph.D.), studies on the biology of some Hippotaenid cestodes.

Mike Thompson (ex Adelaide), and Alison Cree (ex Waikato) are post-doctoral fellows working on various aspects of tuatara ecology, reproductive biology and genetics on Stephens Island. This project, under overall leadership of Charlie Daugherty, has a number of collaborating institutions in Australia and U.S.A. Mike recently reported on this work at the Australian Society of Herpetologists conference in Sydney. Other ongoing staff research includes Ben Bell on the biology of New Zealand frogs and studies of pacific Acrocephalus warblers, Charlie Daugherty on skink taxonomy and geographic variation in the kiwi, and Ross McQueen on Nothofagus in New Zealand and South America. Ross McQueen is also compiling a chapter on New Zealand vegetation for a volume on vegetation of the Pacific Islands edited by Mueller-Dombois and Fosberg.

The interaction between VUW and DOC Conservation Science in the fields of conservation genetics and herpetology among others brings us distant rumblings of a debate between the 'holists' and the 'structuralists' of DOC. We await the outcome with bated breath - but does it mean any more jobs for graduates?

Paul Blaschke
Graeme Elliott
OF MOAS AND MARINE TERRACES

Stimulated by last year's Ecological Society symposium, Ian Payton raised an interesting question as to the origin of the rounded quartz pebbles up in the subalpine scrub of Westland (Newsletter 46, p. 17). Are they relics of beach gravels deposited on marine terraces, moa gizzard stones, or maybe misplaced fluvial gravel?

I don't think the question has been seriously addressed, because earth scientists and life scientists have approached from opposite directions without yet meeting in the middle. Hence the scorn heaped on Ian's head by a soil scientist for mentioning the fanciful moa. This is not good for science, nor for Ian's head, so I'd like to raise the question's profile a little, before it slides back down its inter-disciplinary hole. I'm a geologist with a special interest in marine terraces and more than a passing interest in moas, but I'm not in a position to pursue the question myself.

Horizontal steps at altitudes up to 1700 m on the ridges rising form the Alpine Fault have been claimed to be erosional remnants of marine terraces of the order of 100 000 to 300 000 years old, after Cooper and Bishop's (1979) study in South Westland. Important evidence in support of this claim is the presence of rounded granules and small pebbles of quartz in the peaty soils on the steps. Surface textures of the quartz grains are revealed by scanning electron microscopy to be characteristic of a high energy turbulent subaqueous environment, and are essentially identical to those of quartz grains of the nearby ocean beach today (van der Lingen, 1979).

However, a moa's gizzard could also be described as a high energy turbulent subaqueous environment. Could not these quartz pebbles be moa gizzard stones?

I have patiently discussed the pros and cons of the alternatives that the quartz grains are of marine or moa origin, and how these hypotheses might be tested, with a fourth year geology student studying an area in North Westland. The resulting thesis dismissed the moa hypothesis as lying outside the realm of geology and so not warranting comment or analysis(!) Hence Ian's story of being rubbished struck a chord, or maybe a raw nerve, with me. Earth scientists do indeed tend to regard the moa as a fanciful beast of no geological significance. Bull and Cooper (1986) do not raise the moa hypothesis when reasserting the marine origin of the quartz pebbles in a broader study of the proposed marine terraces covering a 250 km length of Westland.

But geologists have looked for rounded quartz grains only on the ridge steps anticipated to be marine terraces, and they generally find what they seek. To my knowledge, however, no one has described solid masses of quartz-rich gravel or sand from these steps realistically resembling a marine deposit but inconceivably derived from moas. Instead the quartz grains are found sparsely scattered within the "soil" - a predictable product of a few millenia of moas, or possibly the residue of pre-Last Glaciation marine terrace cover deposits after wind deflation, solifluction and normal colluvial slope processes have removed the rest. What of other sites, sufficiently flat to retain any loose deposits for an appreciable
length of time, but where a marine or fluvial origin is implausible or impossible? I haven’t looked in Westland, but in the Dusky Sound area of southern Fiordland I have seen rounded quartz pebbles on glaciated inland ridge crests above the level of any former ice-marginal streams, and on bedrock hillocks on glacial valley floors, where a Holocene (or very late Pleistocene) age is certain, a marine origin is impossible and a fluvial origin highly implausible, but a moa origin is reasonable.

I have collected small rounded quartz pebbles that occur in clusters of a dozen or more within thick Holocene blanket peat at an altitude of 700 m on Swampy Summit, Dunedin. (The setting is similar to Maungatua where Alan Mark showed quartz pebbles to Ian Payton when he was a young lad). These pebbles cannot be residues of the widespread quartz-rich Cretaceous-Tertiary cover overlying schist basement. Quaternary marine and fluvial origins are also impossible, and the clustering is an expected characteristic of moa gizzard stones. Surface textures of these quartz pebbles are the same as those from the West Coast ridge crests (P.C. Angus, pers. comm. 1984).

Clearly there is a reasonable case for moa-rounding of quartz pebbles from some subalpine-alpine settings, but there is a shortage of critical evidence from Westland to allow confident discrimination between the hypotheses there. Careful study of pebble occurrence and non-occurrence with respect to geomorphological setting and soil or regolith stratigraphy should reveal much. There is also much potential for careful study of quartz surface dissolution features to give useful results. The degree of etching should be a function of soil pH and time since deposition, and the different hypotheses of pebble origin yield testable predictions of age characteristics of sets of pebbles within sites, and between sites.

If the quartz pebble evidence is discounted, then it needs to be acknowledged that the published case for a marine origin of the West Coast steps is less than compelling. Resolution of the question is important to geology, as the terraces have the potential to make a major contribution to understanding the Quaternary tectonics of the Alpine Fault, the most important feature in New Zealand. Knowledge of the origin and age of the quartz pebbles is very relevant to studies of rates of soil and landform development in Westland. And if the moa hypothesis can be sustained and abiotic alternatives refuted, there is information on moa distribution and habitat range, and that much more grist to the mill of those who would portray the moas as a major force in New Zealand’s natural history.

It’s an interesting question. The evidence to resolve it needs to be sought and examined with careful regard to scientific method and in a spirit of inter-disciplinary humility.

References:


Chris Ward

NO COMMENT DEPARTMENT

'EXCITING TIME TO BE AN ENVIRONMENTALIST'

The Minister of Finance, Mr Douglas, has made it an exciting time to be an environmentalist and deserves an environmental award, according to the director of the Joint Campaign on Native Forests, Mr Guy Salmon.

Mr Salmon made these comments in the publication, "Environment Meets Economics," released last Friday by the Ministry of the Environment to record a series of public debates held recently.

"Roger Douglas is the unsung hero of New Zealand's natural environment. He has cut off funding for uneconomic clearing of native forests, obtained a firm phaseout period for swamp-drainage subsidies, abolished the Land Development Encouragement Loans Scheme and tax concessions used for land clearance, and by corporatising the State-owned enterprises he is setting up a framework which will curb the building of State-protected 'think big' projects," said Mr Salmon.

"In short, thousands of hectares of native forests, swamps, rivers and wildlife habitats are being saved by the dismantling of the structure of State-sponsored carnage. It is Roger Douglas, more than anyone else, who had made this such an exciting time to be an environmentalist."

Mr Salmon has suggested establishing the Conservation Department as an incorporated society, with membership open to any New Zealand resident supporting its conservation objectives.

This could lead to a more accountable way of striking a balance over resource issues that were in the public interest.

"In spite of the restructuring of the environmental administration system, conflict between bureaucratic resource managers and the conservation-minded citizen is almost inevitable," said Mr Salmon.

"This gap can only be bridged if there is real accountability to conservation-minded New Zealanders."

(Christchurch Press 4.06.1987)
NOTICES

WELLINGTON BOTANICAL SOCIETY BULLETIN

Copies of the April 1987 (bulletin number 43) bulletin are available for $7.00 (+$1 p & p) from:

Susan Timmins
C/- Science Directorate
Department of Conservation
PO Box 10-420
WELLINGTON

There are both articles of regional and national interest:

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WORKING PAPER 3.2 - A NATIONAL EXOTIC FOREST DESCRIPTION UPDATE

The 1986 version of the above database has recently been published by the New Zealand Forestry Council.

This new report includes updated information on the productive exotic forest estate in New Zealand to 1.4.86. It is provided on a county basis, with a further breakdown by species, owner, tending regime, area unroaded and hauler terrain. Histograms are also included.
The cost of this year's update is $16.50 (incl. GST). Copies can be obtained from:

Fiona McGregor
Policy Division
Ministry of Forestry
Private Bag
WELLINGTON

Transactions New Zealand Institute, Vol. XXVII. Pl. XLVII.

MOA FOOTPRINTS