



Welcome to the  
Autumn 2007 issue  
of in-land.

As usual we've included a  
broad range of our recent  
projects, activities and  
achievements.



On first reading, it struck me how these articles exemplify the three core themes that underpin our work.

First, is our high quality science which centres on research into land use and its many facets, both environmental and social. With a particular focus on sustainable development, we are especially concerned with the understanding and managing of change in environmental and social systems.

Specific projects address the key environmental qualities of water, soil, and biodiversity, as well as the social and economic systems sustaining our communities. Like many research organisations, we have prioritised our areas of work in light of the very real threat of climate change - but unlike many of our peers, we carry out that research at the very interface of society with its environment.

Our science helps to understand how communities and landscapes work, whether they work well, why they change and how they can best be managed.

By way of examples, this newsletter describes some of this science in our work on soil function ([Back to the future, p11](#)), the impact of grazing animals on upland habitats ([Grazing the surface, p7](#)), and the sustainability of Scotland's rural environment ([Scientists seeking sustainable Scotland, p 5](#)).



Second, is our commitment to communicating our scientific results and evidence to the broadest range of audiences - be they scientific, policy, management, or public.

Examples in this issue include the Scottish Government ([An Absorbing Read, p12](#)), and Cairngorms National Park Authority and Aberdeenshire Council ([Sizing up CO2 emissions, p6](#)). We also use a variety of mechanisms and media to communicate these messages, including television ([Institute on the Menu for TV dinner, p14](#)), the internet ([Web brings flooding into the home, p13](#)), public events ([Nature is the best defence, p 15](#)), and film ([Get the picture, p4](#)).

Our educational exhibits such as that featuring the characters 'Dr O. R. Ganic' and 'Sandy' produced for the Royal Highland Show held in Edinburgh in June have proved very popular - firing the imagination of visitors old and young alike.

The '[Dirt Doctors](#)' ([p.8](#)) refers to the name by which the staff of the Macaulay Institute were known locally in Aberdeen from the 1930s onwards - a name that even today recognises the importance of science in understanding soil health, and that soils significantly contribute to Scotland's economy and environment.

Third, is the global reach and international relevance of our science and collaboration.

We have projects and collaborators worldwide, including in the Annapurna region of Nepal ([Seven weeks near Tibet, p18](#)) and the Mara River Catchment in Kenya and Tanzania ([Eau sans frontières, p15](#)). The work of the Ørskov foundation ([New Ørskov grants, p12](#)) is also internationally focused with both individual and community projects in poor rural communities across the world.

Managing land and landscapes to achieve sustainable communities and environments requires a sound understanding of the social, economic, environmental and other changes we face.

Such changes are increasingly global in scale but with effects that are felt locally. Understanding these local effects and consequences is an important aspect of our research and we have developed important collaborations to provide the vital underpinning science that addresses local political, social and environmental issues in Scotland and elsewhere.

I hope you enjoy reading about these recent highlights. Many other examples of our work can be found on the Institute website and we are, of course, always pleased to hear from you directly.

Best wishes,

*Richard*

Professor Richard Aspinall  
Chief Executive





**Get the picture?**

A NEW film showing how the public can become more involved in the planning process has met with rave reviews.

Putting People in the Planning Picture was produced for the Institute by Callisto Productions, and includes contributions from MP Malcolm Bruce and the Scottish Government's Director-General for the Environment, Richard Wakeford.

The film demonstrates how the Virtual Landscape Theatre is moving forward the way in which the public can engage in land-use planning, as well as voice their opinions on the decisions which shape the landscapes around them.

Commenting on the 16 minute feature, Professor David Miller said: "We produced the film to explain how individuals could make a real

difference in influencing the decisions made regarding their surroundings.

"When it comes to the planning process, members of the public often feel that they are not given the opportunity to contribute and have no real control over the decisions made.

"Encouraging communities to become more closely involved in the decision-making process is an important step. But in order to do this effectively, it is essential that they have a credible impression of how their world might look in the future."

The Institute's Virtual Landscape Theatre - the first mobile unit of its kind in the UK - uses cutting edge virtual reality technology to recreate landscapes, allowing groups to visualise and fully assess the impacts of proposed changes.

"The theatre can be used by developers or planners to enter into informative debates with residents. In our experience, once local people become more informed and engaged in the process, many initial objections to a development will be dropped," said Professor Miller.

"Additionally, gaining a greater understanding of public perceptions benefits the planning process and paints a much more vivid picture of what is and isn't valued in the landscape."

Putting People in the Planning Picture was premiered in March as part of a conference organised by Holyrood Magazine, launching Scotland's ambitious new planning legislation.

The film can be viewed via the web at [macaulay.ac.uk/planning](http://macaulay.ac.uk/planning)

**Scientists seeking sustainable Scotland**

THE SCIENTISTS carrying out the government's research into the future of Scotland's countryside have met for the first time with key individuals from the farming and environmental sector.

The 'Making Scotland's Rural Environment More Sustainable' meeting brought together researchers working on the Scottish Government's £10 million flagship environment and land use research programme, with representatives from a variety of other organisations interested in creating a sustainable Scottish countryside.



Programme co-ordinator Professor Steve Albon



Coordinator of the research programme, Professor Steve Albon said: "A number of factors including climate change, pollution, policy shifts and urbanisation are placing our rural communities, land, and natural resources under increasing threat.

"Our biggest challenge is how to stimulate economic growth and social inclusion, without harming Scotland's natural environment, which has also become an important international 'brand' in its own right.

"We invited to the meeting key individuals with an interest in rural Scotland, including politicians, policy makers, and staff from a variety of non-governmental organisations.

"The idea is to get greater collaboration between interested parties in finding solutions to the pressing rural challenges we now face."

Key themes that were discussed included developing rural communities, conserving natural heritage, safeguarding the nation's soils and enhancing water quality.



*"Our biggest challenge is how to stimulate economic growth and social inclusion, without harming Scotland's natural environment"*



Professor Maggie Gill, the Scottish Government's Chief Scientific Adviser for Rural and Environment gave the opening presentation

The five-year programme is a major collaboration between staff from the Institute - who are leading the research - with colleagues from Biomathematics and Statistics Scotland, Royal Botanic Garden Edinburgh, Scottish Agricultural College and Scottish Crop Research Institute.

The innovative research programme has brought together social and economic scientists to work with environmental scientists, geographers, mathematicians and statisticians.

Professor Albon said the meeting involved an overview of the current research where discussion and feedback from attendees was actively encouraged and it culminated in a participatory workshop.



"Together we explored issues where further evidence is required, and discussed how we can improve the effective communication of our findings to society in general."

For more information go to [programme3.net](http://programme3.net)



**Sizing up CO2 emissions**

THE CAIRNGORMS National Park's carbon footprint is to be measured for the first time thanks to a new partnership project.

The Cairngorms National Park Authority (CNPA) has joined up with the Institute and Aberdeenshire Council to form a climate change team.

Studies have identified the Cairngorms as potentially being an area with the 'most to lose' in the short term as a result of climate change, and this project will help to identify ways of tackling that threat by measuring and then reducing the area's carbon footprint.

Fiona Chalmers, the CNPA's Integrated Land Management Officer who is involved in developing the partnership link with the Institute, said: "We are really pleased to be involved with the Macaulay Institute and its important work in this field.

"This partnership will not only allow us to identify the Park's carbon emissions for the first time, but it enables us to research and identify measures that can be specifically tailored to the needs and special qualities of the Park.

"This work should bring a real difference to the Park and help protect it for future years."

The Cairngorms National Park is the UK's largest National Park and has the country's largest area of arctic mountain landscape. It is also home to 25 per cent of the UK's threatened bird, animal and plant species.

David Green, the CNPA's convener, said: "Climate change has become a major political and social issue and it is particularly relevant for the Cairngorms National Park, which is home to some of the most important landscape and wildlife in Europe.

"The Macaulay Institute is renowned for its work in rural land issues. It is therefore very significant to the Cairngorms National Park that the CNPA is involved in its work on climate change.

"This work will be vital in our attempts to understand climate change and its impact on the special qualities of the Park."

It will be the first time the Cairngorms National Park has measured its carbon footprint and it is something other UK National Parks are beginning to look at.

The programme is largely funded through the Scottish Government and

- The Park is 3800 sq kilometres in area, 40% larger than the Lake District and twice the size of Loch Lomond and the Trossachs
- It's home to 16,000 people. At 4.2 people per square kilometre, the population density is very low
- Tourism-related businesses account for about 80% of the economy, including activities such as ski-ing, walking, fishing, shooting and stalking
- It is thought that at least 500,000 people visited the Cairngorms in 2001 - 350,000 to Badenoch and Strathspey alone

the first outcome of the partnership will give an understanding of the level of greenhouse gas emission within the National Park.

This research, which has been grant aided by the CNPA, will be used to identify ways which will tackle and reduce the emission levels. It will also help to develop methods of adapting to the effects of climate change within the Park.

Professor Bill Slee who is leading the project for the Institute said: "It is good to see the Cairngorms National Park Authority addressing the hugely important problem of climate change.

"It is not just the wildlife of the Park but also the economy which is challenged by climate change. We will work closely with the Park Authority in estimating the greenhouse gas footprint in what we anticipate will be a fruitful partnership.

"The Authority's willingness to face the global challenge in a local context is very encouraging."

For more information contact Bill Slee [b.slee@macaulay.ac.uk](mailto:b.slee@macaulay.ac.uk)



**Grazing the surface**

RESEARCH into the relative impacts of different grazing species in Scotland suggests that livestock are generally having a much greater effect on our hillsides than wild herbivores.

Recently published in the Journal of Applied Ecology, the research looked at the grazing and trampling impact of herbivores such as sheep, cattle, red deer, rabbits, mountain hares and red grouse on open-hill habitats in eleven areas of upland Scotland.

Professor Steve Albon, who led the study said: "Overall the presence of sheep was associated with the largest increase in grazing and trampling impact of all herbivores. Cattle had the second largest impact, whilst the impacts of wild herbivores tended to be smaller and only significant on a local scale.

"Red deer have significantly lower impact than sheep in most types of habitat, and in most parts of upland Scotland that we have studied.

"There are, however, a few localised exceptions where this is not the case.

Giving their views at the meeting were (l-r) Professor Steve Albon (Macaulay Institute), Professor Des Thomson (SNH), Professor Maggie Gill (Scottish Government), Robert Balfour (ADMG), Robert Carr (NFUS) and Professor John Milne (DCS)

These are mostly likely associated with locally high densities of deer."

The results have important implications for land managers in Scotland, and will help them anticipate the possible effects of changing grazing pressure on natural heritage as the relative numbers of sheep and red deer change in relation to both European agricultural reform and climate change.

The Institute held a meeting in February to which interested parties were invited to discuss both the findings and the possible directions for future research.

At the meeting, Professor Albon

presented a summary of the findings on behalf of the project team, following which representatives from some of the key interest groups gave their views on how the results fit within the wider body of evidence on grazing impacts on the open hill in Scotland.

The meeting was chaired by Professor Maggie Gill of the Scottish Government, and invitees included representatives of the Deer Commission for Scotland, the National Farmers Union Scotland, the National Trust for Scotland and the Scottish Gamekeepers Association.

**High Wheat Prices May Aid Upland Biodiversity**

RECORD HIGH prices for wheat might be bad news for consumers, but they may bring an unexpected benefit for the UK's upland wildlife. According to the Institute's Professor Robin Pakeman, the increasing price of those crops used to make animal feed could lead more to more upland areas being used to graze cattle, which is potentially good for biodiversity.

Professor Pakeman said: "Our research over the last five years has shown some level of grazing is actually beneficial for a healthy mix of wildlife in

the uplands. Cattle are especially good in this regard as the way in which they graze leads to a richly varied habitat which allows a greater range of plant, insect, and bird species to flourish".

"Areas such as the uplands that had not been considered profitable to farm in recent times may very soon see a return of grazing livestock," he added.

In such areas sheep numbers have declined in recent years, due in part to changes in EU support subsidies. It was feared that a lack of financial incentive would have led to a complete loss of mixed livestock farming. However, greater demand from countries such as China and India for wheat and an increase in land

being used to grow biofuel crops have increased cereal prices.

"Many farmers in the lowlands and hill areas where cereals can be grown will shift out of the relatively unprofitable beef market and into grain. Global demand for meat is, however, increasing and this may make upland cattle more attractive," he added.

"Like many commodity markets, agricultural products are in a global economy and changes in prices will impact on the UK countryside. Sometimes negatively - as the change in set aside policy might be - or positively, if it keeps livestock farming going in the uplands and marginal areas of the UK."



This year the Institute is highlighting the importance of soil health to our everyday lives.

Many people are surprised to learn that soil is alive – in fact there are more living things in just one teaspoon of soil than there are people on the planet.

And like all living things soil can become unwell and even die if not cared for properly.

Which would be bad news for us because, as our front cover shows, there isn't an aspect of our lives that doesn't ultimately depend on soil.

The following page contains some of the exhibition material produced around this theme.

Our stand at this year's Royal Highland Show (pictured left) was a big hit, and 'Sandy' in particular turned out to be very popular with young and old visitors alike. You can learn more about Sandy and his friends on the next page.

Given the theme of soil health, it seemed appropriate that Sandy should visit his GP, Dr O.R. Ganic, for a check-up.

The 'Dirt Doctor' measured Sandy's breathing, his nutrient levels and took a sample of his DNA for further analysis.

Visitors to the stand could compare their breathing with Sandy's and test their eye sight (using the chart on the next page). Younger visitors learnt how different soils were affected by the rain when they played 'The Drain Game'.

Sandy Soil attends the soil health clinic where he is seen by Dr O.R. Ganic.

*in-land* readers wishing to test their soil health can do so by logging onto [macaulaysoils.com](http://macaulaysoils.com)

**Macaulay Soil Health Clinic**

Scotland's soils have very different characters. Below is our Consultant Pedologist's report on just some of them.

Youngster **Sandy** can most usually be found playing around on seaside golf courses. He displays a gritty determination and a very dry sense of humour but if disturbed, he is prone to breakdown and should be handled with care.



It could be said that whisky distiller **Pete** has a young head on old shoulders. I advise this patient to keep himself moist at all time to protect his skin. Has a history of constipation and water retention. Nil by mouth and do not disturb.



Despite advancing years, **Heather** is extremely interesting. This highland lady appears quite shallow on the surface but, with some digging, she demonstrates hidden depths. Unlike Pete, this patient shows no signs of water retention.



**Claude's** blotchy appearance may explain his dour attitude - many who know him complain he is hard to work with, and he is prone to depression if under pressure. Well-known throughout the West of Scotland, the patient could work harder if treated correctly, despite his feet of clay.



Years of cosmetic surgery have given **Rusty** a much younger appearance. This East Scotland arable farmer is generally easy-going which makes him popular with the plants, but he reacts badly to certain individuals. Overfeeding is inadvisable as it can be bad for him and his neighbours, the Waterbodies.



For more about the health of these characters, as well as the real low-down on Scotland's soils go to [macaulay.ac.uk/news/dirtdoctors/](http://macaulay.ac.uk/news/dirtdoctors/)

**D  
I  
D  
Y  
O  
U  
K  
N  
O  
W  
T  
H  
E  
R  
E  
A  
R  
E  
M  
O  
R  
E  
L  
I  
V  
I  
N  
G  
T  
H  
I  
N  
G  
S  
I  
N  
A  
T  
E  
A  
S  
P  
O  
O  
N  
O  
F  
S  
O  
I  
L  
T  
H  
A  
N  
T  
H  
E  
R  
E  
A  
R  
E  
P  
E  
O  
P  
L  
E  
I  
N  
T  
H  
E  
W  
O  
R  
L  
D  
?**



Visitors to the clinic could also test their eyesight with a larger version of the chart above.

**Back to the future**

*Cabinet Secretary hails long-term benefits of National Soils Archive*

A BETTER understanding of Scotland's soils is "vital" for the future of Scotland's farming, water and tourist industries, according to Cabinet Secretary for Rural Affairs and the Environment, Richard Lochhead.

The comments came during the Secretary's recent visit to the newly refurbished National Soil Archive of Scotland, housed at the Institute.

Whilst there he heard how the archive is allowing Institute scientists to monitor changes to the country's soils.

Mr Lochhead said: "Soils play a major role in almost every aspect of our lives - from the long term sustainability of our habitats, agriculture and forestry, to protecting the flow and quality of the nation's water. Even tourism, which is our biggest industry, ultimately depends on our soils being healthy.

"Given their importance, it is worrying to learn that we lose an area of land the size of Dunfermline every year under new building developments and most of it is prime agricultural land.

"It is vital therefore that we understand the implications of such threats to soils and also how they will react to changes in climate and farming practices."

The improvements to the National Soil Archive are to accommodate 1500 new samples which will be added over the next three years as a result of a new sampling programme covering the whole of Scotland (see notepad).

Mr Lochhead said: "This facility houses one of the best resources of its type in Europe, and this new wave of sampling will allow Macaulay Institute scientists to measure the changes that have occurred in our soils over the last 25 years. Such information can then be used to make predictions and assist in safeguarding the nation's soils for future generations."

The archive currently houses 40,000 soil samples from right across Scotland, some of which date back to the 1940s, collected as part of previous surveys and long-term



Richard Lochhead (right): "one of the best resources of its type in Europe"

experiments. The cost of assembling such a collection today is conservatively estimated to be £10 million.

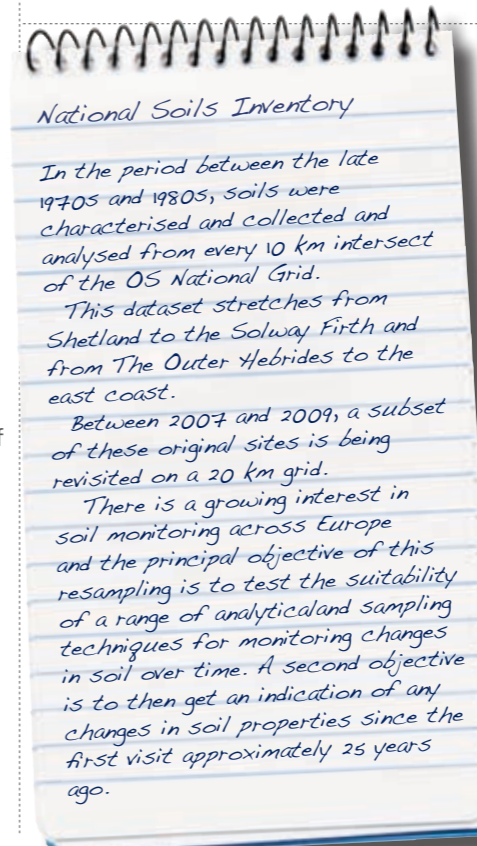
According to Dr Colin Campbell, Head of Soil Research at the Institute, the existence of the soil archive has also allowed recently developed scientific techniques to be applied to soils collected 40 or 50 years ago.

"This gives us a snapshot of how the environment was before the production of many of today's contaminants," he said. "We aren't just measuring change - rather we are measuring whether the changes have affected the ability of the soil to function."

"The healthy functioning of soils is crucially dependent on the diversity of microorganisms which is vast and unexplored - for example a teaspoon of soil can have up to 10,000 different bacterial species. We can now measure this using advanced DNA fingerprinting methods.

"Accordingly we are also building up a soil DNA archive for the scientists of tomorrow to tackle the challenges of the future".

Such applications will benefit the agricultural, pharmaceutical and forensic industries, he added.



*National Soils Inventory*

*In the period between the late 1970s and 1980s, soils were characterised and collected and analysed from every 10 km intersect of the OS National Grid.*

*This dataset stretches from Shetland to the Solway Firth and from The Outer Hebrides to the east coast.*

*Between 2007 and 2009, a subset of these original sites is being revisited on a 20 km grid.*

*There is a growing interest in soil monitoring across Europe and the principal objective of this resampling is to test the suitability of a range of analytical and sampling techniques for monitoring changes in soil over time. A second objective is to then get an indication of any changes in soil properties since the first visit approximately 25 years ago.*

**Scottish Soil Strategy**

THE STATUS of Scottish Soils report produced by the Institute in 2006 is now providing the basis of the development of the government's Scottish Soil Strategy.

A Scottish Soil Strategy Project Board has now been established and they have agreed a group approach to the development of the strategy, with four Institute staff asked to join.

Dr Colin Campbell said: "This represents a significant move towards partnership working between scientists and policy makers and will help both parties reach a clearer understanding of each other's strengths and roles. It will also help the Institute keep up-to-date with important policy developments."

The report was produced in collaboration with Stirling University and launched by the Scottish Government last September.

**New Ørskov grants**

NINE projects have received funding totalling £16,000 from Institute-based charity The Ørskov Foundation.

The projects were selected from over 60 applications for both individual student assistance and funding for community projects.

Three student applications were approved by the trustees; including one evaluating land-use changes using GIS in Kenya.

The community projects included the development of small-scale cattle production in Vietnam, a beekeeping project in Uganda and goat production in Malawi.

The Foundation is a charitable body set up by the Institute to promote sustainable development for the poorest rural communities in the world. It does this through the integration of agricultural education with community projects.

Information on each of these projects is on The Ørskov Foundation website [orskovfoundation.org](http://orskovfoundation.org)

**An absorbing read**

SPRING saw the launch of two new collaborative publications from the Institute.

In February, Holyrood magazine produced a 16-page 'Environment' supplement in association with the Macaulay.

The supplement focused on six important environmental issues including soil quality, water resources and biodiversity management.

Holyrood is officially the most read magazine by MSPs, and Institute Chief Executive, Professor Richard Aspinall, said further supplements were already planned.

"Working with Holyrood magazine provides us with another route to the country's key decision-makers – making it easier for us to keep them up to date with the latest developments."

In March a new regular publication aimed at both scientific and policy audiences was launched.

ABSORB is a joint-venture summarising socio-economic research conducted by



staff at the Institute and the Scottish Agricultural College (SAC), and includes research commissioned by the Scottish Government.

The Institute's Dr Wendy Kenyon – who compiled the first issue – said: "ABSORB is the first publication of its kind to bring together the key findings of research from these prominent organisations.

"Our aim is to enhance and strengthen the understanding by the wider scientific and policy community, of some of the socio-economic research being conducted in Scotland."

The first issue of ABSORB, focused on two themes – "participation" and "land-based industries".

The participation section provides an overview of the theory and practice behind public involvement in research, as well as a look at its value, whilst the land-based industries section looks at findings in areas such as dairy farming, agriculture and forestry.

Copies of either publication can be obtained from [in-land@macaulay.ac.uk](mailto:in-land@macaulay.ac.uk)

**In-land**

Printed on 100% recycled paper

Editor :: Dave Stevens

Photography :: David Riley (unless otherwise stated)

Graphic Design :: Barrie Milne

Any comments, or to receive your regular copy, email [in-land@macaulay.ac.uk](mailto:in-land@macaulay.ac.uk)



**Royal tea**

HRH Princess Anne chats with Institute staff (including chairman Michael Gibson) after this year's SABRI lecture, held at Edinburgh's Moredun Institute. The 2008 lecture will be hosted by the Macaulay.

Moredun Research Institute Photo Library

**Web brings flooding into the home**

UP TO THE MINUTE information on river levels available over the internet could provide early warnings of flooding, a new hi-tech initiative has shown.

Live feeds of environmental conditions from three Institute study sites - including the depth of a tributary of the River Dee - are now freely available via the web.

According to the Institute's Helen Watson, they are proving as useful to local residents as they are to the scientists.

"It's very much public interest to see if the Tarland Burn is rising, and for farmers and landowners to be a little forewarned. We have had really good feedback from people.

"It's also very useful for us to be able to refer to real-time data when planning our field visits as we can assess how safe it is to work in the river before we travel."

Other interested parties in SEPA and the fisheries board can also access

the data easily, she added.

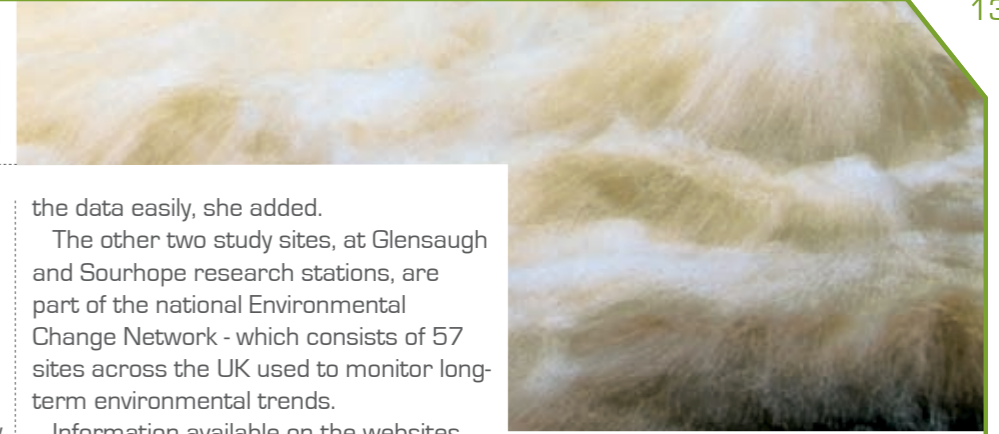
The other two study sites, at Glensaugh and Sourhope research stations, are part of the national Environmental Change Network - which consists of 57 sites across the UK used to monitor long-term environmental trends.

Information available on the websites includes local rainfall, wind speed and temperature.

The meteorological station data from the research stations situated in Aberdeenshire and the Scottish Borders are a relatively recent addition to the internet, but, says Helen, the data are regularly requested by students and researchers worldwide.

"We have also had requests for commercial use for flood prevention schemes planned by councils, and from soft fruit growers interested in assessing ripening conditions.

"It would also be possible to link the pages into outdoor-pursuit websites, as both sites are close to areas with well defined long and short distance



footpaths, mountain bike trails, and fishing interests."

Researchers hope to add a further river site to the web by 2008.

Lunan Water is one of SEPA's designated Priority Catchments for Monitoring due to concerns about its water quality. This will be part of wider research and work being undertaken by the Institute in partnership with SAC and SEPA.

For more information contact Helen Watson [h.watson@macaulay.ac.uk](mailto:h.watson@macaulay.ac.uk)

The live environmental feeds can be found at: [macaulay.ac.uk/ECN](http://macaulay.ac.uk/ECN)

**Group looking out for sheep**

A WORKSHOP aiming to identify those factors influencing the welfare of extensively-managed sheep has brought together a number of recognised experts and key industry players.

The group – including representatives from Quality Meat Scotland, Waitrose, Bristol University and a number of progressive sheep farms - explored those issues of policy, consumer influence and marketing which impact the welfare of sheep kept under extensive production systems.

The workshop was part of a wider project commissioned by Defra involving researchers from the Institute, SAC and ADAS.

The multi-year, multi-discipline project will establish the interaction between economics, husbandry and animal welfare in large hill sheep flocks in light of the reform of the Common Agricultural Policy. A key feature is the



direct involvement of farmers working in focus groups based in Scotland, mid-Wales, as well as the Peak and Lake districts.

Workshop coordinator Dr Pete Goddard said: "The exchange of information through the food marketing chain has crucial importance when addressing these issues, from informing consumers to influencing animal welfare policy."

The new project takes forward work which showed that the only important management choice that produced a conflict between improving animal welfare and financial performance was the use of labour.

This research showed that profit need not otherwise be obtained at the expense

of animal welfare, with extra inputs generally being cost effective.

The group will develop indicators of sheep welfare by using a network of welfare experts and food market stakeholders, a knowledge base of animal welfare, and an inventory of farm system characteristics and resources.

Dr Goddard said: "We hope that workshop delegates will remain connected with the project to ensure that the knowledge base remains up-to-date, and to complement the farmer focus groups which have been established in the major hill sheep farming areas of Britain."

For more information contact Pete Goddard [p.goddard@macaulay.ac.uk](mailto:p.goddard@macaulay.ac.uk)



### Institute on the menu for TV dinner

BBC PROGRAMME Working Lunch featured the Institute during a special week of programmes featuring Aberdeen businesses.

The popular daytime show highlighted the Institute's successes in turning its research into sought-after commercial services, which last year brought in over £1.5 million worth of business.

Concentrating on how the Institute is applying its world-leading scientific expertise to new ventures, the report featured the commercial potential of soil forensics research, the Virtual Landscape Theatre and MacaulaySoils.com.

Whilst in Aberdeen, programme presenter Rob Pittam not only received a tour of the city courtesy of the Institute's

Dr Lorna Dawson, but he also took part in the staff's weekly game of football.

"Throughout the week we were treated to some generous doses of Scottish hospitality. We usually spend much of the week on the road closeted in hotels," he said.

To watch this report (and other Institute TV appearances) go to: [macaulay.ac.uk/news/broadcastmedia](http://macaulay.ac.uk/news/broadcastmedia)

### Conference makes a splash

A RECENT workshop attempting to bridge the gap between freshwater research and the realities of river system management attracted 32 experts from around the globe.

Held in conjunction with the University of Aberdeen, the international meeting addressed the gap between traditional scientific studies which analyse the complex water environment at relatively small spatial scales, and the realities of water management which require understanding of much larger geographical areas, such as river basins.

The group of field-based experimental hydrologists and mathematical modellers met for four days to consider how science could achieve this goal.

Co-convenor, Dr Sarah Dunn said: "Thanks to the workshop we now have a clearer vision of how science needs to progress to achieve effective water management."

### Planning tool wins award

THE SCOTTISH Borders Council and the Institute won a Certificate of Commendation in the Scottish Executive's 2006 Scottish Awards for Quality in Planning.

Their entry, A Borders Wetland Vision: Development of a Strategic Planning Tool for Wetland Biodiversity, was also featured in the last issue of in-land.

The commendation, which recognises achievement in development planning, was received in March by the Institute's David Donnelly and Roger Cummins, along with Andy Tharme of Scottish Borders Council.

The tool has already been embraced by a number of organisations including the Scottish Environmental Protection Agency, Scottish Natural Heritage, Forestry Commission Scotland and by the Scottish Borders Local Biodiversity Action Plan.

The Institute also provided GIS services to two other projects that were praised by the judges.

The Edinburgh awards ceremony was attended by a number of MSPs and a wide range of environmental planning organisations.

### Eau Sans Frontières

IMPROVING the management of natural resources that span international borders is the focus of a new Institute collaboration.

INTRePID (Integrated Trans-boundary River Management Policy Development) will use the Mara River system in East Africa as its case study.

Project leader, Dr Kevin Urama said: "River basin management, biodiversity conservation, and livelihood programmes across Africa have evolved independently, often with overlapping and conflicting goals and responsibilities.

"Such a lack of cooperation between neighbouring countries can lead to increased poverty and biodiversity declines."

The project plans to address this by recognizing that these factors are interconnected and that policy initiatives focusing solely on individual aspects are likely to fail.

The Mara River catchment was chosen as it typifies these conflicts, says Dr Urama.

"It encompasses the Mara River which rises in Kenya and is a critical source of water for the Tanzanian Serengeti - where there are currently concerns about Kenyan plans for agricultural water uses.

"The Mara River is important to the economic development of both Kenya and Tanzania as it is the focus of their thriving wildlife tourism industries."

Currently, there are different policies, ministries and programmes in the two countries for the management of biodiversity, the national park and water resources.

The project hopes to promote cross-border collaboration in developing policy initiatives for the sustainable and integrated management of water, biodiversity and livelihoods in the Mara River basin.

It aims to provide a platform for policy makers, practitioners and researchers to draw on relevant expertise of the management of both African and European river basins.

The research is an EC 6th Framework project and involves the Institute and two partners - the African Technology Policy Studies Network (ATPS) and Tanzania National Parks (TANAPA).

More information can be found at [macaulay.ac.uk/INTRePID](http://macaulay.ac.uk/INTRePID)

### Nature is the best defence

MOST Scots would rather plant trees than build walls as a defence against flooding, a new Institute study suggests.

The wildlife and landscape benefits of trees and the cost and reliability of walls are the main reasons behind the preference.

Dr Wendy Kenyon, who carried out the research, said: "These results show that the public can recognise the wider implications of different flood management techniques and that hard structural defences are no longer the only option that can, and should, be considered."

The findings, reported in the journal Ecological Economics, come from discussion groups held in Alloa, Callender and Inverurie in 2005.

A total of 69 people considered the full impacts of a number of different techniques that could be used to manage flooding in Scotland. These included planting native trees, creating wetlands, building flood walls, and demolishing buildings that stand in the way of flood waters.

Participants thought that whilst flood walls have the obvious effect of preventing flooding in the immediate

vicinity, associated negative impacts also needed to be considered.

These include the high cost of building and maintaining flood walls, the reliability of flood walls now and in the future, the effect of the walls on flooding downstream, and the visual impact of the structures.

Conversely, most people thought planting or allowing native trees to regenerate upstream of a flood risk area could have many positive impacts - such as increasing wildlife and providing attractive landscapes, as well as having social and cultural benefits.

"Recent policy change in Scotland to encourage more sustainable flood management means that more natural methods are likely to play a greater role in flood defence in Scotland in the future - an outcome that would be welcomed by the people involved in this research," said Dr Kenyon.

For more information contact Wendy Kenyon [w.kenyon@macaulay.ac.uk](mailto:w.kenyon@macaulay.ac.uk)

or visit [macaulay.ac.uk/projects/flood](http://macaulay.ac.uk/projects/flood)







Bernie Milne

# GENDER BENDERS

Behind The Headlines

A spate of recent news stories have reported various studies implicating man-made pollutants in human and animal health problems. Links have been made to potentially fatal diseases such as cancer, and serious medical conditions including obesity and infertility. The majority of chemicals implicated in these reports are classed as Endocrine Disrupting Chemicals or EDCs.

Here, Institute scientist and EDC expert Dr Stewart Rhind explains some of the facts behind the headlines.

### What are EDCs?

EDCs are man-made pollutants, which can act on the chemical signalling systems of the body, causing alterations in normal function.

### How do they affect us?

They can interfere with normal biological functions in every group studied so far - from bacteria to humans.

While most reported effects concern the reproductive system (hence the term 'gender benders') they can also affect behaviour and disease resistance, and worryingly have been implicated in increasing incidences of testicular cancer, breast cancer and obesity in humans, as well as population declines in many wildlife species.

### Where do they come from?

Common sources of EDCs are plastics, pesticides and engine exhausts. Most everyday objects including food, food packaging, drink, electrical equipment, clothing, cosmetics - even tooth fillings - contain EDCs either because they were manufactured with them in or, in the case of food and drink, because they were contaminated with them in the environment.

### How widespread are EDCs?

Although they are mostly man-made, EDCs have now become ubiquitous in every environment - where they are present in soil, water and air. In fact, they are present in the deepest oceans, in tropical forests, and even in the snow and ice of the polar regions. It is likely that every animal on the planet has been exposed.



### How do EDCs get into our bodies?

EDCs can be ingested, but can also be absorbed through the skin (as with cosmetics) or inhaled from the air (exhaust fumes).

### How much of a concern are they?

Whilst many of these chemicals are present at very low concentrations, it is now becoming clear - partly through studies conducted at the Institute - that when the hundreds or thousands of these compounds in the environment act together, they can cause changes in many vital organs.

Many of these synthetic chemicals are of particular concern because they remain in the environment and in animal tissues years after they were released, during which time they can continue to exert very subtle adverse effects, particularly in the foetus or young.

Furthermore, recent studies have shown that exposure to these pollutants in one generation can affect reproductive function even in the third or fourth subsequent generation.

### Many of these chemicals have been around for decades - why are we only hearing about this now?

It took some time initially for the dangers to be recognised. One of the earliest examples was during the 1960s when populations of many birds of prey declined as a result of their exposure to pollutants such as dieldrin and aldrin which disrupted egg shell formation and prevented successful breeding.

These two chemicals, and others - such as DDT and PCBs - were banned once their adverse effects were recognised. The effects of many modern chemicals are only just coming to light; the complication is the myriad different effects exerted by the vast number of combinations of them.



### EDC work at the Institute

Issues of uptake and exposure are being addressed in the Institute by studying lifetime exposure of breeding sheep to very low concentrations of a mixture of pollutants, equivalent to fairly normal levels of exposure.

Ewes are being grazed on pastures treated with processed sewage sludge, applied to the surface as a fertiliser - a variation of common farming practice. This contains various plant nutrients but because it is derived from domestic, agricultural and factory waste, it also contains all of the pollutants, including EDCs, that are present in the wider environment.

Since relevant amounts of this fertiliser results in barely detectable increases of pollutants in soil or animal tissue, the "dose" may be considered to be representative of normal exposure.

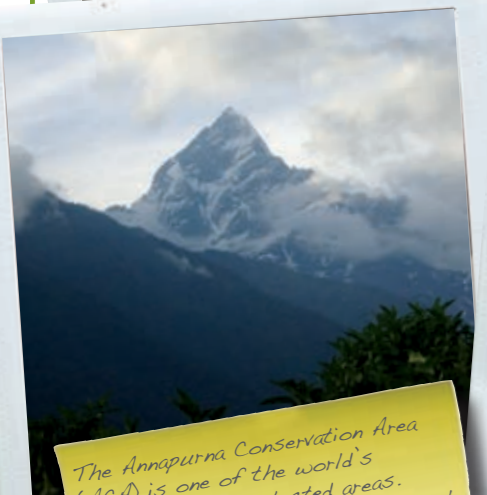
This makes it a valuable tool to study the effects of environmental levels of exposure to EDCs on animal tissue concentrations and on their organs.

Results from such studies can then be used to improve understanding of potential risks to human and animal health from these ubiquitous pollutants.

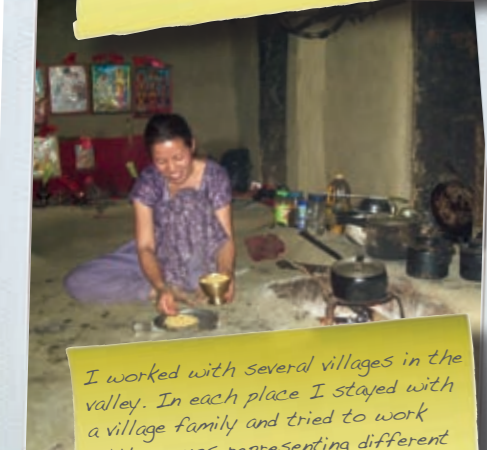
For more information contact Stewart Rhind s.rhind@macaulay.ac.uk

# Seven Weeks Near Tibet

*Kerry Waylen spent two months in the Annapurna region of Nepal this summer, researching how attitudes towards natural resources affect their use by local villagers, as part of her PhD research into how people's values affect the outcomes of conservation projects.*



1 The Annapurna Conservation Area (ACA) is one of the world's most famous protected areas. Landscapes range from subtropical jungle, via high mountains, to the arid Tibetan plateau. Many isolated rural communities live here, and it is home to one of the largest efforts to establish community-based management of local natural resources. I visited the Seti Khola valley, in the south.



6 I worked with several villages in the valley. In each place I stayed with a village family and tried to work with groups representing different parts of society: men, women, young people and disadvantaged castes.



2 The people here are mostly very poor farmers, and they depend on the rich natural resources of their local forests. Firewood is needed by most people for cooking, heating and lighting. The forests also provide fodder and food, and many plants are used as medicines or to make crafts.



7 As I only speak basic Nepali I used a Nepali student as an assistant and translator. We gained trust by clearly explaining our backgrounds and purposes, being open to questions and discussion, and sharing information collected. Quite often we learnt more from children as they were less reluctant to talk about sensitive subjects. However all groups expressed attachment to their surroundings.



3 The ACA is within the Himalayan biodiversity 'hotspot' and its forests are home to many rare species, including all of the six Himalayan pheasants found in Nepal. The World Pheasant Association has worked with villages local to a special area called Pipar for over 25 years, encouraging conservation of the birds and their forest by financially supporting village schools in the nearby Seti Khola valley.

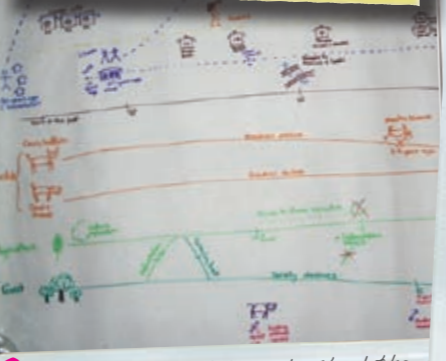


8 Visual tools - such as maps and pictures - are more accessible to illiterate people, and made discussions more interesting. Dividing a pile of 100 soy beans between the various forest benefits indicated their relative importance for villagers.

Kerry is a PhD student co-supervised by Imperial College London, and a Research Associate of the World Pheasant Association. Her work is funded by ESRC and NERC. [k.waylen@macaulay.ac.uk](mailto:k.waylen@macaulay.ac.uk)  
All images Kerry Waylen except where stated



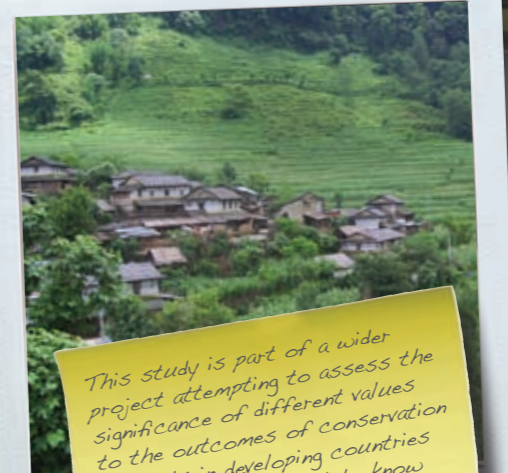
4 Local people's natural resource use might also be influenced by motivations other than practical need, such as religious beliefs or traditional cultural values. Nepal is renowned for its mix of cultures and castes - religion is an important feature of daily life and Hinduism and Buddhism are uniquely intertwined. Temples are a common sight. Where I worked Hinduism is dominant and the Gurung caste predominate.



9 It was important to understand the context of natural resource use (as shown in this timeline of village history)



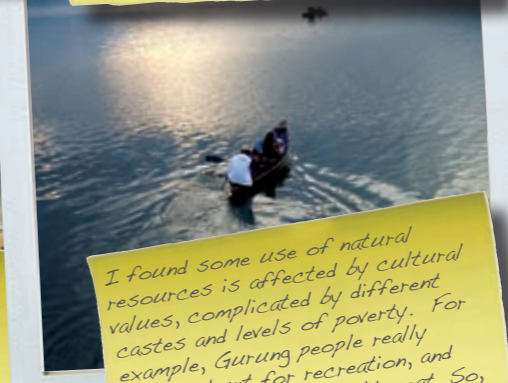
11 At each village we left copies of the visual materials produced, and a brief report of our activities and information collected. Some villages did not have maps so this output was very popular.



5 This study is part of a wider project attempting to assess the significance of different values to the outcomes of conservation projects in developing countries (see box 5). I want to know to what extent resource use is influenced by less tangible benefits such as religious values or cultural preferences?



10 Many conservation issues are sensitive subjects - for example hunting is illegal so people may not talk honestly about it. Building trust helps but sometimes it was necessary to think like a detective. For example, in this picture we encouraged some youths to illustrate a hunter, which we were discussing. They previously denied guns were used, but when asked to draw the hunter they drew him with a gun.



12 I found some use of natural resources is affected by cultural values, complicated by different castes and levels of poverty. For example, Gurung people really love to hunt for recreation, and prefer the taste of wild meat. So, although many families can afford domestic meat this doesn't stop them eating wild meat. This is an important finding because many studies assume practical benefits are the only important influence on such people's behaviour.

## Poor understanding?

Conservation projects in developing countries often focus on providing practical benefits such as cash or infrastructure as a motivation for local communities to support conservation actions.

However, if conservation projects are to be a success, an understanding of why and how local people value natural resources is needed, especially where communities are very poor. Nepal was selected as a case study because it is one of the world's poorest countries, and globally, biodiversity is mostly concentrated in areas of great poverty.

As Kerry explains: "As we all depend upon the goods and services that the natural world provides, it is vital that we improve the outcomes of conservation projects in such countries."

Understanding human motivations is a large and complex area, and Kerry uses an interdisciplinary approach to combine insights from fields as diverse as economics, psychology, and philosophy.

Participation is also an essential prerequisite for encouraging people to engage with conservation outcomes. However involvement - and hence benefit distribution - is often skewed to an elite.

Kerry said: "This project involved a situation with an unusual degree of inequality, as the caste system reinforces inequality in poverty.

"In all situations conservationists must try to seek out and understand the views and situations of all sectors of society, or policies and projects may not accurately reflect society's values. This is useful whether we are working in Scotland or further afield."

This study also demonstrates that the Institute's combination of social and natural sciences expertise has applications across the world, says Kerry.

"We need a thorough understanding of local values, combined with biological information, before we can understand the best options to promote sustainable development for an area."

*Luckily, you don't  
have to go this far  
to get a good view*

We know it can be hard to find someone with a really clear view of the land.

That's because all of our different needs for land – such as farming and forestry, conservation, recreation or renewable energy - usually get treated as separate issues.

We realise they are all joined-up - and that's why we are joined-up too.

Our smarter approach to research brings together environmental and social scientists, economic experts and policy analysts, and over the years we have developed an unrivalled understanding of the 'bigger picture'.

So if you are looking for advice regarding our land and natural resources,  
email [biggerpicture@macaulay.ac.uk](mailto:biggerpicture@macaulay.ac.uk)  
and get an unparalleled view of a more sustainable Scotland.



[www.macaulay.ac.uk](http://www.macaulay.ac.uk)