

Decision on Centre for Ecology & Hydrology

NERC's governing Council met on 8 March to discuss restructuring the Centre for Ecology & Hydrology (CEH). Council discussed the consultations with staff, stakeholders and the public on proposals for the centre, which were set out in a statement of intent last December.

The plan to focus staff and research on to four of CEH's sites (Bangor, Edinburgh, Lancaster and Wallingford) is unchanged. The other four research sites will close (Banchory, Dorset, Monks Wood and Oxford). The director's office will move from Swindon to Wallingford, making Wallingford the new headquarters. Key science at sites that are to close will be continued at retained sites. Council anticipates the restructuring will cost about £43 million, will take four years, and will lower CEH's annual operating costs by over £7 million per year.

The consultation raised concerns that some of CEH's strengths, such as in biodiversity, nationally-important datasets and long-term monitoring, might be jeopardised. To reduce these risks, Council revised its funding allocation for CEH, adding £1.3 million to the original £15 million per year. It also agreed a revision of the original target for commissioned research from £11 million to £12.4 million per year. As a result, up to 40 of the 200 posts at risk in the business plan will be saved.

Council also confirmed that NERC will go ahead with a partnership funding initiative, of £2 million per year, that both CEH and partners (such as universities) can bid into for collaborations in key areas of ecology and hydrology.

CEH will remain a science-driven, not a site-based, organisation. It will continue to deliver high quality science through three core programmes – biodiversity, water and biogeochemistry – and two cross-cutting themes of climate change and sustainable economies, all supported by environmental informatics.

Council believes that the decision on restructuring creates the right size and shape for CEH, enabling it to sustain and improve on its position as a leading centre in environmental research and monitoring. Council greatly regrets the impact on CEH staff, and will ensure that everything possible is done to assist all staff, particularly those adversely affected.

Links:

Press release: www.nerc.ac.uk/publications/latestpressrelease/2006-13ceh.asp

Statement: www.nerc.ac.uk/secretariat-council/ceh/decision.asp

Winners

We have three winners of our book competition, who each get a copy of *Underground* by popular science writer Yvonne Baskin. Mrs Joyce Robinson, of Consett, Co. Durham, Ann Henderson of Edinburgh, and Paul Dickson of Ormiston, East Lothian, all told us that an estimated six million square miles of seabed is dredged or trawled each year.

Monitoring fires from space

Researchers monitoring fires across Africa can now calculate how much vegetation is going up in smoke as the fires burn, helping quantify air pollution and greenhouse gas emissions.

Martin Wooster, of King's College London, said, 'Before, we relied on burn 'scars' spotted after the fires had happened. Now, new instruments on satellites that orbit above fixed points on the Earth's surface (geostationary satellites), together with better analysis techniques, let us estimate how much vegetation a fire is burning up as frequently as every 15 minutes. The new measures sense heat from the fires, and can feed information about smoke emissions into models of the atmosphere. This assists forecasts of where the smoke ends up—important because it can have dramatic effects on air quality. The amount of heat also indicates how much greenhouse gas a fire produces. Two fires may burn the same area, but the amount of fuel they consume per unit area, and so the amount of greenhouse gases they produce, can be quite different.'

The European Space Agency is already using the team's results to help decide what data a future satellite mission (part of the Global Monitoring for Environment and Security programme) should collect, and EUMETSAT (operators of the geostationary satellite) is investigating how it can provide routine long-term data on fires and their contributions to atmospheric aerosols, greenhouse gases and climate.



Fires burning across the West African country of Sierra Leone.

Jeff Schmaltz, MODIS Rapid Response Team, NASA/GSFC

NERC news

The British Geological Survey's education webpages came runner-up in the Yahoo! Search Finds of the Year 2005 competition. Yahoo! Search said, 'If you want to know anything about rocks or how they were formed, try here. The site even has a section that allows you to ask specific questions and get a response.' www.bgs.ac.uk/education/

Our joint exhibition on biodiversity, with the Biotechnology and Biological Sciences Research Council, was number one in *The Times*' top five museums for January. The exhibition is at Cardiff Museum until 21 April and will be at The Forum, Norwich, in September as part of the BA Festival of Science. www.nerc.ac.uk/insight/exhibitions/biodiversity.asp

NERC has launched a new £4 million research programme into atmospheric aerosols and their effects on climate change. Our poor understanding of atmospheric aerosols makes predictions of global and regional climate change very uncertain. The research will help tackle this. The programme will run until 2010/11. You can find out more through the NERC website.

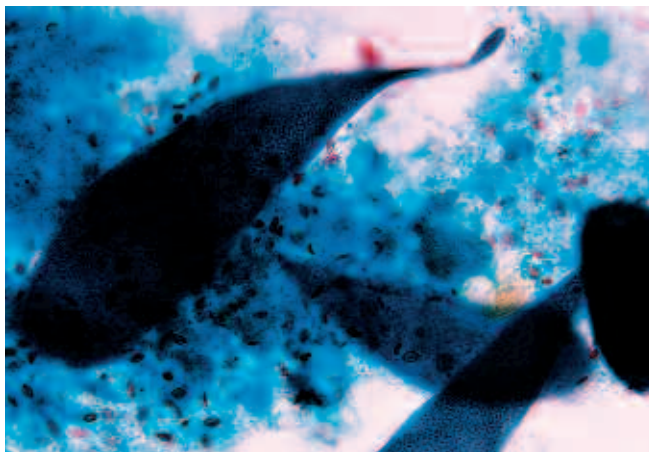
Nicholas Cox, of the British Antarctic Survey, was awarded an MBE in the New Year Honours list for services to British polar science. PhD student Robert Wilson was the only UK-based winner in the International Midland Valley Structural Geology competition. Congratulations Nicholas and Peter!

Do hormones in sewage affect wild fish?

Scientists are preparing to find out whether hormones in sewage effluent disrupt the sex lives of wild fish populations. Peter Matthiessen, of the Lancaster Environment Centre (part of

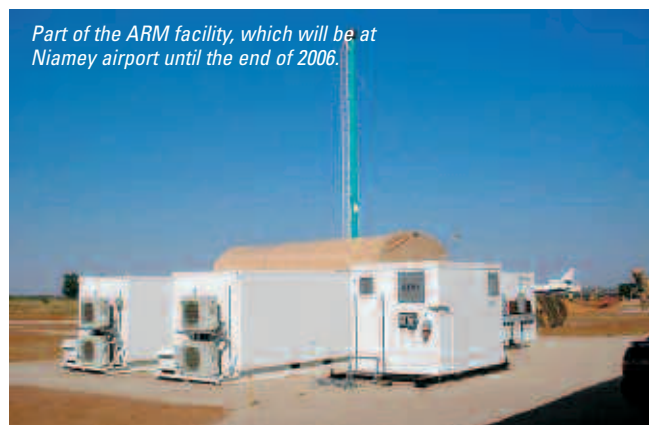
NERC's Centre for Ecology & Hydrology – CEH), explained, 'We know that when stickleback fry in the lab are exposed, even very briefly, to concentrations of the synthetic birth-control hormone

ethynylestradiol found in sewage, their sexual development, breeding behaviour and the number of eggs they eventually produce is impaired.' Now, Defra, the Environment Agency and UK Water Industry Research want to investigate the long-term implications for wild fish populations. They are supporting a large study downstream of a sewage discharge on the River Ray, Wiltshire. The research, which began in January, involves scientists from CEH, Plymouth Marine Laboratory, the Centre for Environment, Fisheries and Aquaculture Science, Brunel University and the Universities of Exeter and Sussex.



Looking at our atmosphere from above and beneath

This spring, NERC scientists went to Niamey, capital of Niger, to collaborate with American researchers studying how much heat the atmosphere absorbs and emits, both as seen from the Earth's surface and from space. Tony Slingo, of the Environmental Systems Science Centre in Reading, explained, 'It's exciting because we're combining information from satellites (the Geostationary Earth Radiation Budget instruments) with data from a new mobile laboratory, run by the US Atmospheric Radiation Measurement (ARM) programme, that looks up through the atmosphere. We can stare at the atmosphere for long periods both from above and from below, avoiding the limitations of previous short experiments.' He went on, 'We don't fully understand what contribution



Part of the ARM facility, which will be at Niamey airport until the end of 2006.

greenhouse gases, clouds, dust and other aerosols make to the Earth's radiation budget, ie, how much each factor either warms or cools the Earth. There are many worrying disagreements between our models of the climate system and what we actually see. This research should help reduce these, improving our ability to predict climate change.'

The work also contributes to a huge international experiment investigating the structure and variability of the West African monsoon (the African Monsoon Multi-disciplinary Analysis) and there are many links between the two projects. You can find out more about the research Tony is leading at www.nerc-essc.ac.uk/RADAGAST/

Repairing war damage in Afghanistan

Librarian Bob McIntosh has been repairing some unusual damage to geological reports and maps—bullet holes. Bob, who usually works at the British Geological Survey in Edinburgh, has been helping the Afghanistan Geological Survey (AGS) in Kabul get back on its feet. He explained, 'The Survey was on the front line during the civil war after the Russians left in 1989. So it is no surprise that the library and archive suffered damage, but seeing it really brings the situation home. One report we were preparing for scanning had a direct hit from a 7.62mm Kalashnikov round, which had penetrated a good three inches from the back cover and



through 15 folded maps before coming to a stop near the front. The volume was almost certainly being used to protect fighters who were positioned

in the Survey building, and thankfully it must have been successful.'

Bob is training AGS staff to repair and conserve maps as

The damage to this portfolio of maps gets worse as the bullet penetrates—clockwise from the cover.

part of a DfID-funded project. He added, 'Every day poses new challenges. One map, when unfolded, had eight bullet holes.' The maps, once repaired, will be scanned and linked to a library and archive database that the Afghan staff are developing. This will help strengthen the Survey's resources, and should also attract interest from local and international mining companies. Developing the country's rich mineral potential could help lead to a more secure future for Afghanistan.

Recovering rivers?

Dissolved organic carbon (DOC) is turning our upland rivers and lakes darker. But they may be returning to pre-industrial states rather than suffering from climate change as some think, according to researchers from the Centre for Ecology & Hydrology (CEH), University College London and the University of Leeds. Chris Evans, of CEH, explained, 'Since 1988, levels of DOC in UK upland waters studied by the UK Acid Waters Monitoring Network have risen 91 per cent on average, and similar changes are occurring in parts of Scandinavia and North America. Some blame climate change, predicting peatlands will begin releasing vast quantities of climate-changing carbon. But this may be overly pessimistic. Our analyses

suggest the biggest consistent factor affecting these ecosystems is reduced acid rain. Less acidic soils allow more of the soluble organic carbon produced by plants and soils to leach into streams and lakes. Rising temperatures, more droughts and faster plant growth may contribute, but we suspect they're not the main cause.'

Not everyone agrees, and, as Chris comments, there's 'a lively ongoing debate'. So, this spring, work led by Pippa Chapman starts at the University of Leeds to test the researchers' ideas. The team will experiment with soils from polluted and unpolluted sites across the UK. The research should help predict changes in the peatland carbon cycle, and in the ecology of upland waters.

Carbon dioxide makes rivers rise

Carbon dioxide doesn't just warm our planet, it also affects the world's water resources, according to Nicola Gedney, of the Met Office and colleagues from NERC's Centre for Ecology & Hydrology (CEH).

More water has been flowing through rivers around the world in recent decades, even though rainfall over land has changed little. When the team modelled these river flows they found short-term climate variations alone weren't enough to explain the increases. Instead, the patterns match what's expected when plants respond to carbon dioxide. Peter Cox, of CEH, explained, 'When carbon dioxide levels rise, plants start closing pores on their leaves,

so they lose less water, and in turn take less from the soil. Put simply, this means there's more left to drain into rivers.'

This is the first time this response has been seen on a large scale. Peter added, 'We need to consider carbon dioxide's effects on vegetation when assessing how global water resources will change over the coming decades. This mechanism could partially offset water shortages where rainfall drops, but will exacerbate changes where rainfall increases.'

The study, which was reported in the journal *Nature* in February, was carried out at the Joint Centre for Hydro-Meteorological Research, based at CEH's Wallingford site.

Cementing a profitable relationship

A new way of testing cement, developed by Mark Ingham and colleagues at the British Geological Survey, has won an award under NERC's 'Rewards for Innovators' scheme.

Mark explained, 'The idea came when a cement works asked my advice about their testing regime. They were trying to use the British Standard method, but it was time-consuming and technically challenging. I realised that BGS had the expertise to devise a better approach.'

Cement manufacturers need to know what's in their raw materials, so as to control production. They analyse them using X-ray fluorescence spectrometry. Mark and his colleagues developed standard materials for calibrating X-ray spectrometers from commercially-available high purity chemical compounds. The new system uses 13 oxides—six more than the previous method.

Mark and his colleagues started developing the idea only to find that cement works couldn't introduce the innovation. But the new procedure seemed so promising that Mark approached the spectrometer-manufacturing company PANalytical about making it commercially available. The technology is now selling well, and both BGS and PANalytical are profiting, shipping over 30 sets of standards in one year alone.

NERC recognised the team's work by awarding them a share of sales revenue. Chris Miller, from NERC's commercialisation team, said, 'This is our first award and we're pleased that the new scheme is beginning to show results. It's considerably more generous than the old one. NERC needs to encourage innovation and believes properly rewarding people for their efforts is the key element in this.'

Bluebell battles

Almost half the world's bluebells (*Hyacinthoides non-scripta*) grow in the UK, where they can form vast springtime carpets of colour. But hybrids of the imported Spanish bluebell, introduced into the UK in the late 1600s, and widely grown in gardens, may be threatening this spring spectacle. Deborah Kohn, who is undertaking a three-year study into bluebell ecology, explained, 'Hybrids could out compete or cross with our native flowers where the two types grow close together. There's strong anecdotal evidence that Spanish and hybrid bluebells are now common in natural habitats, and that they resist strenuous (and ingenious) attempts to eradicate them.' Deborah has sampled bluebells across central Scotland, finding that about a third of native bluebells grow close enough to non-natives to hybridise. But she cautions, 'We don't yet know for sure whether non-natives spread from where they've been planted or dumped, or whether they really are taking over.' NERC is funding Deborah's work through the Daphne Jackson Trust.

Biotechnology YES

NERC-funded students from the University of Birmingham were amongst the winners of the Biotechnology YES competition 2005, designed to tutor young scientists in setting up new businesses. Poppy Leeder, from NERC's commercialisation team, explained, 'It's a bit like *The Dragon's Den* on BBC2. The students form an imaginary spin-out company with a hypothetical science plan, and seek funding from venture capitalists. Metallogica wanted £2.2 million to recover precious metals from domestic and industrial ash. Their entry won £500, but the real prizes were the skills and the contacts they took away.'

Metallogica outlined strategies to develop a bacterium that sequesters metal on its outer membrane. Such a bacterium could help reduce the need for open cast mining, and also help clean-up operations. The team had to demonstrate they understood the financial aspects of their plan, and how they would hold onto their ideas while promoting them.

NERC has co-sponsored the competition for several years. Participants attend workshops

where experts mentor teams in marketing, finance and intellectual property rights. Poppy added, 'We realise how useful a thorough grounding in starting up a successful business can be, and we know that participants are almost twice as likely to end up working in the private sector as students who didn't take part. This year, we're again sponsoring a prize for the best idea based upon NERC science, and we want to encourage NERC-funded students to apply. There may also be a workshop devoted to the sciences of the environment that NERC supports.'

The top teams from the workshops will go through to a London final with the opportunity to win £1000 and a trip to the USA to present the winning strategy in a US business plan competition.

Biotechnology YES is organised by the Biotechnology and Biological Sciences Research Council and the University of Nottingham Institute for Enterprise and Innovation.

Find out more at: www.biotechnologyyes.co.uk



Springing into action



Springwatch, the biggest survey ever into the arrival of spring, is underway once more. The Centre for Ecology & Hydrology (CEH) has again joined forces with the Woodland Trust, the UK's leading woodland conservation charity, and the BBC, to oversee the study.

Springwatch shows how the timing of seasonal events relates to our climate. Tim Sparks, from CEH Monks Wood, said, 'The natural world is responding to a warming climate. With the help of our dedicated recorders we can start to understand where this may cause problems in the future.'

People are reporting frogspawn, ladybirds, red-tailed bumblebees, peacock butterflies, hawthorn flowers and swifts through the springwatch website (www.bbc.co.uk/springwatch). This year, volunteers can also send text messages about sightings from mobile phones while out and about. The calls automatically log the date and the recorder's location.

Last year, 157,000 records from volunteers threw up some startling results.

Ladybirds and butterflies were waking up around three weeks earlier than 30 years ago. The hawthorn, which is also known as the mayflower, and traditionally linked to late spring, was often spotted flowering in April, while swifts arrived around a week earlier than expected.

This year's results will be revealed during the three-week series *Springwatch* with Bill Oddie, on BBC2 in May. Find out more at www.bbc.co.uk/springwatch

Drought in the Amazon



The 2005 drought in the north-west Amazon region could be a sign of worse to come, according to Oliver Phillips from Leeds University, who is leading an international team of researchers to assess the situation. In October, parts of the Amazon River reached their lowest levels for 35–60 years. The drought, which seems to have been the worst since records began, appears to have been associated with warmer water in the North Atlantic and Gulf of Mexico. Oliver said, 'The 2005 drought reflects what many scientists think will be the future for the Amazon region as climate changes. So this is an unprecedented opportunity to examine its short- and medium-term effects on the forest.'

Yadvinder Malhi, of Oxford University, explained, 'The north-west Amazon usually has no dry season. Most tree species that grow in this region are unlikely to be adapted to even modest seasonal drought, so this long drought may have particularly severe effects.' The Oxford researchers have been working with Brazilian and NASA scientists, using weather and satellite data to map the extent of the drought and explore its effects on the forest canopy.

Over the last 25 years, forest growth has sped up in Amazonia, locking away a substantial amount of potentially climate-changing carbon. But researchers know that short-term droughts in the Amazon (sometimes caused by El Niño) can reduce rates of tree growth and even kill trees, releasing carbon as the wood decays. The scientists want to know if this is happening now, and whether it could offset the recent gains.

The team visiting the Amazon, which includes scientists from Brazil, Colombia, Peru and Venezuela, spent February and March revisiting long-term monitoring plots. They were looking for changes in tree growth and death rates that might have been caused by the drought.

The scientists are now analysing the data and examining tissues from tree leaves and roots collected before and after the drought, trying to find out the biological mechanisms behind any changes. Jon Lloyd, of Leeds University, explained, 'It will be particularly interesting to see if the drought has hit some species harder than others. This might slowly start to change the biodiversity of the region if droughts become more frequent, as some climate models predict.'

We hope to bring you news of the findings in future issues of *Planet Earth*.