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THE MACAULAY INSTITUTE
research today for land use tomorrow

Newsletter

Achieving Scientific Excellence

DIRECTOR'S INTRODUCTION

Publicly-funded research institutes are distinctive organisations in the research sector. They are more 'mission-orientated' than universities, yet unlike the research departments of private companies, that mission is not primarily about profit for the organisation itself, but about contributing to the health of the national economy and/or to the 'public good'. The Macaulay Institute's mission statement is: *'To be an international leader in research on the management of rural land resources for the benefit of people and the environment'*. Thus, we clearly have a dual role of generating a sound scientific base for land management and contributing to an improved quality of life, primarily of the Scottish people.

'To be an *international* leader in research on the management of rural land resources for the benefit of people and the environment'

In delivering this mission, we have a commitment to scientific excellence and in the scientific world, 'excellence' is judged in terms of having an international reputation. In this issue of our bi-annual Newsletter, we highlight some of the evidence of this for the Macaulay, in relation to the work we are doing with international partners. Through building up trusted partnerships with high quality research groups overseas, not only do we become aware of new methods and knowledge at an early stage in their development, but international partnerships also give us the opportunity to test our ideas and hypotheses in a broader range of circumstances.

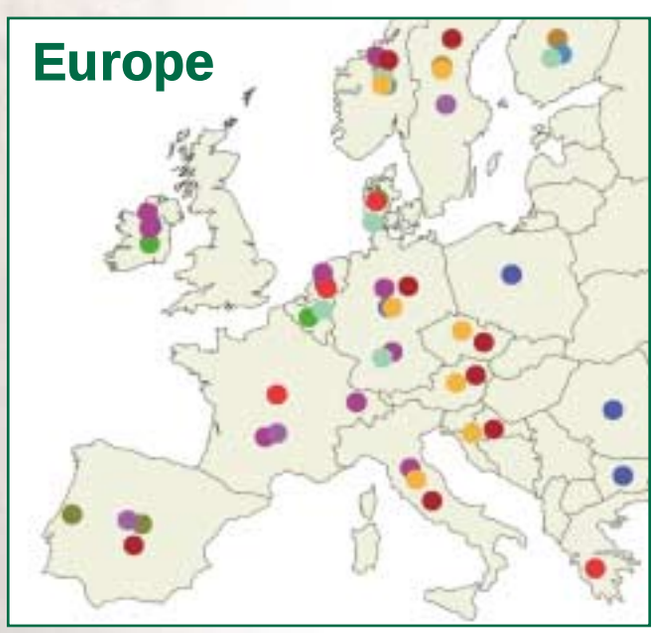
Four projects with European collaborators are highlighted in the following pages, out of the 32 currently ongoing. These projects with European collaborators not only facilitate collaboration with groups of high scientific standing in other European countries, but also bring in funding from the European Commission to support local employment. Over the past 5 years we have averaged over £400,000 per year of income from the European Commission.

We also have to look beyond Europe, to groups with facilities which enable us to conduct experiments which we would not be able to do at the Macaulay Institute. One of our plant scientists is currently working in Canada, running field experiments which could not be conducted in the UK. Two other colleagues are heading to Australia later in the year and will be coming back with new methods and new ideas to apply to Scottish problems. Each of these visits has again been facilitated by funding from overseas.

International collaboration is not initiated, however, at the expense of collaboration within the UK. We currently have joint projects with 18 University departments and 9 research organisations in the UK. Part of this collaboration involves the sharing of facilities and/or data. Whilst we welcome collaboration with other researchers on the use of our soils data, we also recognise the national importance of these datasets. We have therefore revised our data leasing policy, as explained on page 3, to make them more freely available to some categories of user.

Finally, while we have been successful in securing funds from overseas, the majority of our income still comes from the Scottish Executive. I was therefore delighted to be invited to join the Scottish Science Advisory Committee and look forward to participating in what I am sure will be a lively debate on key issues for the future of science in Scotland

Margaret Gill, *Director*



Sites in Europe with which Macaulay Institute has collaboration funded by the European Commission.

The Benefits of working overseas

A number of Macaulay scientists have spent extended periods overseas in recent years. What is the benefit of such visits to the research programme of the Institute? Three scientists travelling overseas during 2002 give their views:

Professor Pete Millard

For the past eight years I have been collaborating in my research on tree ecophysiology with a group at the Pacific Agri-Food Research Centre (PARC) in British Columbia, Canada. The Centre is in the Oakanagon valley in the interior of BC, which is the main fruit growing area of Canada. The climate is very dry and the soils poor, so no crops grow without irrigation. This has meant that the agricultural industry in the area has developed methods of precision agriculture. In the orchards irrigation and fertilisation are combined to deliver precise doses of nutrients to individual trees. In this way the concentration of nutrients available to the trees in the soil solution can be controlled very precisely, both spatially and temporally.

What is precision agriculture to the grower, is a tremendous experimental tool to me. It is possible to run experiments, for example looking at the timing of N supply on tree development, on mature trees growing in soil with the precision that back in Scotland I could only achieve in a greenhouse experiment, using juvenile trees. So the opportunity to spend time working in Canada will give me a chance to develop my research further at the field scale. At the same time I will have opportunities for technology transfer by interacting with the Washington State Tree Fruit Research Commission (who are funding my trip). Finally, the PARC has a good team of soil scientists, microbiologists and agronomists on one hand, and molecular biologists on the other. My interests bridge the gap between the two.

Dr Alan Duncan

My own experience is that sabbaticals are an important means of enhancing our international research profile, developing collaborative links and stimulating ideas. In 1992 I had the opportunity to spend six months at the Institut National de la Recherche Agronomique in Paris. I used this time to develop new methods of studying the digestion of glucosinolates, a group of plant defence chemicals found in Brassica species. The collaborative links developed during those six months led to subsequent involvement in a European research consortium which successfully secured signficant funds from the European Commission. The sabbatical also fuelled an avenue of research on glucosinolate metabolism which continues to the present.

Four years later, in 1996, I spent a month visiting research institutions in Pakistan and India. A number of collaborative links were established, most notably with the Aga Khan Rural Support Programme, a development NGO based in the Karakoram Region of Pakistan. Again, the links established in 1996 have led to a major

Dr Alan Duncan (second from right) and his colleagues in Pakistan

multi-lateral programme of research on livestock systems in Northern Pakistan, co-ordinated by Institute scientists. There are exciting possibilities for further research in that part of the world.

In October of this year, I plan to embark on a six-month visit to the Australian National University in Canberra. I will be collaborating with Professor Bill Foley conducting research on diet selection in relation to genetic variation in the ability of possums to detoxify plant toxins found in Eucalypts. My hope is that I can use the techniques and principles we develop in Australia to apply to our continuing programme of research on upland herbivores in the UK. Such cross-fertilisation of ideas is essential to maintaining a lively and relevant programme of research back home as well maintaining our international reputation and attracting external funds for further research.

Dr Glenn Iason

If an overseas visit is planned and used wisely, it can be of considerable benefit to our own research programme. Firstly, evading the everyday routine tasks and pressures of work and home, permit time to pick up a blank sheet of paper and 'think out of the box'. This process, combined with stimulation from new colleagues, facing a different suite of scientific problems in different environments, should allow development of new ideas and directions, and application of new approaches and techniques to our research. I was recently awarded a visiting scientist grant from the Coordinated Research Centre for Sustainable Production Forestry, Hobart, Tasmania, which is why I was asked to write this article! During my visit I shall be presenting seminars on our own work, conducting a research project, and supervising graduate students studying the diet diversity of brushtail possums. Although cute to look at, they are voracious forest pests. Their nutritional ecology is well understood, and provides a model system, in which to study problems of relevance to all mammalian forest herbivores, including our own.

Why did I ask to spend a few months in Australia? The obvious answer could have something to do with sunshine, beaches, amazing wildlife and tannin-rich red wines. But I am sure there will be more lasting benefits than those!

Analytical Services

Specialist expertise for industry

Publicly funded scientific organisations are being increasingly encouraged by their sponsors to maximise commercial gain through the exploitation of research activities and intellectual property rights, and use of facilities. The analytical facilities used in support of core-funded work are also deployed by Macaulay Analytical Services, a Sector of Macaulay Research Consultancy Services Ltd, to generate income from commercial sources. The initial decision to sell analytical services was facilitated by the requirement of the local oil and gas industry to out-source specialised analyses. The facilities and expertise available at the Institute meant that it was possible to service that requirement and the oil and gas sector has been and remains the major client base. Rather than provide a service which is based on high volume and low profit, it has been the policy to concentrate on work which relates to helping solve problems within the oil industry and this has resulted in a number of research and development projects sponsored by oil companies. Analytical work and projects are derived from both local and international sources. This approach has resulted in the income of the business growing to about £300K in the current financial year.

For any business to be sustainable, it is essential that there is diversification of sectors which are being serviced. In this context, work is derived from a number of areas which includes local authorities, who require analytical data to determine the efficiency of strategies to dispose of waste materials, and to identify and make a register of contaminated land. Because of the specialised techniques which Macaulay Analytical Services can provide, there is an increasing demand from other publicly funded bodies and University Departments. In addition, work is carried out for food companies, independent consultants, horticulturalists and manufacturing industries.

The selling of services depends on a number of factors which include good dialogue with clients to ensure their needs are met (the customer is always right!), value for money and not least quality. With regard to the latter, the accreditation of the analytical facilities to ISO 17025 quality assurance standards has undoubtedly been a significant factor in attracting business.

For further information, please contact Alistair Smith, a.smith@macaulay.ac.uk.

Determination of Radiogenic Isotopes in Rocks using Thermal Ionisation Mass Spectrometry

New policy for soils data

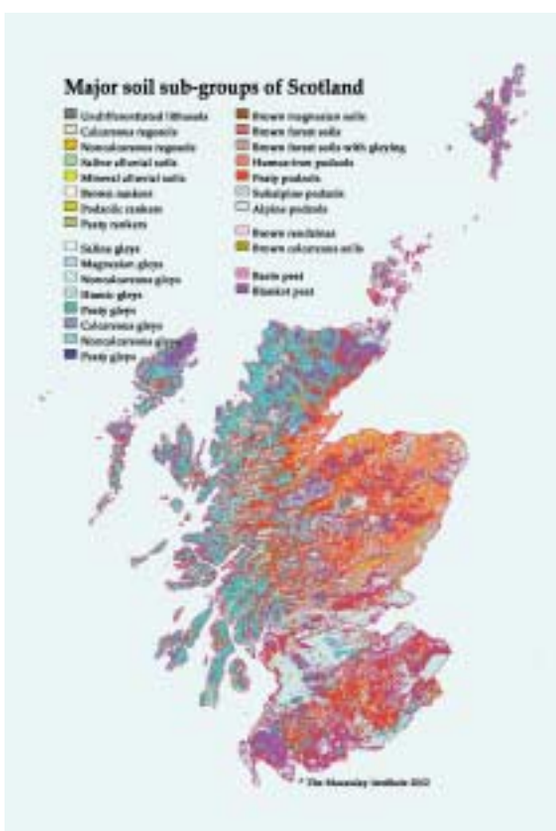
The Institute has revised its policy in order to make the soils data for Scotland that it holds more widely available to the education and research communities.

To encourage the educational use of soils information, the soils map at the 1:250,000 scale, showing the major soil sub-groups will be available free of charge in digital format. It is planned to facilitate this through an internet- and CD-based package, called Exploring Scotland, which will provide such information in an interesting and educational manner.

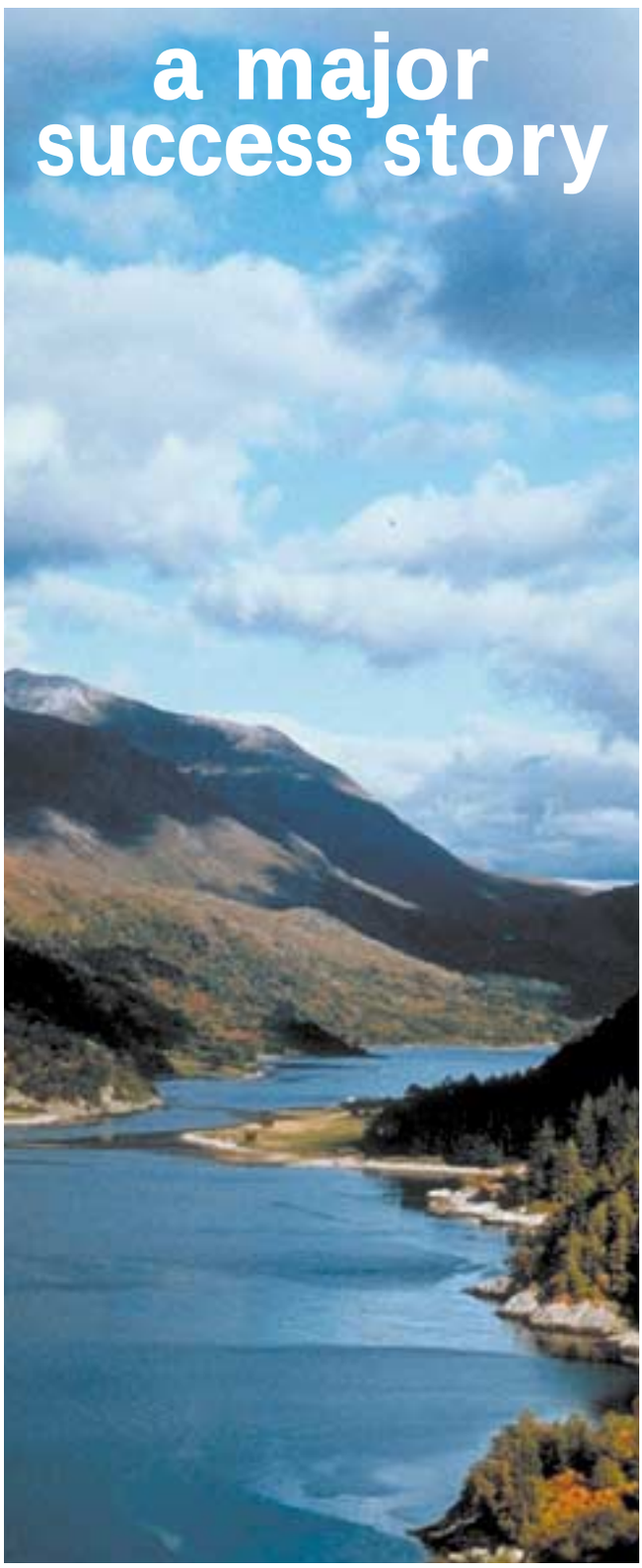
At the 1:250,000 scale, more detailed digital data at the Soil Map Unit level will be made available to postgraduate students subject to only a handling charge and up to a certain areal extent. The same data sets will also be provided to researchers, funded by the UK government and its Research Councils, or the Scottish Executive and its agencies, subject to a handling charge, or, if the research is done in collaboration with scientists at the Institute, free of charge.

The Institute also holds data for soils in parts of Scotland at the 1:25, 000, 1:50,000 and 1:63630 scales. These data require considerable interpretation to obtain the maximum benefit from their use. The Institute will be pleased to provide such data, tailored to meet the individual needs of researchers and others, at normal commercial rates.

Those interested in licensing soils data from the Institute should contact Ann Malcolm: a.malcolm@macaulay.ac.uk



EU funding for collaborative research



Over the last five years the Institute has been involved in over 32 EU-funded projects, which together have been worth over 4,000,000 euros. Below we describe four new projects which taken together are worth over 800,000 euros and which involve a wide range of institute research expertise including soil microbial diversity, water quality modelling, socio-economics and grazing ecology.

Restoring peatlands

A new three-year project which aims to increase our ability to restore peatlands is being funded jointly by the European Commission and the Swiss government under Framework V to a total value of 2.0 million euros. It will involve 10 partners based in France, Switzerland, Germany, Finland and Scotland and will be co-ordinated from the Macaulay Institute by Dr Steve Chapman.

RECIPE (Reconciling Commercial Exploitation of Peat with Biodiversity in Peatland Ecosystems) is designed to provide information to assist conservationists and managers of peat extraction with options to restore peat accumulation and carbon (C) sequestration in peatland that has either been abandoned or designated for restoration. The objectives will identify combinations of water table, vegetation, microbiology and chemistry favourable to the re-establishment of peatland biodiversity and long term regeneration. Emphasis will be placed on understanding the relationship between the development of microbial diversity and the processes governing C cycling. By achieving these objectives in the context of current management practices, RECIPE will provide guidelines for sustainable management that will reconcile peat use with the maintenance of biodiversity. A socio-economic appraisal will show the value of both limited peat utilization in rural areas dependant upon this industry and the need for restoration of these unique habitats. **Contact: Dr Steve Chapman: s.chapman@macaulay.ac.uk**

Developing methods of consulting the public over complex environmental and scientific issues

This is a Thematic Network co-ordinated by Professor Clive Spash, Head of the Socio-Economic Research Programme at the institute. CIVICS (Consultative Institutions: Values and Information in a Changing Scoety) is concerned with methods for the assessment of socially and ethically acceptable technologies capable of improving the quality of human life. The focus is on the use of genetically modified organisms

(GMOs) in the production of food. The network aim is to find mechanisms for the effective communication of the uncertainty and risk inherent in the use of GMOs to meet the needs of the public both as consumers of technologically intensive goods and citizens concerned with the welfare of the environment and future generations.

The project will involve seven partner institutions from five European countries including Germany, Spain, Norway, France and Italy. This 15-month project started in January 2002 and is funded by the EC under their Quality of Life and Management of Living Resources Programme.

The current state of the debate over the implementation of GMOs across Europe is being explored by the interdisciplinary project partners and relevant parties from industry and non-governmental organisations. Three workshops will be held to discuss issues pertaining to the synthesis of methodologies for analysing attitudes and values, discourses, institutions and implementing deliberative processes across participating countries in the EU and elsewhere. **Contact: Professor Clive Spash, c.spash@macaulay.ac.uk or Claudia Carter, c.carter@macaulay.ac.uk**

Developing a 'Toolbox' for the Water Framework Directive

The Institute has been successful within an eight Institute consortium to attract funding of 4.7milllion euros to help underpin the implementation of the Water Framework Directive throughout Europe. The main objective of the project is to establish a set of biogeochemical, socio-economic and systems analytical criteria to assess the appropriateness of integrated models for use in the implementation of the Directive. The project also aims to test and demonstrate the use of models at selected river basins throughout Europe differing in their ecotype, land-use, pollution activities and problems, in order to answer questions relevant for the implementation of the Directive. Concurrently, it aims to provide an internet-based "Toolbox" for the dissemination of information, models and approaches for use by stakeholders, resource and catchment managers.

The Catchment Management Research Programme at the Institute is taking the lead in co-ordinating modelling of the movement of diffuse pollutants from land to water, while the Socio-Economic Research Programme will undertake the evaluation of cost-effectiveness models and how they can be utilised within the Directive. The project will consider all water body types including urban waters, rivers, lakes, groundwaters, wetlands and estuarine waters, and involves collaborators from Finland, Norway, France, the Netherlands, Spain and the UK.

Contact: Dr Bob Ferrier, r.ferrier@macaulay.ac.uk

Developing farming systems for endangered South American Vicuna for luxury fibre

The Institute is co-ordinating a major project to develop methods for the management of the endangered South American vicuña. The aim is to enable local communities to harvest its highly valued fleece with minimum disturbance to the animals. Funded by the European Community, the project involves collaborative programmes between research teams in four South American countries and five leading research organisations in Europe. The project will last for four years and will cost £600,000. Johnstons of Elgin Ltd, a leading quality textile manufacturer in the North East of Scotland, will provide advice to the project on the market potential for vicuña fibre.

The vicuña is a South American camelid which inhabits high regions of the Andes at altitudes between 3,500-5,000 metres. It is highly valued for its fleece and in the past vicuña were hunted almost to extinction. Today, after a period of total protection, the vicuña population has made a good recovery and Peru, Argentina, Chile and Bolivia are permitting local communities once more to harvest the fleeces. There are several different types of management system being used. In Peru, where the Government has passed ownership of the vicuña to the local communities, large stretches of fencing have been erected to create what are effectively large ranches. Another system of management is called 'wild capture' and this involves herding large groups of vicuña into corrals.

If scientific information is not provided to guide the management of this endangered species, then the population is likely to start to fall again. For instance, intensive systems of management prevent the males from moving around and this will adversely affect the genetic make-up of the vicuna in the long run. On the other hand, potentially the 'wild capture' system causes the animals a great deal of stress.

This is a unique project as it offers a real opportunity to demonstrate how endangered wildlife species can be managed by local communities to produce a high-value product for the economic benefit of local communities.

Contact: Professor Iain Gordon, i.gordon@macaulay.ac.uk or Mr Jerry Laker, j.laker@macaulay.ac.uk, www.macaulay.ac.uk/macs/

A vicuña in the Chilean altiplano

Agriculture and the Environment — the contribution of European research

regarding reduction, regulation and control of the environmental impacts of agriculture

The Scottish Executive, in the document *A Forward Strategy for Scottish Agriculture*, made a commitment "to examine the environmental issues which will impact on farming and food processing businesses over the next 5-10 years". The SEERAD-sponsored Agriculture and Environment Working Group (AEWG), set up under the chairmanship of Professor T.J. Maxwell, subsequently identified the need for a review of recent UK and European research relevant to agriculture and the environment. After competitive tendering, a team of experts from the Macaulay Institute and the NERC Centre for Ecology and Hydrology were selected by SEERAD to undertake this review.

The review was concerned with recent research. Specifically those findings that could contribute to practical, cost-effective solutions in agricultural management, particularly those that enhance environmental benefits or reduce negative environmental impacts. The Review covered the following specific issues:

- soil physical damage
- hydrological effects
- accelerated loss of nutrients
- herbicides and pesticides
- faecal pathogens
- habitats and biodiversity
- non-indigenous species
- landscape level effects
- climate change
- delivery mechanisms

The final report presents summary statements, critical commentaries and selected bibliographies on each issue. A set of fact sheets has also been produced. These summarise the problems and the potential impacts, and identify those areas of Scotland that are most at risk, together with descriptions of practical management solutions that are available.

The review identified gaps in our knowledge about the environmental impacts of agriculture and raises issues about the low standard of environmental management that appears to be practised by many Scottish farmers. Whilst education and advice will be important factors in improving the latter, consideration also needs to be given to the problem of mismatch between the scale of agricultural management and the scale that environmental issues need to be dealt with. Because many of the environmental impacts interact and tend to propagate to the catchment or landscape scales, it would appear sensible to develop approaches to managing them at these scales. The review concluded that an approach to environmental management based upon clusters of farms rather than individual farms might be most appropriate.

Contact Dr Dick Birnie r.birnie@macaulay.ac.uk

A group photo of all participants outside the conference centre where it was held.

Local biodiversity management in protected areas

A Workshop in Bulgaria

This workshop was held in Bulgaria in the Vitosha Nature Park, near Sofia. The workshop aim was to provide a forum to discuss how local economic development and biodiversity conservation can be linked, to advance innovative, self-funding conservation, such as eco-tourism and eco-farming. The main source of funding for conservation in Bulgaria is a cash-limited centralised agency, and in this regard Bulgaria has much in common with other countries in Central and East Europe and with developing countries. Representatives were present from every nature and national park in Bulgaria and from a wide range of governmental and non-governmental organisations locally, including World Wildlife Fund, US AID, the United Nations Development Programme and local tourist agencies. In addition, guest speakers were from universities in Norway, Italy and the UK, the Triglav National Park in Slovenia, Scottish Natural Heritage and the Macaulay Institute. The Institute organised and sponsored the event.

Some of the workshop participants at the Vitosha Nature Park visitor centre

The subjects discussed included: examples of integrated conservation-development projects from around the world; best institutional structures to advance these; how to address local conflicts of interest; and how to attract external funding for conservation. It was agreed that Bulgaria possesses great natural resources. Bulgaria also lacks certain critical institutional resources necessary for successful conservation, such as effective land markets, nationally co-ordinated nature promotion and incentives for local protected area administrators. The workshop participants framed solutions to these issues in terms of three major conservation project proposals, to be part self-funded and part utilising external funding opportunities. Regarding the latter, the European Union is particularly committed to raising institutional capacity in Eastern Europe.

The Scottish Science Advisory Committee with Professor Margaret Gill, Director, Macaulay Institute, pictured, seated far left, on the occasion of their first meeting.

Photo: Gary Doak, Courtesy of the Scottish Science Advisory Committee

RSE/SABRI First Joint Regional Lecture, 26 April

Professor Roy Anderson, FRS, Imperial College, London, gave the first joint regional lecture of the Royal Society of Edinburgh and the Scottish Agricultural and Biological Research Institutes, hosted at the Macaulay Institute.

Photo gallery

SABRI Postgraduate Day, 26 May

Vjera Magdalenic (centre of photograph) from the Moredun Institute is congratulated by her fellow students from the Scottish Agricultural and Biological Research Institutes on winning the SABRI Directors' prize for best presentation.

Dr Miller's Countryside Change Toolkit, Ythan Project, March

We took our interactive computer programme to the Ythan Project Fun Day in March. The Toolkit uses animated sequences and embedded video clips to introduce children and the general public to the techniques and models we have used to investigate the options and impacts of countryside change, at the new Ocean Lab in Newburgh.

Glensaugh Research Station, February

We were delighted to welcome guests including local councillors, MPs, MSPs, NFUS members, members of our Board of Governors and neighbours to our Research Station in the eastern end of the Grampian Mountains.

Donald Barrie, Farm Manager, speaks to colleagues and guests.

For further information contact Jane Lund, Events Manager, The Macaulay Institute, Craigiebuckler, Aberdeen AB15 8QH. Tel. 01224 498200, Fax. 01224 311556, email: enq@macaulay.ac.uk, http://www.macaulay.ac.uk/.