

Bush Telegraph

The House Magazine of the Edinburgh Consortium for Rural Research

SUSTAINABLE AQUACULTURE

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Compared to many of the terrestrial agricultural activities in Scotland aquaculture is a relatively new animal production system. It was Sir James Maitland who designed and built the first scientifically run trout farm that closed the life cycle of the brown trout at Howietoun in 1874 and has continuously supplied brown trout for restocking angling waters ever since. Howietoun was purchased by the University of Stirling in 1979 and has been completely renovated and now, along with

the trout, it also produces salmon smolts to supply the growing Scottish Atlantic salmon farming industry.

The salmon farming industry in Scotland started in the mid 1970's and over the past 30 years has grown to a point that it now is responsible for 50%, by value, of Scottish agricultural exports (>£150 million in 2005) and over 10,000 jobs. Scotland is the largest producer of farmed fish within the EU member states. It is over the same period that the **University of Stirling's Institute of Aquaculture** has also grown by undertaking basic and applied research to help the development of the aquaculture industry at home and overseas.

By reading the press coverage of aquaculture one would have to assume that much of this development has been achieved by devastation of the marine aquatic environment through pollution, over exploitation of small fish for fishmeal production, genetic introgression of farm escapes into natural stocks and rampant disease and parasite outbreaks. It has to be admitted that any animal production system has an environmental footprint but research at the Institute has shown that this can be minimised to the benefit of the industry and society. The Institute is multidisciplinary with five main research grouping that often work together in different combinations to solve particular problems.



Collecting tilapia fry as part of a breeding programme in Vietnam. Tilapia is now one of the top aquaculture species in the world. Much of the early genetic work was done at the Institute of Aquaculture.

The Institute was initially setup to study fish diseases in wild salmon but was soon involved in the problems occurring in the new salmon farms. Early disease problems such as Furunculosis (*Aeromonas salmonicida*) could only be treated using antibiotics but the Institute along with the FRS Marine Lab (Aberdeen) developed the first commercial Furunculosis vaccine in the UK in the mid 90's. We were also influential in the development of management strategies and new chemotherapeutants for effective sea lice treatments. Collaboration with the industry in the development of more disease resistant fish through selective breeding and the identification of QTLs is in place. The recent development and use of a high density cDNA microarray (17K ESTs) for the Atlantic salmon will enable us to better understand the underlying genetic control of these traits. The Institute has also been involved in the development of a wide range of antibody probes for most of the main commercial species and their application for use in fish health

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SUSTAINABLE AQUACULTURE

management. Today there is little use of antibiotic treatments in salmon farming.

Control of the sexual maturation and reproduction is critical if we want to consistently produce the high quality seed needed to supply the growing production sector. Research into the manipulation of reproduction and growth using light has halved the time taken to produce a farmed salmon in the last 10 years. Many of the species used in aquaculture are still essentially wild animals in comparison to the genetic improvement undertaken in terrestrial animals and plants. Genetic management and improvement needs to be closely monitored to avoid problems of inbreeding in hatchery produced fish. The development of parentage assignment using microsatellite markers is now widely used in aquatic animals that are difficult to physically tag because of their small size or do not lend themselves to being reared as separate families. Most of the new marine species such as cod, halibut, bass, bream and shellfish such as oysters and sea urchins fall into this category. We are also involved in the development of techniques that result in the production of

sterile fish through chromosomal set manipulation (e.g. triploidy) or environmental manipulations that produce single sex or sterile fish that are less likely to interact genetically with wild populations.

Aquaculture has been criticised for its use of fish meals and oils and the damage this causes to marine food chains. Aquaculture does use between 25-30% of the available fishmeal but there is a sustainability issue in that marine fisheries are now fully exploited. The Institute has been actively involved in research that first understands the nutritional requirements of the different farmed species to reduce and replace both fish meal and marine lipids with vegetable alternatives without compromising the welfare of the fish or its nutritional value to the consumer. A major focus of the work is the study of the functions, biosynthesis, metabolism and requirements for polyunsaturated essential fatty acids (PUFA) in fish. This knowledge is of equal relevance to the nutritional status of higher mammals, including man.

The analyses and quantification of inputs and outputs from various types of aquacul-

ture operation on the aquatic environment is an active research area, particularly the impact of aquaculture chemotherapeutics, pollutants, and eutrophication on the aquatic food web. The molecular toxicology of xenobiotics and their effects on the genes concerned with the immuno-competence of aquatic organism is also presently of some interest. All of this information is used to develop computer models, which enable the environmental impacts of farms to be accurately assessed and related to those of other stakeholders in the aquatic environment.

Sustainability will be the major determinant of future aquaculture development. The ability to define and recommend appropriate culture methods of use under differing socioeconomic and geographical conditions is critical. As a leading international group in developing and applying multi-disciplinary approaches, staff analyse biotechnical, socioeconomic and institutional features of UK and international aquatic resources, fisheries and aquaculture sectors, and develop new approaches to provide practical and strategic guidance, and inputs to national and international policy.

CHANGES AT THE NATIONAL MUSEUMS

Following Suzanne Miller's departure to the directorship of the South Australian Museum, Andrew Kitchener has been appointed as Acting Keeper of Natural Sciences at the National Museums Scotland. After a PhD at Reading University and a year at the BBC's Natural History Unit as a researcher, Andrew became the Principal Curator of Mammals and Birds at NMS just over 19 years ago. In that time he has been involved in developing new exhibitions on global nature conservation. He is currently leading the Animal Senses gallery team as part of the Royal Museum Project.

Since joining NMS, Andrew has carried out a wide range of research, including reconstructing the dodo as a thin bird. His principal interests include geographical variation in mammals and birds, hybridisation between wildcats and domestic cats and the effects of captivity on endangered mammals and birds, including the development of skeletal pathologies and ageing effects. His current projects include geographical variation in the clouded leopard, ageing and reproductive biology of hedgehogs from the Western Isles as part of the Uist Wader Project, and the recolonisation of Britain by polecats with the Vincent Wildlife Trust.



Scotland & N. Ireland Forum for Environmental Research



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SCIENCE & THE MESSAGE

One of the greatest challenges facing research scientists is how to ensure that diverse audiences comprehend the outcomes and implications of their findings and take appropriate action.

Nowhere is this more important than in environmental research, where raising awareness of how seemingly unrelated activities impact on the local environment often has to be combined with precautionary planning and actions.

An example of what can be achieved is a new communications package developed for the Water Framework Directive by a SNIFFER-managed project in partnership with the Environment Agency, the Geological Survey of Ireland and the Scottish Environment Protection Agency.

The Water Framework Directive (WFD) provides a new framework for the protection, improvement and sustainable use of waters across Europe. WFD requires that public participation lies at the core of decision-making, so a method by which stakeholders could be assisted in understanding WFD was a necessity.

A VISUAL APPROACH

The SNIFFER groundwater visualisation tool provides a representation of how groundwater bodies function within different geologies in the UK and Ireland and the influence of differing pressures and impacts (such as pollution) on those bodies under WFD. The tool has been specifically designed so that complex features relating to groundwater can be easily communicated to both technical specialists and non-specialists such as planners, water managers and the general public.

The tool consists of a set of images depicting representations of groundwater interactions under different geologies and pressures. For example:

- A base image representing a cross section of a typical catchment within the WFD and the basic elements of the hydrological cycle (see Figure 1).
- Cross sections of the base image which represent three different land use settings: upland rural, lowland rural and urban (see Figure 2).

Interchangeable wallpapers and layers in the 2D cross section, which can be added to each land use setting as required and represent:

- Geological and hydrogeological conditions in regions of the UK and Ireland
- Pressures associated with the different land uses within each setting

Various combinations of these settings were developed, by adding or removing layers, in order to tell a story regarding a specific aspect of groundwater within the WFD. A complement of over 1000 images is currently available.

LAUNCH OF WFDVISUAL.COM

The website www.wfdvisual.com has been launched by SNIFFER in December 2006 to deliver the first phase images for groundwater. Use of the site and the images is free of charge. A simple registration form to gain access to the full range of services, including the facility to save searches and image collections for future use.

Further information on the development of the images and the website is available from the SNIFFER website, www.sniffer.org.uk (search code WFD32 or WFD70).

Please note that at the time of publication of this article, these images are still drafts and are indicative of the final versions which will appear on the web site.

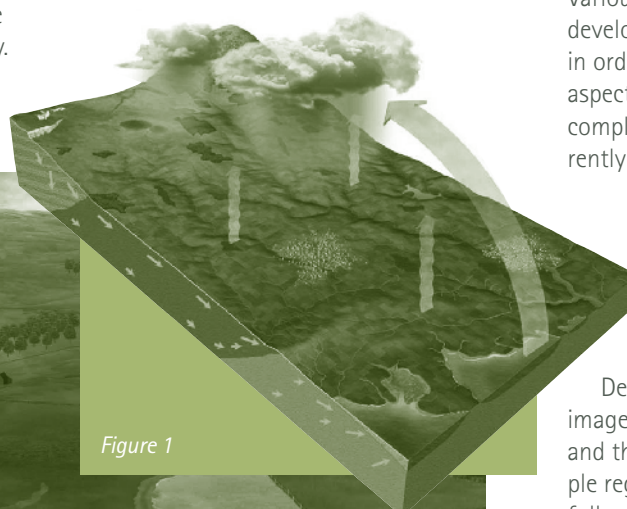


Figure 1

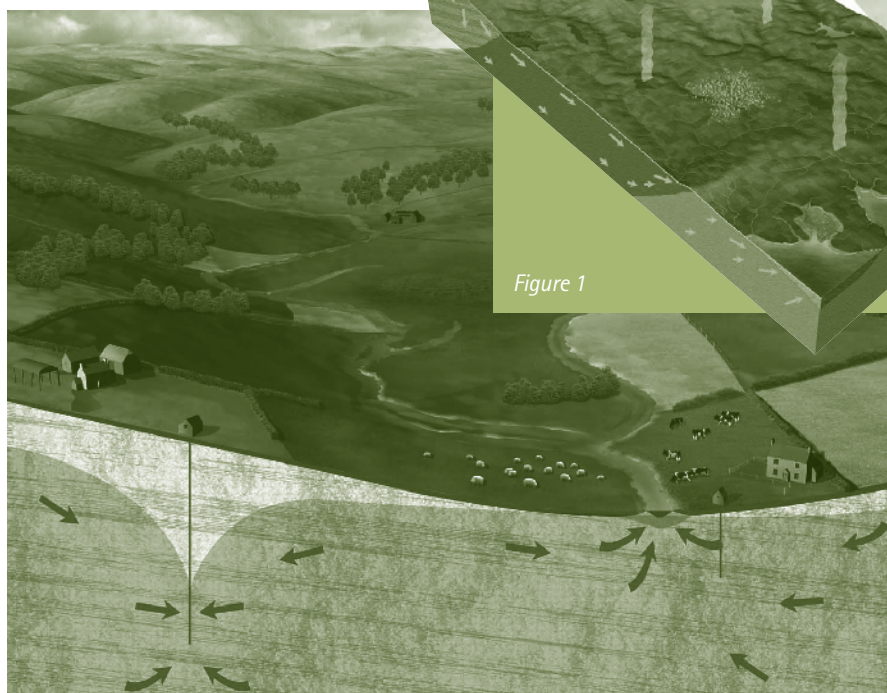


Figure 2: Lowland rural example

Centre for Ecology & Hydrology



Centre for
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NATURAL ENVIRONMENT RESEARCH COUNCIL

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RESTRUCTURING FOR NEW CHALLENGES

As noted in the Winter 2005 edition of Bush Telegraph, the planned restructuring of CEH is now well underway. Closure dates have been set for 4 of the 8 scientific research sites across the UK, at Dorset, Monks Wood, Oxford and Banchory, with the first of these in June 2007 (Dorset). There will be transfers of staff into the remaining research sites, at Wallingford (Headquarters), Bangor, Lancaster and Edinburgh. However, the restructuring process has led to the loss of some personnel who could not relocate, and there will be a need for recruitment to fill key posts. The upshot for Edinburgh will be an increase in overall staff numbers on site, and plans are well advanced for a new building to house the new (to Edinburgh) areas of science. The range of science activity at Edinburgh will be expanded, with a major new Section formed within the Biodiversity Programme of CEH. This will be headed by Dr Allan Watt, currently Head of Site at CEH Banchory, and will comprise existing expertise from Edinburgh on freshwater ecology, tropical land use and tree genetics, and population ecology research that is currently undertaken at Banchory and Monks Wood.

COUNTRYSIDE SURVEY

Despite the organisational upheavals, the Countryside Survey across the UK is scheduled for this year. Countryside Survey is a major audit of the natural resources of the British countryside, which is carried out at regular intervals by CEH. Surveys have been carried out in 1978, 1984, 1990, and 1998 (reported in 2000). The survey assesses habitat and landscape features, vegetation, water courses, soils and land cover. It provides a uniquely useful and internationally renowned series of data, used to identify trends for evidence-based policy. It is relevant to farming and the evaluation of



New building at CEH Edinburgh

countryside policy and allows us to track the effects of environmental change in terrestrial and freshwater habitats. Separate surveys are completed for Great Britain (England, Scotland and Wales) and a linked survey is carried out for Northern Ireland; providing the ability to report at both UK-wide and individual country levels. More information on this is available at <http://www.countryside-survey.org.uk/>.

There are two components of the Survey: Land Cover Map and Field Survey.

- The Land Cover Map (LCM) is produced using satellite imagery to map vegetation types, corresponding to Broad Habitats, across the whole of the UK. LCM 2007 will be based on a broad range of Earth Observation data sources each providing specific information. The new map will be created by combining the satellite data with a generalized version of Ordnance Survey's Mastermap. This will give a more easily recognizable product based on land parcels. A feasibility study has already demonstrated the key processes required to achieve the generalisation.
- The Field Survey involves sending teams

of surveyors into the countryside to measure and record various features, in a selection of 1 km squares. The squares are chosen so that a statistically robust sample of squares is obtained, representing all the habitat types in the UK. The number of squares surveyed has increased with each succeeding survey; in 2007 the survey will cover over 600 squares. This will enable reporting at country level (England, Scotland and Wales) for most elements of the survey, as well as at the Great Britain level for all elements.

The Countryside Survey is funded by a consortium of government departments and agencies headed by the Department for Environment, Food and Rural Affairs. **Funding partners:** *Department for Environment Food and Rural Affairs, Countryside Council for Wales, The National Assembly for Wales, Forestry Commission, Scottish Executive.*

Non-funding partners: *Scottish Natural Heritage, Environment Agency, Natural England, Joint Nature Conservation Committee, Environment and Heritage Service (Northern Ireland)*

Royal Society for the Protection of Birds



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WINDFARMS & UPLAND BIRDS

In an attempt to minimise the effects of climate change, the UK government has set a target to reduce CO₂ emissions by 60 % by 2050. Part of the mechanism to achieve this is to increase the output from renewable energy sources, with a proposed 20 % of Scotland's energy to come from renewable sources by 2010. Onshore wind is currently one of the cheapest and most technologically advanced forms of renewable energy available, leading to a large number of wind farm proposals being put forward in the uplands.

With many upland habitats supporting internationally important populations of a range of bird species, including a number listed on Annex 1 of the EU Birds Directive (79/409/EEC), there is concern that such development conflicts with bird conservation interest. However, there is a lack of information concerning the likely impacts of such developments upon upland bird populations. Detrimental effects may occur through collision, displacement due to disturbance, barrier effects and habitat loss (Langston & Pullan 2003, Drewitt & Langston 2006), of which the first two are likely to be most important in relation to breeding upland bird populations. Because of the pressing need to address this issue, the Scottish Executive Environment and Rural Affairs Department (SEERAD), Scottish Natural Heritage (SNH) and RSPB have jointly funded a study to examine the impacts of wind farms on upland birds, and particularly to assess the likely displacement effects of turbines on a range of bird species.

The work will model the distribution of raptors, grouse, waders and passerines in relation to turbine proximity, and assess whether such effects may impact upon breeding densities. Specifically, we focus on three key areas of investigation:

1. Assessing if wind farms have reduced densities of breeding birds in close proximity to turbines, involving a spatial comparison of paired windfarm and control sites, based on their topography and habitat.
2. Examining if there is reduced habitat usage by birds close to the turbines, accounting for potentially confounding effects of topography and habitat.
3. Assessing the avoidance behaviour of foraging raptors in proximity to wind turbines, by mapping the frequency of flights observed during the breeding bird surveys in relation to topography and weather variables.

Intensive bird surveys were conducted during the summer of 2006 on nine operational wind farms (eight in Scotland and one in England) and paired control sites. Surveys at each wind farm were conducted up to an area extending 1 km from the turbine array, to assess whether habitat usage was reduced in close proximity to the turbines,

and compared with the distribution and abundance of birds within 2 km² control sites. Repeated visits were used to map in detail the locations of birds across each site. Locations of grouse, waders and passerines (excluding meadow pipits and skylarks) were mapped at a 100m resolution, whilst the location and heights of all raptor flights were also plotted, to allow us to examine variation in flight activity for these species in relation to the turbine array. Meadow pipits and skylarks were surveyed at a 10 m resolution within a series of sub-plots (250m x 250m). On the wind farm sites these were located adjacent to each other and radiating from the centre of wind farm area outwards, whilst two sub-plots were located randomly in each of the 1 km squares of the control site.

Preliminary analysis of these data is ongoing, whilst additional data will be collected from a further sample of sites in 2007. Final analyses and write-up of these data will be conducted over the autumn / winter of 2007.



UHI Millennium Institute – Centre for Mountain Studies



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CLIMATE CHANGE IN HIGHLANDS & ISLANDS

CLIM-ATIC is a preparatory project, funded through the European Commission's Northern Periphery Programme. It aims to establish a transnational network within the peripheral regions of northern Europe, in order to develop a multi-partner project which will focus on:

- the potential impacts of climate change on small peripheral rural communities,
- how these communities could adapt to avoid or reduce the negative impacts of climate change, while taking advantage of opportunities.

The proposed collaborative main project will involve five international national regions, each with a number of public and private sector partners, working with a number of communities to develop and initiate a community climate change adaptation strategy. The relevance of, and the barriers and opportunities to, initiating such a scheme will be explored in the context of national and local political structures and policies, available grants, support from the voluntary and business sectors, cultural and social attitudes, media, and climate change awareness. The main project will have a particular emphasis on supporting the implementation of a pilot project within each community that will bring local employment opportunities, social benefits, and improved environmental management. Lessons learnt will inform future community adaptation strategies, community projects and policy decisions

Project regions include:

- Highlands and Islands, Scotland (lead region)
- County of Västerbotten, Sweden
- Lapland, Finland
- North East Iceland
- Sogn & Fjordane, Norway



Research on climate change in Scotland predicts not only changes in average temperature and precipitation, but also an increase in the frequency and duration of floods, droughts, storms and other extreme events, as well as significant sea level rise and the possible breakdown of the thermohaline circulation. The impacts of such changes to agriculture, fisheries, forestry, energy, transport, tourism, cultural heritage, landscape character, and environmental processes is of concern, as is the uncertainty associated with the related impacts on small and rural communities..

The impacts of policy decisions made by national, regional and local government organisations, in an attempt to combat climate change, on these communities are also a key issue as these have significant effects on lifestyles and business operations.

For a community to adapt to the impacts of climate change, through the development and implementation of local climate change adaptation strategies, the best possible understanding of the possible impacts of climate change on communities is required, together with a practical evaluation of the opportunities for, and barriers to, specific activities. Priority areas of interest raised by current project partners in the Highlands and Islands include:

- The impact of extreme weather events

and flooding on communities, transport and the delivery of community services.

- Community participation in renewable energy generation and energy management.
- Community awareness of likely climate change impacts and the barriers to sustainable community action.
- The economic impact of climate change on primary sector industries and opportunities for adaptation, diversification and economic growth.
- The political and policy frameworks that restrict or encourage communities to adapt to climate change.

It is anticipated that the main project will focus on three communities within the Highlands and Islands. Every community has different characteristics and thus possible climate change impacts, and so three different community types have been chosen to enable effective transfer of lessons to a wide range of other comparable communities throughout the region.

- Isle of Westray, Orkney Isles
- Lochinver, Assynt Foundation
- Cairngorm, Rothiemurchus and Glenmore Community, Cairngorm National Park

Please contact Clive Bowman at UHI, if you would like more information on this project or wish to discuss participation.

Royal Botanic Garden Edinburgh

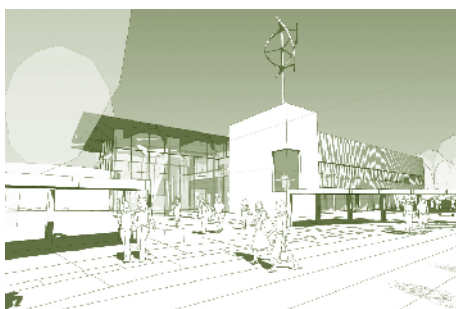


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GATEWAY TO INSPIRATIONAL SCIENCE

Even before the start of construction, the future potential of The Gateway interpretation centre is inspiring new partnerships well beyond the boundaries of the Royal Botanic Garden Edinburgh (RBGE), defining the future of a hub for likeminded organisations to engage wider audiences in the fight to conserve our fragile environment.

Set to open by summer 2009, The Gateway has been conceived not only as a showcase for RBGE but also for the organisation's considerable network of partners in the government and voluntary sectors, at home and abroad. It will provide a city centre platform for the other research bodies to present the most authoritative and up-to-date material about current environmental issues, includ-



An artist's impression of the entrance to The Gateway

ing climate change, biodiversity loss and genetic engineering.

Central to this approach will be increasing the role of "Real Life Science" (RLS) sessions – one of the "unique selling points" of The Gateway experience – which will allow visitors to participate in debates with scientists and other experts on a range of topical issues. Communication links with outside organisations and remote field stations will enable

scientists and audiences to discuss science as it is happening, where it is happening. This material will often take the shape of live presentations rather than static exhibits.

Pivotal to the success of The Gateway's rolling programme of events has been the appointment of Dr Max Coleman, the Garden's recently appointed Science Communicator. With a strong background in plant science and the communication of environmental issues, he is tasked with expanding the breadth of RBGE's current programme in readiness for the new facility. It is a challenge which Max Coleman relishes. A key role will be to ensure the public gain optimum satisfaction from their interaction with scientists at the new facility through the preparation and listing of events.

"The need to communicate the challenges facing the environment has never been more acute", he commented. "It's up to organisations across the board to engage the public about what is happening to Earth's biodiversity and how it is likely to affect them as individuals. Our best chance of inspiring a positive public reaction to conservation is by operating within a wider framework and building on the individual strengths of our partners. For example, while RBGE has a wealth of knowledge relating to plant life, input from other specialist organisations is invaluable in putting into context the necessity of the work we do. Plants are fundamental to our very existence and to every living thing around us".

"Bringing to life to a year-long programme will be challenging – the offering needs to be varied enough to capture the imagination of a huge spectrum of individuals and be stimulating enough to entice them back for more". To make it all worthwhile, visitors need to be empowered to find ways they can reduce their ecological footprint and to help conserve nature.

"The designers have risen to the challenge of producing exhibits that the youngest visitors will find entertaining, while still providing interest and novelty for adults. It's up to us now to fill that space with vitality", he concludes.



An example of the kind of Real Life Science planned for the Gateway – Dr Stephan Helfer, RBGE's Senior Mycologist, with school pupils.

Scottish Agricultural College



Janette Elder

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APPLIANCE OF PLANT & ANIMAL SCIENCE

As well as providing food and bringing beauty into our lives, plants provide a store-house of raw materials. In this context SAC plant scientists have recently contributed to the development of a new range of sensitive skin care products launched earlier this month by Boots. The products contain essential oils found in Bog Myrtle, also known as Sweet Gale, which work against the bacteria that cause spots.

Bog Myrtle is a native of the Scottish Highlands and has long been known for its antibacterial and antioxidant properties. SAC's role was to study its composition and develop a reliable profile of the plant. Using this information Boots was then able to produce a standardised product which has both the antibacterial and antioxidant properties required.

Dr Katerina Svoboda analysed the oil in Sweet Gale and demonstrated that it had useful chemicals present. She then carried out analytical work on the oil; firstly to see if she could identify clones that had higher than normal amounts of oil that could be propagate up and secondly to look at quality control of the oil and its constituents.

Mr. Peter MacDonald was involved in the development of methods of propagation of the plant.

The scientists have also developed micro-



Harvesting bog myrtle



Professors Bill McKelvey and Geoff Simm at the beef research Open Day

propagation techniques for Bog Myrtle which are capable of providing material for commercial scale production of the plants, and have looked at the basic requirements of its production including the effects of soil type, planting methods, plant spacing and timing of planting, and harvesting.

SAC held an open day at the Ayr Campus on 14th March to enable anyone interested in a career in the horticulture industry to come and hear about the interesting range of careers in horticulture, garden design and plantsmanship. Although horticulture is primarily a hands-on career growing or maintaining plants, there is also a need for scientists, managers and sales people to support and develop the industry.

SAC'S BEEF RESEARCH CENTRE

SAC has announced plans to carry out a major upgrade of its beef cattle research facilities at Easter Howgate Farm, Bush Estate, near Penicuik. The SEERAD-supported development will provide modern handling and weighing areas and animal housing. The improved facilities will enable SAC to

undertake applied large scale beef research in order to advance our scientific knowledge whilst also providing a resource for knowledge transfer to the industry.

Speaking at the event, 'Good for the Environment, Good for Business' which was held at Easter Howgate, SAC Chief Executive, Professor Bill McKelvey said, "The production of high quality beef is crucial to the success of Scottish agriculture. Scottish beef producers and processors face many new challenges and need to harness the opportunities offered by technical advances on both sides of the farm gate.

"The development will provide facilities for an expanding programme of research with special emphasis on beef genetic improvement, meat eating quality and sustainable beef cattle management systems.

"The up-grade further enhances SAC's capabilities to carry out high quality farm-based research. Together with our research partners and with strong support from the industry, SAC will be better positioned than ever to support the development and sustainability of the beef sector."

In Brief...

Fatal mudslides underscore the need for reforestation

An Edinburgh-based botanist working to alleviate the dangers of environmental erosion caused by deforestation in central Peru has seen his latest book published, within days of mudslides which were reported to have killed at least 16 people and left scores more homeless.

Having completed a two-year project to encourage the prevention of environmental destruction by equipping mountain farmers with the knowledge and skills to replant economically useful trees Dr Toby Pennington, of the **Royal Botanic Garden Edinburgh** (RBGE), could not have anticipated how the importance of his research would be underscored by a coincidental act of nature.

Working closely with communities in the Andes who live in fear of mudslides and flash floods caused by extreme deforestation, the 38-year-old tropical plant specialist was awaiting delivery of his new publication, the Darwin Initiative funded "Arboles útiles del Ande Peruano" (Useful trees of the Peruvian Andes), when disaster struck.

"Deforestation is a massive problem in the Andes", he explained. "If you have areas where there are no trees, it creates a situation where you have bare land that is prone to flash flooding and massive landslides. Reforestation can improve the situation – and that is one purpose of the new publication. This isn't a guide for botanists or enthusiasts: it's a simply-explained set of guidelines for poor farmers – available free of charge – to teach them how to save their surroundings and improve their incomes. It's only a small project, but I hope it will help to make a big difference in helping to protect this type of natural environment.

"However, it is cold comfort to see it coinciding with the devastation which was caused at San Ramon on January 20. Rivers burst their banks and mudslides buried villages after torrential rains; roads were cut off, isolating various areas and hindering



Mudslip at Jenaro in the Peruvian Andes.

rescue and recovery efforts. Many children were reported to have been swept to their deaths and about 150 families were left homeless. Such a torrent might not have happened if the slopes had been reforested and my hope would be that similar tragedies could be avoided in the future".

Healthier foods

Scientists at the **Scottish Crop Research Institute** are leading a European project to discover how to make healthy food even better for us. SCRI, Scotland's leading institute for research on crops and plants, is spearheading a European Union project to find ways of boosting the nutritional value of crops. The Develonutri project will focus on plant metabolites. These are small, natural compounds found in grains, fruit and vegetables and play a key role in human health and well-being.

The work will be undertaken by a consortium of European scientists and companies led by Dr Derek Stewart. Dr Stewart manages a team at SCRI that researches food quality, health and nutrition.

Dr Stewart said: "For many foods, the journey from the farm gate to the dinner plate is often accompanied by large reductions in the level of the natural compounds that we know are beneficial to health. This can lead to chemicals having to be added back into the food to supplement these losses. As part of this project we will look at the natural variation in the health beneficial compounds and (micro) nutrients in three main staple food crops: potatoes, wheat and tomatoes. We will follow them through many post-harvest processing and transporta-

tion chains to establish to what extent – and where – the nutrients are being lost.

Crime fighting scientists

The Macaulay Institute is leading an international team, which includes the **British Geological Survey**, to find ways that new technologies can help in the forensic investigations of crime, such as narrowing down areas of search for the police. One of the main thrusts of this new initiative is how more can be made of soil evidence. Dr Lorna Dawson, who leads the soil forensic research team at the Macaulay Institute said: "Soil has tremendous potential for providing forensic intelligence to police investigations, due to the complex nature of its composition. Despite having a long history, soil evidence in criminal cases has been largely under-used, primarily due to difficulties in analysis."

The network aims to change that by integrating soil fingerprinting methods and national soil databases with GIS – a form of 'smart map' that allows users to match soil forensic samples to their likely geographical origin.

Partnership Helps Rebuild Sri Lanka

Edinburgh University has joined with Queen Margaret University to help train people to rebuild their communities in Sri Lanka, after the devastation of the 2004 tsunami. The Universities have launched a joint PhD programme, designed to link academic research with professional practice in areas affected by conflict and humanitarian disaster. Students will divide their time between work

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and research in Sri Lanka, and short periods of supervision and training in Edinburgh.

The current group of students will soon return to Sri Lanka, where they will continue their work with some of the country's most vulnerable people, while researching for the PhD that will equip them to train the next generation of health and development practitioners to follow them.



Professor Richard Kerley, Vice Principal of Queen Margaret University and Professor Tim O'Shea, Principal of the University of Edinburgh, with the PhD students from Sri Lanka

Antarctic Ocean may lose all its ice

Researchers have identified four Antarctic glaciers that pose a threat to future sea levels using satellite observations. In a comprehensive evaluation of the Earth's ice sheets, experts from the University of Edinburgh and University College London determined the effect that Antarctica and Greenland were having on global sea level.

They found that together these two ice-sheets were responsible for a sea level rise of 0.35 millimetres per year over the past decade - representing about 12 per cent of the current global trend.

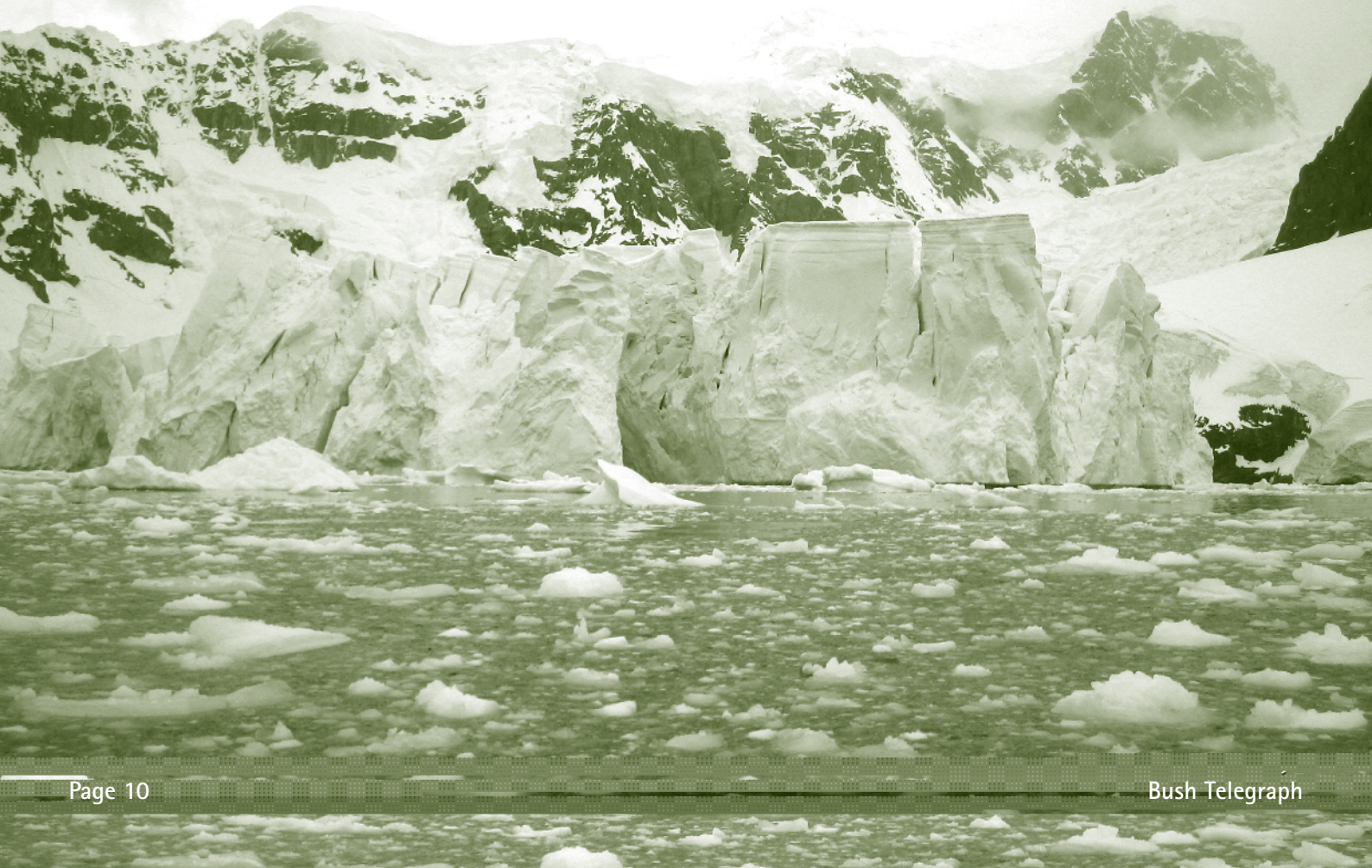
However, despite recent attention that has focused on the importance of the Greenland ice sheet, the research shows that its glaciers are changing too erratically to establish a trend with confidence. In contrast, four major glaciers in East and West Antarctica

were shown to be retreating in unison; raising concerns that global sea level could rapidly rise if the oceans continue to warm.

Dr. Andrew Shepherd, at the University of Edinburgh's School of GeoSciences, said:

"Our assessment confirms that just one type of glacier in Antarctica is retreating today - those that are seated in deep submarine basins and flow directly into the oceans.

"These glaciers are vulnerable to small changes in ocean temperature, such as those that have occurred over the 20th century, and those predicted for the 21st century. A rise of less than 0.5 °C could have triggered the present imbalance."



People & Events

ECRR DIARY 2007

Apr 18	Main Board	SAC Peter Wilson Building, King's Buildings, Edinburgh	14.15
May 14	Executive Committee	SCRI, Invergowrie, Dundee	10.30
	Directors' Lunch	Scottish Crop Research Institute, Invergowrie, Dundee	12.30
May 30	Biennial Forum	"Scotland's energy" – a one day meeting at SNH Battleby Centre	
Sep 3	Directors' Lunch	Moredun Research Institute, Pentlandsfield, Penicuik	12.30
Oct 12	Executive Committee	SAC, King's Buildings, Edinburgh	10.30
	Directors' Lunch	SAC, King's Buildings, Edinburgh	12.30
Nov 7	Main Board & AGM	Edinburgh, Venue TBA	11.00
	Directors' Lunch	Edinburgh, Venue TBA	12.30
	Workshop on climate change research	Edinburgh, Venue TBA	13.30-17.00
	Reception	Edinburgh, Venue TBA	17.00-19.00
Dec 3	Executive Committee	Venue TBA	10.30
	Directors' Lunch	Venue TBA	12.30

THE SCOTTISH ENERGY FORUM AT SNH BATTLEBY CENTRE, NEAR PERTH

SCOTLAND'S ENERGY ^{30 MAY} 2007 & ENVIRONMENT: THE TECHNOLOGICAL & SOCIAL CHALLENGES

The Forum will cover traditional and renewable energy technologies on the supply side, and will have a particular focus on their environmental and social impacts. We need renewables in the face of climate change and its inevitable impact of at least a 2°C rise by 2050; otherwise, the impact will be considerably greater.

Much of the technology is already available, leaving the potential barriers to implementation in the environmental and social issues. It is here that insufficient understanding, research and data exist, and, therefore, where the main debate must lie to assist rapid take-up, acceptance and ownership by our communities. Lessons learnt in these fields will benefit the export success of our emerging renewables industry.

Each of the five sessions: Oil and Gas/Coal/Nuclear; Wind Onshore/Offshore; Marine; Biomass/Biofuels; solar, will comprise a summary of the technologies and a presentation on environmental/social issues together with a discussion.

TOPICS & SPEAKERS

- o The Energy Challenges: Jim Skea, UK Energy Research Centre
- o Fossil Fuels and Nuclear: What is their Energy Future?: Stuart Haszeldine, Edinburgh University
- o Wind Technology: Bill Leithead, Strathclyde University
- o Interactions Between Birds & Wind Farms: Rowena Langston, RSPB
- o Social Aspects of Wind Farms: Claire Haggett, Newcastle University
- o Emerging Marine Energy Technologies: Robin Wallace, Edinburgh University
- o Socio-economic and Environmental Impacts: Sandy Kerr, Heriot-Watt University, Orkney
- o Biomass to Butanol Distribution: Martin Tangney, Napier University
- o Biomass/Biofuels in the Environment and Communities: Nicolas Gubbins, Highlands & Islands Community Energy Company
- o Prospects for Photo-Voltaics in the UK: David Infield, Loughborough University
- o From Hydro to Energy Company: Keith MacLean, Scottish and Southern Energy

VENUE

The Forum venue is Scottish Natural Heritage's Battleby Centre, near Perth (www.snh.org.uk/pdfs/scottish/tayslack/battlebymap.pdf)

REGISTRATION AND CONTACT DETAILS

Delegate: before 14 May £55, (after 14 May £70)

Student: before 14 May £20, (after 14 May £25)

Please register on-line and pay by credit card at <http://www.ecrr.org.uk>. If you have a query, please contact Chris Browitt or Mike Talbot at the University of Edinburgh: cbrowitt@staff-mail.ed.ac.uk or mike@bioss.ac.uk

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MRC Human Reproductive Sciences Unit	www.hrsu.mrc.ac.uk
National Museums of Scotland	www.nms.ac.uk
Royal Botanic Garden Edinburgh	www.rbge.org.uk
Royal Society for the Protection of Birds – Scotland	www.rspb.org.uk
Scottish Agricultural Science Agency	www.sasa.gov.uk
Scottish Crop Research Institute	www.scri.sari.ac.uk
Scottish Natural Heritage	www.snh.org.uk
Scotland & N. Ireland Forum for Environmental Research	www.sniffer.org.uk
Edinburgh Centre for Tropical Forests	www.nmw.ac.uk/ectf
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FUTURE ISSUES

Contributions to the Bush Telegraph are welcomed. All contributions, comments and suggestions can be emailed to Mike Steele at mike.steele@sac.ac.uk.

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