



MP gets to the root of the problem with Royal Society scheme

Find out more on page 3..

CONTENTS

Collaboration in Aberdeen ...page 2

News in brief ...pages 2 & 3

When science and politics meet ...page 3

Science Overview ...pages 4, 5 & 6

- *Agricultural cooperation - a force for environmental improvement?*
- *Nitrogen saturation and the role of Carbon*
- *Prenatal nutrition and its lasting effects in sheep*
- *How close is your nearest Park?*

Out and about with the Institute ...page 7

Macaulay Enterprises - helping the renewable energy industry ...page 8

Forthcoming events ...page 8

*Malcolm Savidge MP helps
Dr Lorna Dawson to investigate
life below ground using 'soil cam'.*

Chief Executive's Introduction

Spring is a time of new beginnings and that is no less true for the Macaulay.

Our new Head of Science, Professor Steve Albon, took up his post at the end of March on the retirement of Professor John Milne, who had worked for the Macaulay/HFRO for 33 years. Steve comes to us from the Centre for Ecology and Hydrology at Banchory, one of the two partner organisations with whom we are developing the concept of the Aberdeen Centre for Environmental Sustainability (ACES), the other being the University of Aberdeen. Scientists from the three organisations have worked together to develop an integrated science plan, the essence of which can be captured in the phrase 'resolving environmental conflicts'.

This phrase implies two important principles of ACES: firstly that the aim is to come up with solutions, not just to undertake academic research, and secondly that the proposed research will involve a partnership between environmental scientists and socio-economists. This partnership is required to resolve conflicts such as those which arise from the multiple demands on "common pool resources" e.g. the need for clean, safe water from rivers which flow through farmland and may also be used for recreational purposes. Similar demands on land may endanger both the sustainability of landscapes, habitats and species and/or their enjoyment by all or some groups. So what can research bring to these conflicts? At the Macaulay we have social scientists who are exploring the values which different stakeholders place on natural resources such as land and clean water. We are also exploring the factors which influence the decisions which managers take about their land, but these conflicts will not be resolved by social science alone.

All three organisations have environmental scientists who are studying the biological processes - seeking to understand, for example, why plants and trees grow successfully in particular locations; by understanding at the molecular level how the different parts of the system - soil microbes, plants and animals and the interactions between them - operate as a whole to generate the landscape which we can see. It is the bringing together of these different levels of understanding which will help to identify how those responsible for decisions relating to resource management can balance the demands of a diverse range of land users, both those living now and those of the future.

Professor Margaret Gill

• News in brief •



Chinchilla Rescue Mission

In January, David Cope (pictured) visited Chile for 10 days to meet with collaborators who are interested in the conservation biology of the long-tailed chinchilla (*Chinchilla lanigera*).

This threatened species was so intensively hunted in the 20th Century for its valuable fur, that it was thought to be extinct. One remnant population was rediscovered in the 1970s, and a reserve was established to protect the last members of the species. Whilst protection has been successful, the numbers have remained low. Unfortunately the habitat in which the chinchillas live is turning into desert, probably as a result of human impacts and climate change. This is likely to be bad for both the chinchillas, and the local human population.

The visit was funded by the Darwin Initiative, under their new pre-project travel grants, the aim of which is to allow British researchers to visit developing countries and talk to potential co-workers about developing a full Darwin Initiative project. The Darwin Initiative is a DEFRA-funded granting body, set up in response to the 1992 Rio Earth Summit convention on biological diversity.

The proposed research will aim to find out whether desertification can be reduced by altering the number of grazing livestock. The project will also investigate the relationship between habitat quality and chinchilla populations, and look at how well chinchilla populations are able to disperse across the landscape.

If the CAP fits...

The Macaulay Institute hosted a workshop at its Hartwood Research Station in December 2003, to stimulate the debate during the Scottish Executive's consultation on Common Agricultural Policy Reform. The 20 participants included local representatives from the agricultural community as well as national representatives from government agencies and NGOs. A second workshop was held at Glensaugh Research Station in April 2004 during the consultation on Good Agricultural and Environmental Condition. Again there was a mix of attendees, including senior figures from SEERAD.

• News in brief •

Soil Dynamics

The institute is developing a model to simulate carbon and nitrogen dynamics in organic soils and predict response of these soils to land use and climate change. This three-year contract is funded by SEERAD and is being co-ordinated by Steve Chapman.

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• Staff News •

Deputy Director Retires

The Macaulay Institute bade farewell to its Deputy Director, Professor John Milne MBE who retired at the end of March 2004 after more than 30 years of service to agricultural research.

John began his career with the Hill Farming Research Organisation (HFRO) in 1970 and by 1982 he had been promoted to Head of Animal Nutrition Department. In 1987, when HFRO merged with the Macaulay Institute for Soil Research and became the Macaulay Land Use Research Institute, he became Head of Animal Production and Nutrition Department. In 1992, he was appointed Deputy Director of the Institute and he became an Honorary Professor at Aberdeen University in 2000.

New Head of Science

Professor Steve Albon joined the Institute in March 2004 to take on the role of Head of Science.

Steve was previously Site Director of the Centre for Ecology and Hydrology in Banchory and his main research interests are in the population ecology of red deer.

Photo: David Riley

Awarding times

Alison Hester has recently been awarded the Founder's Prize from the British Ecological Society. The Prize is awarded to "an outstanding ecologist early in her career who is making a significant contribution to the science of ecology" and will be presented to Alison at the BES Annual Meeting in September.

John Wallace of the Macaulay's Research Station at Sourhope has been awarded a long service medal from the Border Union Agricultural Society. John has been a member of the society for 32 years and was presented with his bronze medal by the Duke of Roxburgh at a lunch held at the Society's showground, Springwood Park, on Friday 19 February.

When Science and Politics meet

Not every scientist has an insight into how the parliamentary process works, but recently, Dr Lorna Dawson was one of a group of scientists and MPs brought together under the Royal Society's 'pairing' scheme. Lorna was paired with Malcolm Savidge, the MP for Aberdeen North, and visited Westminster for a week to 'shadow' Malcolm, who sits on the Commons Environmental Audit Select Committee.

"Most MPs seem to 'live their job', not dissimilar to many scientists with whom I work. Both groups also share a common aim, in working for a better world with the best available information." commented Lorna afterwards. "From my visit it is clear that scientists can help the political process and our MPs, by improving our methods of communication and highlighting key issues to support policy development."

In addition to the exchange visits a system of networks has been established, within the scientist group and between the scientists and the MPs involved. Lorna added, "with many scientists at the Macaulay Institute currently undertaking policy relevant research, it was an opportunity to better understand the link between scientific advice and the policy making process."



Malcolm also visited the Institute to learn more about our work, spending time in the laboratories as well as meeting with other staff to find out the diversity of our research.

Photo: David Riley

Science overview

There is a huge variety of research within the Institute; here is an insight into a few of the projects that we have been involved with recently:

Agricultural cooperation - a force for environmental improvement?

A new project within the Socio-Economics Research Programme has been investigating the scope for more cooperative working between farmers on environmental issues.

The project, entitled 'Challenges in Creating Local Agri-Environment Cooperation Action amongst Farmers and Other Stakeholders', is funded under the Scottish Executive's Flexible Fund research programme and focuses on the three key environmental issues of biodiversity, diffuse pollution and landscape change.

Cooperation between farmers already occurs in commercial marketing groups and machinery rings, where the benefits of cooperation - primarily reducing costs and strengthening competitiveness - are well recognised. Environmental cooperation could also deliver important benefits, such as managing for rare species at a landscape rather than individual farm scale, but the opportunities and incentives for farmers to adopt these cooperative approaches are much less well developed. Although the government's main agri-environmental scheme is being adapted to encourage more cooperative applications, there is still a lack of knowledge about how best to encourage management across farm boundaries.

We have built a database of relevant initiatives within Scotland

ranging from large regional organisations like the Tweed Forum and Southern Uplands Partnership, to local initiatives where small groups of farmers cooperate to solve specific problems. Often government agencies such as Scottish Natural Heritage (SNH) and Scottish Environment Protection Agency (SEPA) play a leading role in encouraging cooperation between land managers, and perhaps the greatest challenges lie in finding effective ways of stimulating initiatives at a more grass roots level.

We have also undertaken a set of case studies in the Borders, Perthshire, Grampian and the Highlands to explore what contributes to the relative success and failure of cooperative projects, and how inter-farm cooperation can be encouraged. We have reviewed some examples of cooperative initiatives in other parts of the UK and internationally, and we are due to report back soon on possible ways forward for stimulating cooperative environmental approaches in the future.

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Nitrogen saturation and the role of carbon

The recently completed GANE (Global Atmospheric Nitrogen Enrichment) project has been assessing the impacts of pollution on water in the environment. As part of this work, a model was developed which has generated hypothetical relationships between the carbon and nitrogen properties of soils and their effects on nitrate levels in water. The results strongly indicate that nitrogen saturation is a genuine, widespread problem affecting semi-natural ecosystems that are subject to elevated nitrogen deposition.

The findings also demonstrate that the amount of carbon available in the soil is critical in determining soil sensitivity to nitrogen deposition, and this so-called 'carbon pool' must be accurately quantified in order to predict the timescale, extent and severity of global nitrogen enrichment.

The concept of 'nitrogen saturation' was first proposed in the 1980s and suggests that enhanced atmospheric deposition of inorganic nitrogen will damage semi-natural terrestrial ecosystems through widespread, cumulative nutrient enrichment. Nitrate leaching from nitrogen-saturated soils may, as a result, cause surface water eutrophication and acidification.

The absence of observed increases in nitrate leaching in many regions with a history of atmospheric deposition suggests that nitrogen saturation occurs over long and uncertain time-scales. Evidence of nitrogen saturation has been inferred by comparing different locations, rather than changes in one place over time. Even this evidence is

limited by the fact that catchments experiencing similar nitrogen deposition appear to show different levels of nitrogen leaching.

The project was a national initiative funded by the Natural Environment Research Council (NERC) and involved several regions in the UK including the Mourne Mountains of Northern Ireland, the Galloway region of South west Scotland, the Pennines in Northern England and the Snowdonia region of North Wales. The work also links to European initiatives aimed at tackling the issue of nutrient enrichment in sensitive mountain ecosystems.

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Prenatal nutrition and its lasting effects

Extensive husbandry systems often include periods of low food supply (e.g. winter), which may coincide with pregnancy. It is often assumed that undernutrition during early pregnancy is unimportant because the nutrient demands of the foetus are very small and any reduction in foetal growth at this time can be compensated later in development, either before or after birth, when food is more abundant.

A normal birth weight has generally been thought to indicate normal development. Results of recently published research at the Macaulay Institute indicate that this may not be the case: a normal birth weight can mask underlying changes to the reproductive organs, and to the structure and function of the brain. These changes may have significant implications for the animal's future health and productivity.

Previous studies at The Macaulay Institute have shown that prenatal undernutrition of sheep during the first two thirds of pregnancy, followed by normal levels of nutrition in the last third, resulted in lambs with a normal birthweight. However, when adult, the female offspring were shown to produce fewer ova and so were likely to produce fewer lambs.

More recent studies of the behaviour of the offspring showed that they exhibited greater emotional reactivity (i.e. they were more nervous) and reduced behavioural flexibility (i.e. difficulty in changing a routine once learned). Emotional reactivity has implications for handling of domestic species with nervous animals being more difficult to handle, potentially impacting on both human and animal welfare. This may be particularly important in extensive management systems where animals do not get used to being

handled because it happens infrequently. Similarly, in wild species, increased emotional reactivity may be associated with increased stress and susceptibility to disturbance. A lack of behavioural flexibility may make animals less adaptable to changing environmental conditions. It is important to note that the observed behavioural changes indicate that brain structure and/or function have been fundamentally altered by prenatal environment, which means that they are not easily reversible, if at all.

“...a normal birth weight has generally been thought to indicate normal development - this may not be the case...”

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Science overview

How close is your nearest park?

"Greenspaces" within many European towns and cities play a number of different roles. They provide recreational resources, a medium for social interaction, play areas, reserves for urban wildlife and can be aesthetically pleasing backdrops to built development. However, they are often a legacy of earlier decades and in relatively few cities has the planning of urban squares, parks, green corridors and urban nature reserves been approached in a comprehensive manner.

The Macaulay Institute (with the collaborators mentioned below) has been involved in a European Commission funded project, to develop computer based Decision Support Tools to understand how greenspace and amenity areas contribute to quality of life, and address questions on how people use greenspace and the values with which it is associated.

As a case study in the development of the tools a database was compiled with the help of Aberdeen City Council. This contains information about greenspaces in and around Aberdeen, and includes features such as their size, function and resources (i.e. neighbourhood, local or city parks, nature reserves and forests).

These Decision Support Tools have been used to determine areas of housing that are excluded from easy

access to greenspaces equipped with particular facilities (e.g. children's play facilities). This used a calculation of travel distance (by car or on foot) from every address to every type of greenspace, and a comparison with accessibility by public transport. An analysis of the outputs is being used to evaluate details of policies, to ensure that future provision of quality greenspaces is socially inclusive, as required by Scottish Executive Planning Guidelines (e.g. Planning Advice Note 65 on Open Spaces).

Decision Support Tools like this can be used by planners to explore and evaluate policy options, and combined with other sources of information to feed into policy development. Such tools are designed to be used as part of a process, which includes public involvement, seeking to enable more informed decisions to be made.

The greenspaces project was undertaken in collaboration with the Robert Gordon University, the Technical University of Eindhoven, ETH Zurich, University College Dublin, University of Surrey, University of Brighton and Aberdeen City Council.

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Photo: Jane Morrice

Out & About with the Institute



Sourhope Dialogue Day, September 2003

Visitors to our Sourhope Research Station in the Borders are pictured here admiring Bowmont Sheep, (named after the Bowmont Valley in which Sourhope lies).

Photo: Chris York



Techfest, September 2003

We had two displays at Aberdeen's annual science and technology festival in 2003. "Keeping Scotland Healthy" was a collaborative exhibition with the Scottish Crop Research Institute and the Rowett Research Institute in which we showed the importance of healthy soil for plants, people and animals. Our second exhibit was based on a project led by Professor David Miller, Visulands, looking at modelling European landscapes.

Photo: Jane Lund

Edinburgh International Science Festival April 2004

The Institute devised a new exhibition for this year's Festival, themed around 'Future Countrysides'. We used this as an opportunity to engage with the public - asking for people's opinions on wind turbines in the landscape, and other possible future changes to the countryside. Over 10,000 people visited the exhibition over the 12 days of the Festival.



Photo: Jane Lund

Macaulay Lecture, October 2003

Mrs Karen De Segundo, Shell Renewables, Chief Officer, gave the 27th T B Macaulay lecture entitled "A Renewable Energy Future? Challenges and Opportunities" which was followed by a Discussion Forum on "Renewable Energy: Threat or Opportunity to Rural Communities?"

Panel members were:

Mrs Karen De Segundo, Mr John Price, AMEC Wind Energy, Margaret Gill (Chair), Macaulay Institute, Dick Birnie, Macaulay Institute and Drew Ratter, Shetland Islands Council

Photo: David Riley



Scottish Root Group Meeting, November 2003

Katariina Vaisanen is pictured receiving first prize from Bryan Griffiths (SCRI), for her poster in the Scottish Root Group meeting. The prize was given by the British Society of Soil Science for the best student poster at the meeting.

Photo: David Riley



New Directions in Research in Grazing Ecology, December 2003

A day of seminars looking at research opportunities in Grazing Ecology was hosted at the Macaulay Institute to celebrate the contributions of Prof John Milne (centre right) and Prof Iain Gordon (centre left) who have both recently left the Institute.

Photo: David Riley

Macaulay Enterprises helping the renewable energy industry

*Photo montage of a proposed offshore wind farm, Aberdeen.
David Riley/Jonathon Ball*

Macaulay Enterprises Limited (MEL), the new commercialisation company of The Macaulay Institute, is building on the work done by Institute staff to expand its work in the Renewable Energy Sector.

Originally working for statutory agencies such as Scottish Natural Heritage and the Countryside Commission for Wales, MEL now provides consultancy on most aspects of the Environmental Impact Assessments for project developers as well as local authority planning departments.

MEL's strongest discipline is in the assessment and demonstration of the visual impact of proposed projects. Historically, conventional "wire frame" models and two dimensional photomontages have been used at planning enquiries and public consultations. MEL is now the leader in this field and is helping to redefine how these visualisations are portrayed. We can now create 3-Dimensional highly realistic models that use a blend of geographical data and photography, to allow members of the public and developers ascertain what the wind turbines will look like from any chosen location. It is then possible to construct "drive-throughs" along predetermined routes to give an impression of what a development might look like from, say, a nearby road. In



Image supplied by David Miller.

addition to this we are also revolutionising how photomontages are created by now using video clips and sound to generate a more realistic interpretation of a wind farm.

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EVENTS

DATE	EVENT
23 June	3rd Annual SABRI Lecture, Bonar Hall, Dundee to be given by Prof M S Swaminathan
26 October	28th Annual T B Macaulay Lecture, to be given by Prof Brian Walker of CSIRO, Australia "Seeking sustainability in a complex world - managing for resilience"

**For more information about forthcoming events please contact
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