

# KNOWLEDGE EXCHANGE

Sustainable solutions from environmental science



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# Encouraging knowledge exchange

D. Hurst / Alamy



THIS IS A critical time for planet Earth: rapid economic and population growth are putting increasing pressures on natural resources, and human activities are causing unprecedented environmental changes. The Natural Environment Research Council (NERC) funds research that addresses these important environmental issues. It provides the natural science to quantify risks associated with environmental change; develop mitigation and adaptation strategies; and improve people's ability to manage the environment sustainably. Furthermore NERC science makes an important contribution to the economy and improving people's well-being. For the UK to remain competitive within a global economy, we need to ensure that, where possible, scientific advances are translated swiftly into new goods and services.

NERC's research is used by a variety of stakeholders such as the business community, policy-makers and society to:

- **provide the scientific evidence** necessary to inform public policy and business strategy as our environment alters, for example, as a result of climate change;
- **protect people and avoid costs** through more effective forecasting of environmental hazards;
- **create wealth** by providing the starting point for new or improved products, services and solutions in business and industry.

To achieve these goals, we encourage scientists to actively engage with stakeholders to gain a mutual understanding of each other's needs, and NERC's knowledge exchange team helps to stimulate communication at all levels, from

government chief scientists to PhD students. Knowledge exchange is fundamental to NERC's strategy *Next Generation Science for Planet Earth*. We are committed to promoting effective dialogue; providing better systems to share data, skills and knowledge; and stimulating and supporting commercialisation.

We ensure that dialogue with stakeholders is integrated into scientific research in a seamless way, from conception to completion. For example, NERC is taking a leading role in a multiorganisational research programme, *Living with Environmental Change*, which has been designed to incorporate the views and needs of people who will ultimately use the science, right from the outset. The outcome of this is that our research will be more responsive to the needs of society. Knowledge exchange is a two-way process as our science also benefits from the capabilities and guidance provided by our stakeholders.

This publication provides some of the examples of the high value that NERC-funded research programmes have already contributed to the economy and to society.

**Professor Alan Thorpe**  
Chief Executive, Natural Environment Research Council

## What is knowledge exchange?

OUR KNOWLEDGE of the natural environment is continually growing. With the development of new technologies, we are entering an exciting and unprecedented era of modern science. But what good is this knowledge if nobody uses it, understands it, or even knows it's out there? And how can scientists help if they don't recognise what society really needs to know? This is where knowledge exchange plays a vital role. We use this term to describe the two-way exchange of skilled people, knowledge and expertise between the scientific community and those who use science.

## Science to policy

NERC-funded research contributes directly to policy development, monitoring and assessment. We provide reliable and independent policy advice to government in a variety of ways. These include direct briefings, sitting on advisory committees, contributing to international reports and commissioned research. NERC science has had a major impact across the globe; for example, our discovery of the hole in the ozone layer gave impetus to the Montreal Protocol, an international treaty to eliminate the production and consumption of ozone-depleting chemicals. We continue to provide the science needed for both national and international policy in key areas such as climate change, energy, biodiversity and the Water Framework Directive.

### 40% House

A REPORT which outlines the challenges in delivering a 60 percent carbon saving in the UK's residential energy use by 2050 has been produced, thanks to the 40% House project. This study was undertaken by the NERC-funded Tyndall Centre for Climate Change Research. It focused on making deep cuts in carbon emissions whilst successfully meeting household energy needs. Over two-and-a-half years, researchers examined different methods of reducing CO<sub>2</sub> emissions and the changes in policy and industry needed to achieve a 60 percent reduction. Scientists shared this knowledge with policy-makers, white-goods manufacturers, architects and planners, and energy suppliers.



ALASTAIR GRANT/APA Photos

### Climate change policy

NERC is at the forefront of climate change research and spends about £40 million each year on climate change programmes. NERC-funded scientists made major contributions to two landmark reports: the *Stern Review* (2006) on the economics of climate

change and the *Intergovernmental Panel on Climate Change Fourth Assessment Report* (2007). These reports will form the basis of global climate change policy in the next decade.

### Guidelines to protect Antarctic waters

THERE ARE widespread concerns about ships transporting invasive marine species into Antarctic waters and between biologically distinct regions within the Antarctic Treaty Area. Ships can take on board marine organisms in their ballast water – the extra water carried to provide stability. Experts from NERC's British Antarctic Survey, together with the Maritime and Coastguard Agency, have produced draft guidelines on ballast water management for all vessels entering Antarctic waters, based on scientific research. These were accepted by the Antarctic Treaty Committee on Environmental Protection in June 2006 and have been passed to the International Maritime Organisation to be extended to all shipping activities.





## Capturing and storing carbon dioxide

NERC's British Geological Survey (BGS) is one of the organisations involved in the world's first demonstration that carbon dioxide (CO<sub>2</sub>) can be captured and stored underground. The project (Statoil Sleipner) is of huge international interest because if the concept can be applied widely, it holds out the promise of making deep cuts in global CO<sub>2</sub> emissions.

BGS is monitoring and modelling the distribution of injected CO<sub>2</sub> in the Utsira Sand, Norway, to check that it is not migrating out of the intended storage site. This type of demonstration will do much to satisfy requirements for legal verification and address safety issues. BGS leads the UK in carbon storage technologies and it contributed to the government's *A Strategy for Developing Carbon Abatement Technologies for Fossil Fuel Use*, launched in 2005.

In a separate study, NERC's collaborative centre, Plymouth

Marine Laboratory (PML), has influenced both national and international policy-makers on the issue of ocean acidification due to rising concentrations of atmospheric CO<sub>2</sub> and the potential impact of carbon capture and storage.

Rocks under the North Sea could store over 800 gigatonnes of CO<sub>2</sub>. However, if storage facilities were to leak, the surrounding seawater could become more acidic. In collaboration with BGS, PML emphasised to policy-makers the importance of minimising the chance of accidental leakage. However, they stressed that to adequately assess the possible benefits of geological storage, the environmental impacts of high but localised contamination must be compared with the inevitable ocean acidification caused by doing nothing to reduce atmospheric CO<sub>2</sub> emissions.

## Fall in albatross deaths

POLICIES based on British Antarctic Survey (BAS) research reduced the numbers of albatrosses killed by long-line fishing around South Georgia from 6000 deaths in 1997 to zero in 2006. Long-term monitoring and extensive tracking programmes using satellite technology clearly showed that the birds' foraging trips overlapped with local fisheries. The Commission for the Conservation of Antarctic Marine Living Resources, which regulates fishing in the Southern Ocean, used BAS data to decide on mitigation measures.



**IN BRIEF****Bird-ringing stresses birds**

Bird-ringing techniques used to track wild birds can cause stress and lead to erratic behaviour, according to research at Cardiff University. The scientists found that following release, many birds temporarily stopped foraging for food in their usual locations and failed to return to their nests for several hours. During these long absences nest temperatures fell, leading to slower embryo development. NERC Fellow, Rob Thomas, is now working with the British Trust for Ornithology to develop this research and to revise regulations for bird ringers.

**Law of the sea**

GEOLOGISTS and geophysicists at the National Oceanography Centre, Southampton (NOCS), have delivered independent scientific evidence to the UN which could have a major impact on the UK's territorial sovereignty.

The UK's sovereignty extends beyond dry land to include a sizeable area of the seabed which forms the continental margin. According to the UN Convention on the Law of the Sea, a state has sovereign rights to a 200 nautical-mile Exclusive Economic Zone and beyond that, up to a further 150 nautical-miles of continental shelf.

NOCS staff led the UK technical team in preparing and presenting submissions to the UN which could secure UK sovereignty over continental shelf areas beyond 200 nautical-miles. A submission made jointly in May 2006 with experts from France, Ireland and Spain covers a part of the Bay of Biscay and is currently under review\*. Cases for other UK shelf areas and Overseas Territories will follow before May 2009.

NOCS is a world leader in providing this type of technical advice for shelf delimitation. Its impartial evidence can support negotiations between neighbouring coastal states on overlapping territorial claims. This has led to a growing number of commissions from governments of other coastal states for its advisory and training services.

*\*at time of publishing*

**Rebuilding Afghanistan's economy**

BENEATH an old al-Qaeda training camp close to the outskirts of Kabul, British Geological Survey (BGS) scientists and colleagues in Afghanistan have identified a vast copper deposit that could be worth \$30 billion to the war-torn country's shattered economy. The UK team of geologists has been assisting the Afghanistan Geological Survey over the past two years to interpret geological data. The group, funded by the Department for International Development, has created a detailed three-dimensional model of the deposit.

To help capitalise on this world-class resource, BGS and the World Bank worked with the Afghanistan Ministry of Mines to prepare a new minerals law to enable effective management of an emerging mining industry.





### Tsunami alert

SCIENTISTS at NERC's Proudman Oceanographic Laboratory (POL) played an integral role in designing and installing crucial parts of the Indian Ocean tsunami monitoring system which became operational around the coast of Africa and the Arabian Peninsula in August 2006. Phil Woodworth from POL said, 'The central part is getting information off the instruments and back to warning centres as quickly as possible. Tsunami travel times in the Indian and Atlantic Oceans are much shorter than in the vast Pacific, so we realised we needed an alert system that would be substantially faster than the Pacific Tsunami Warning System.' As well as rapidly responding to a tsunami threat, the system will constantly monitor sea-level rise.

### IN BRIEF

#### Energy Atlas launched online

The UK Energy Research Centre (UKERC) has launched the Energy Research Atlas, the first tool to show the live status of energy research and development in the UK. The atlas is intended to form a key part of the evidence base for prioritising and planning research as well as development and demonstration activities. This is the first time that the UK's energy research activities have been so comprehensively tracked and recorded. You can view the atlas at: [www.ukerc.ac.uk](http://www.ukerc.ac.uk)

*Funded by: NERC, the Engineering and Physical Sciences Research Council and the Economic and Social Research Council.*



### Countryside survey

SINCE 1978, NERC's Centre for Ecology & Hydrology has run the Countryside Survey – a unique study of the natural resources of the UK's countryside.

The survey is repeated every eight to ten years to stock-take things such as wild plants, trees, hedges, streams, ponds and soils. The information is used to help plan the management of the countryside and protect biodiversity.

Examples of where this world-leading audit has been used are:

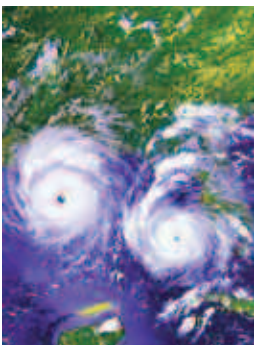
- determining the landscape potential for renewable energy production;
- increasing knowledge of the impacts of nitrogen and acid deposition;
- determining the quality of freshwater and soil resources;
- informing hedgerow legislation to encourage management, planting and protection;
- monitoring for Priority Habitat Action Plans for arable field margins, hedgerows and some upland habitats.

## Products and services

NERC's research centres, collaborative centres and funded research in universities can contribute directly to the economy by providing goods and services, or by helping people to react quickly and effectively to environmental hazards, avoiding economic disruption and loss of lives.

### Insurance companies collaborate with atmospheric scientists

ONE of the world's biggest insurance companies, the Willis Group, has hooked up with researchers from the National Centre for Atmospheric Science to work on the frequency, severity and impact of hurricanes, floods and storms to contribute to the financial evaluation of these events. This is part of the Willis Research Network, the largest-ever collaboration between academic and financial communities. This type of knowledge exchange allows investment into academic research whilst translating science into useful information to help the insurance sector better prepare for events that may arise from climate change.



### City slickers – tracking urban pollution

RESEARCHERS at the National Centre for Atmospheric Science and colleagues, have formed a business partnership with an engineering solutions company, CD-adapco, to develop urban-scale weather and air-quality computer models. The researchers found they could use software developed by CD-adapco in air quality models to successfully reproduce the shape and layout of streets and buildings in UK towns and cities,

and to simulate air and heat flow.

Scientist Stephen Belcher said, 'There is a growing need to simulate flows in urban areas for applications ranging from dispersion of traffic pollutants to predicting the spread of terrorist gas releases. This new partnership promises the tools we need to tackle these issues.'

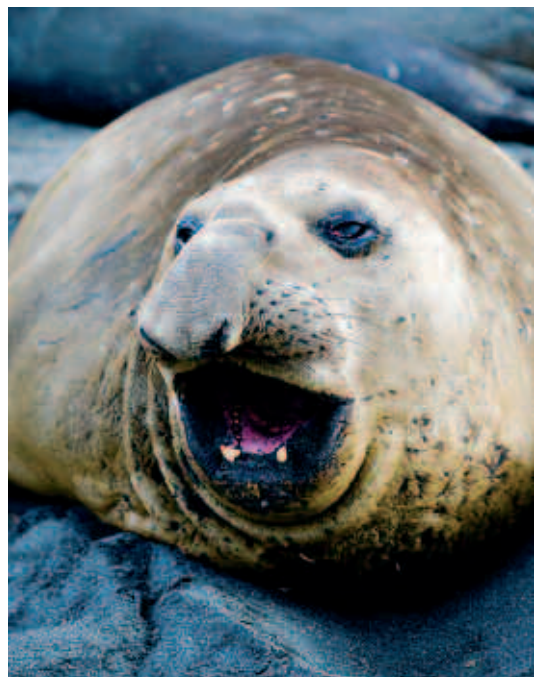
### Elephant seals help science

SCIENTISTS at NERC's collaborative centre, the Sea Mammal Research Unit based at the University of St Andrews, have equipped southern elephant seals with sensors to provide temperature and salinity profiles across the Southern Ocean.

By studying the journeys of these natural explorers of the Antarctic, researchers have not only recorded information about their habits, but have also collected data which have improved our understanding of the connections between the ocean, global climate dynamics, and the influence of human activities. In particular, these near-real-time data have provided new insights into the dynamics of the Southern Ocean and its role in transferring heat around the world.

The small computers used inside the seal tags are very light so as not to interfere with the behaviour of the animals. After several months, they drop off during the annual moult when seals shed their old fur. These sensors are being sold and are used by other research groups.

*Funding: through NERC's Connect B (predecessor of Partnership Research Grants) and matched by the Department of the Navy (USA).*





## Saving coral reefs – fishermen use science to influence government

A STUDY to model the effects of parrotfish on the health of Caribbean coral reefs has led to an example of science informing stakeholders, who then take a lead in influencing government policy.

In November 2007, researchers from the Universities of Exeter and California Davis published a paper in the journal *Nature* which showed that damaged Caribbean reefs will continue to decline over the next 50 years. Parrotfish keep reefs healthy by eating the seaweed that can smother the coral. The scientists argue that in order to secure a future for coral reefs, particularly in light of the predicted impact of climate change,

parrotfish need protection from fishermen. Overfishing the parrotfish reduces the health of reef habitats which then support fewer fishes and so decreasing the sustainability of commercial fish species.

The Fisheries Cooperative in Belize invited one of the lead scientists to a meeting to discuss the role of parrotfish in reef ecosystems. At the meeting, 170 fishermen unanimously decided to recommend a ban on the exploitation of parrotfish – largely because they see the value in maintaining the reef habitat for their target fish species. As a result, the government of Belize is preparing new legislation to address the issue.

## Ground stability report for home buyers

PEOPLE buying a property in the UK might benefit from a new ground stability service launched by the British Geological Survey and The Coal Authority in 2006. The report provides low-cost property-specific information in simple language on the potential hazards related to natural subsidence, the impact of mining and the risk of damage from brine extraction. The economic benefits to the insurance industry of BGS ground stability information are estimated to be £70-270 million.\*



## Marine bioproducts – a growing market

NERC's Marine and Freshwater Microbial Biodiversity programme has put the UK in a good position to exploit a growing market in the marine bioproducts sector. If the UK were to claim just a one to five percent share of this market by 2021, it could realise economic benefits of around £224-1122 million.\*

Achievements include the discovery of a whole range of new microbes, many of which appear to produce compounds with innovative applications. One microbe is exhibiting properties that seem to inhibit the hospital super-bug, MRSA. The programme also offers solutions to the problem of microbial fouling on ships' hulls and other wet surfaces, and has implications for medical implants, food-processing facilities and bioreactors.

## Monitoring sea ice

THE BRITISH Antarctic Survey (BAS) has been awarded a major contract to manage sea ice monitoring services for research ships, cruise liners and fishing boats navigating in the Southern Ocean. This will involve managing a consortium of organisations from Canada, Denmark, Germany, Italy, Norway and the United Kingdom which provide these services. The project is part of Polar View, a programme which delivers a range of polar environmental information services as part of the European Commission and European Space Agency's Global Monitoring for Environment and Security programme.



\* The consultants, PricewaterhouseCoopers, used an accepted methodology, known as evidence-based appraisal, which focuses on interviews with key stakeholders. A deliberately cautious approach was taken with regard to the economic modelling – with benefits being annualised over 25 years using a discount rate of 3.5 percent for all case studies. This conforms to HM Treasury appraisal standards and protocols as set out in the 'Green Book' on appraisal and evaluation in central government. The benefits are expressed in present value terms. These estimations were published in May 2006.

**IN BRIEF****Better predictions of dangerous gusts at airports**

After a decade of work, scientists at the National Centre for Atmospheric Science and the Met Office have at last seen the fruits of their labour – a new weather forecast system for airports that can predict turbulence and dangerous gusts. The Met Office has already adopted the system, which came into operation in November 2006, and it is being used at four airfields in the UK and the Falkland Islands.

**A 3D look at the world beneath our feet**

SCIENTISTS at the British Geological Survey (BGS) are developing the next generation of geological maps of the UK – three-dimensional visualisations of the world beneath our feet. Using information, mainly from boreholes, they are constructing detailed 3D geological models of parts of London, Glasgow, Manchester and Salford.

One of the biggest regeneration initiatives in the UK has commissioned BGS to model the geology of Scotland's Clyde Gateway area in 3D. The Clyde Gateway Partnership\* is taking place in the east of Glasgow and South Lanarkshire and will be developing vacant, derelict and contaminated land to improve people's well-being, the area's economy, and to create new facilities for the Commonwealth Games in 2014.

These new models explain features using both geological and engineering language which help planners, engineers and developers to understand the different soil and rock layers beneath the city in terms that are relevant to them. This will help them determine how best to use the land and address the many complicated environmental issues resulting from the area's industrial heritage such as shallow mining, drainage problems and contamination. The key to the models' success is in understanding how planners, engineers and regulators work, and producing a product which is tailored to their specific needs.

*\*The partnership includes Glasgow City Council, South Lanarkshire Council, Scottish Enterprise and Communities Scotland.*

**Flood Estimation Handbook**

THE CENTRE for Ecology & Hydrology's *Flood Estimation Handbook* provides guidance on rainfall and river flood frequency estimation in the UK. Flood frequency estimates are needed for planning and assessing flood defences, and designing structures such as bridges and reservoir spillways. The handbook also provides methods for assessing the risk of notable rainfalls or floods. It builds on previous flood studies which have already provided significant benefits to the UK economy and is predicted to generate further benefits of £7-34 million.\*

*\* See bottom of page 7 for details of calculation.*



## After the gold rush

BRITISH Geological Survey scientists have developed new methods of extracting gold which reduces the risk of mercury poisoning and could save the lives of thousands of people.

Worldwide, the small-scale gold mining industry employs around 13 million people, but many workers pay a high price for this precious metal. They often damage the environment and their own health by using mercury to extract gold from the sludge at the bottom of a gold pan. Miners stir this toxic metal, usually by hand, and recover gold from the mixture by heating the alloy over an open fire. This process releases mercury vapour which causes serious health problems when inhaled.

Working with the Department of Mines at the University of Tarkwa in Ghana, the scientists developed a technique which uses cheap, safe and readily available chemicals along with an easy-to-make furnace. It has been proved that it can safely recover virtually 100 percent of the gold.



### IN BRIEF

#### Commissioned research services

Through its research centres, NERC provides commissioned research in excess of £40m per annum to a wide range of commercial and governmental customers.

#### NERC's expertise for government advisory bodies

At present, around 25 advisory committees and similar bodies benefit from the expertise of NERC scientists. These include the UK Biodiversity Research Advisory Group, the Advisory Committee on Pesticides and the UK Global Environmental Change Committee.



## Folkestone earthquake – helping local government

SEISMOLOGISTS at the British Geological Survey (BGS) have been helping Shepway District Council in Kent to understand the reasons for the level of damage caused by the Folkestone earthquake in 2007. The magnitude of the earthquake was not unusual for the UK as a whole, but the intensity of

shaking and level of damage have rarely been exceeded. Damage seems to have been exacerbated by local site geology, and BGS has installed new sensors in south-east England to better study future seismic activity.

## Antarctica in the classroom

A NEW online interactive teaching tool was launched in June 2006. The website, Discovering Antarctica, was developed jointly by BAS, the Royal Geographical Society and the Foreign & Commonwealth Office Polar Regions Unit.

Discovering Antarctica has a host of interactive activities, video and audio clips, images to download, factsheets and links. A rigorous teacher-testing process during its development kept the content relevant and useful for teachers, and the site is structured around lesson plans.

With thousands of visitors and downloads each month, the site has received excellent feedback from the educational press and professional groups. It was nominated for a Children's BAFTA award for secondary education and an international Webby award for education.

[www.discoveringantarctica.org.uk](http://www.discoveringantarctica.org.uk)



## Marine worms – a source for a new human blood substitute?

RESEARCH from NERC's recently completed Environmental Genomics programme is spurring the growth of the biotechnology industry in the north-east of England and has led to sales and licensed production of marine worms globally.

Peter Olive from Newcastle University and colleagues at Leicester University created a genechip (a miniature set of an organism's genes on a glass slide) to study the pattern of switching on and off genes in marine worms such as *Nereis virens*. This was initially done to understand the complex rhythms of marine organisms. However, the biotechnology led scientists to the discovery that marine worms can produce essential fatty acids including the health-promoting omega-3 fatty acids, and giant haemoglobin molecules – the red protein that transports oxygen in the blood. Seabait Ltd, a spin-out from Newcastle University, is using this biotechnology to generate aquaculture feeds and, in collaboration with the French company Hemarina SAS, is creating production systems for a new generation of human blood substitutes and other medical products.

## Protecting whales and dolphins from seismic surveys

RESEARCHERS are developing a new device to locate marine mammals, further protecting them from seismic survey equipment which uses loud noises to map subsea geology. Hydrographic surveyor Victor Abbott from the University of Plymouth said, 'The system we are developing could be described as an eavesdropping mechanism that listens out for sea mammal noises.'

'It will aid the detection of mammals at night, in bad weather and while they are below the surface – a major advance on using human observers,' he added.

Industry partners Westland GeoProjects, who carry out seismic surveys, want to permanently install the device on their ship. The work is funded through the Knowledge Transfer Partnership scheme with NERC funding.

## Marine science provides solution to CO<sub>2</sub> emissions

MARINE scientists have announced a viable, natural way of reducing greenhouse gas emissions by using algae to absorb CO<sub>2</sub> from power stations.

Plymouth Marine Laboratory (PML) Applications Ltd is building light-transparent reactors called photobioreactors to cultivate large quantities of microalgae (microscopic marine plants). The photobioreactor technology developed because of PML's need to carry out fundamental research on microalgae and also because the health-care industry recognised that these marine plants could be an alternative ingredient to petroleum-based products. However, they are discovering that microalgae can have many other uses. Grown on a large scale, they have the potential to capture a significant amount of CO<sub>2</sub>. Furthermore, some species are particularly rich in lipids making them a potential source for biofuels. This provides an attractive proposition to power stations and other manufacturing industries because CO<sub>2</sub> emissions can be captured and the resultant biomass used as a source of biofuel or as a source of natural ingredients.

*Funding: NERC's former Small Business Research Initiative; the former Department of Trade and Industry Technology Programme; and the Biotechnology and Biological Sciences Research Council's Renewable Materials LINK programme.*



# Commercialisation

Intellectual property arising from NERC-funded research makes a vital contribution to many businesses. We commercialise our science through licensing, joint ventures and new companies (spin-out companies), and we have strong links with the environmental technology, energy, biotechnology and insurance sectors.

## *Supporting entrepreneurship – giving scientists a financial lift ...*

### Follow-on Fund

This is a proof-of-concept fund for NERC-funded scientists to help them develop their idea to the stage where it can become commercially viable.



### Oil exploration and steroid abuse

OIL EXPLORATION and steroid abuse don't usually appear in the same sentence, but Colin Snape and colleagues at the University of Nottingham have developed a revolutionary technique for oil exploration that can also detect illicit steroid use by athletes and horse trainers. The team, funded through the Ocean Margins LINK programme, took a technique called hydroxyprolysis, which breaks down samples for analysis, and applied it to geochemical studies. This allowed the team to reconstruct the history of ocean basins to help assess where it was worth drilling for oil. With some lateral thinking the team realised you could use the same process for detecting illegal steroids in the

bloodstreams of athletes and race horses. Follow-on Funding helped to develop this research idea leading to the commercialisation of the hydroxyprolysis reactor.

The funding has also allowed the team to become a world leader in a technique which measures how reserves in petroleum basins are altered by the build-up of pressure deep beneath the ground. Historically, oil industries have avoided reserves beyond certain depths as traditional thinking suggested that the higher pressures rendered petroleum resources useless. This technique could help to identify new, viable oil reserves.

### Environmentally friendly pesticides

SCIENTISTS from Lancaster University have developed a technique, using a naturally occurring compound, which allows crops such as tomatoes, red peppers, wheat and maize, to be more resistant to pest attack. They treated seed with jasmonic acid, a key signalling molecule produced by plants as part of their defence mechanism against pests. The resulting germinating plants had an increased level of protection from pests such as caterpillars and aphids. What's more, the acid has low toxicity and is rapidly broken down in the environment, and induces long-term protection via an economically practical technique.

NERC Follow-on Funding supported further technical development leading to the filing of a patent in 2006. In 2007, the technology was assigned (a transfer of ownership in exchange for royalty payments) to Plant Bioscience Ltd.

## *Increasing entrepreneurial awareness in the environmental sciences community ...*

### Environment Young Entrepreneurs Scheme (YES)

NERC provides training for PhD and postdoctoral researchers who may not yet have an idea to start a company but want to develop an understanding of the process of commercialising their science.

The Environment YES training workshops are run as a competition. Teams form an imaginary company and work on their strategy to launch a business based upon a science idea – typically something that they are working on, but it can be hypothetical. The focus of this competition is on developing and nurturing entrepreneurial talent, so the young scientists are permitted to assume future technologies which may still be one or two years away. They receive training and mentoring on different aspects of starting a business and securing funds to support it. Case studies are also used to demonstrate what it is like to do this from an entrepreneur's point of view. Armed with this knowledge, the teams prepare a business plan to 'bid' for funding from an expert panel of judges.

Workshop judge and Head of Knowledge Exchange Richard Blackmore, said, 'It's always exciting to see such a wide range of fantastic ideas – you genuinely believe that these could be real businesses.'

#### NERC's future entrepreneurs

A TEAM of young researchers from Lancaster University and the Centre for Ecology & Hydrology won Environment YES in 2007. The team selected a promising solar technology and used their scientific understanding to propose a new hypothetical material which would reduce production costs. The team recognised the commercial potential in producing affordable and efficient solar power for UK homes and impressed the judges with their research into viable markets and ideas to diversify the product.



### Business plan competition

EVERY good business starts with two things: a good idea and a robust business plan. The science community supplies the ideas and the research councils supply the skills, knowledge and support needed to develop first-rate business plans.

NERC introduced its own business plan competition in 2000 and took the lead in establishing this initiative across all research councils. Participants, not just winners, of previous competitions have gone on to establish successful companies that have made a significant difference in various sectors. As well as skills and coaching, this competition also provides the opportunity to win up to £25,000 of funding to develop business ideas further.

Training activities are supported using experienced entrepreneurs and case studies from a wide range of businesses. Practising professionals coach and mentor successful participants to help them develop business plans.

For more details:  
[www.nerc.ac.uk/using/schemes/businessplan.asp](http://www.nerc.ac.uk/using/schemes/businessplan.asp)

### Remedios

COMPETITION winner Remedios is an award-winning environmental biotechnology company which successfully spun out from the University of Aberdeen. From Environment Agency figures, it is estimated that there are 100,000 contaminated sites in the UK and property development is increasingly occurring on brownfield land. Remedios has successfully exploited the commercial opportunities arising from this situation by developing a unique biosensor technology which provides novel and cost-effective methods for diagnosing and cleaning up potentially contaminated land.

## Inventors meet potential investors

AN EVENT in July 2007 to put inventors of cutting-edge marine research technology in direct touch with potential commercial investors has already led to one commercial licence.

The new technologies on display at the National Oceanography Centre, Southampton (NOCS), attracted intense interest from the companies attending and the first licence – to produce hydrostatic releases – has just been signed. The technology, designed by NOCS engineers, releases deployed equipment once it reaches a pre-determined depth. The licence between NOCS and Ocean Scientific International Limited is the first for NERC's strategic marine science programme Oceans 2025.

The gathering attracted 27 organisations and led to 32 meetings between the inventors and potential licensees.

Organiser Gwyn Griffiths from NOCS said, 'There was a buzz about the room. We have shown that there is a real need for interaction of this kind between business and NERC-supported technologists.'

## Other funding we provide

### Rainbow Seed Fund

The Rainbow Seed Fund is a partnership of the leading UK research councils which aims to commercialise scientific research. The fund invests at the earliest stages, often before there is a company, and helps to find investors and people with the right commercial skills who will turn good ideas into a business.

### Innovation Fund

NERC's Innovation Fund is a scheme for scientists working within its research centres which allows them to develop research with commercial potential. The funding can help take ideas to a point where they can be successfully licensed or attract external finance to establish joint ventures or spin-out companies. This internal fund provides up to £100,000.



## Skills transfer

NERC funds and employs scientists and students in universities throughout the UK and within our own research and collaborative centres. Encouraging skilled people to move between scientific research and the wider economy is one of the most effective forms of knowledge exchange. Their skills and knowledge can lead to new and better products and services, to establishing new businesses, and to new and improved policies.

### Royal Society Industry Fellowships

NERC is a co-funder of the Royal Society Industry Fellowship scheme which establishes personal and corporate links between industry and academia. This funding enables academic scientists to work on collaborative projects with industry, or, people in industry to work on collaborative projects within a university or a not-for-profit research organisation. These collaborations cover a wide range of science areas such as environmental protection, earth sciences and engineering. Companies such as Welsh Water, Rio Tinto, Arup Geotechnics and British Petroleum have participated in the fellowships.



### NERC scientists ... the next generation

NERC supports PhD studentships and Masters courses, both of which contribute to the UK's skills needs. This currently amounts to around 1000 PhDs and 290 Masters Studentships (on 65 courses) per year. Around 30 percent of the studentships are three-year CASE (Cooperative Awards in Sciences and Engineering) studentships where students have the opportunity to

enhance their training by spending between 3 and 18 months in a workplace outside the academic environment. CASE studentships promote partnerships between university and industry or public sector bodies. Over 120 organisations currently collaborate directly in NERC-supported PhD training.

### Knowledge Transfer (KT) Call

KNOWLEDGE exchange has been promoted by our dedicated knowledge exchange grant scheme, with £1.6 million of NERC support leveraging £3.4 million of direct and in-kind co-funding in 2006-07. The NERC Knowledge Transfer Call is a flexible scheme to enable the transfer of knowledge, people, skills and expertise between the NERC research base and its user communities. It supports improved communication between scientists and users, for example, through networks or new ways of using science to benefit the UK economy; science/technology translators; workshops; publications; or new ways to make data more accessible.



## Helping scientists assess seismic hazards

EARTHQUAKES frequently devastate parts of Iran. On Boxing Day 2003, an earthquake killed about 40,000 people in the town of Bam. Staff at NERC's Centre for the Observation and Modelling of Earthquakes and Tectonics (COMET) are collaborating with scientists from the Geological Survey of Iran (GSI) to improve scientists' ability to recognise where potential earthquakes might happen in Iran. As part of this collaboration, COMET is training young GSI scientists in a range of techniques for observing earthquakes, faulting and movements of the Earth's crust which lead to earthquakes.



## Parliamentary secondments

NERC-funded students can apply for three-month secondments at the:

- Parliamentary Office of Science and Technology (POST);
- Members' Research Service of the Welsh Assembly (MRS);
- Scottish Parliament Information Centre (SPICe).

In 2007, POST students Frances Slater and Lyndsey Dodds researched material for two POSTnote briefings. Frances looked at the energy used during sewage treatment and evaluated the options available for energy conservation and generating renewable energy from sewage. Lyndsey examined deep-sea industries and highlighted the difficulties in promoting development of economic opportunities while protecting the deep-sea environment.

## Media training

A FEW decades ago, some scientists were reluctant to step out of their ivory towers to tell the world at large what they were doing. People who did were rather looked down on as trivialisers of their precious specialism. Now the tide has turned and with heightened public interest in issues such as climate change, bird flu and genetically modified organisms, communicating science has never been so important.

Popular communication can also help build bridges across disciplines and many exciting developments in science happen where the boundaries between disciplines touch and rub.

NERC runs a highly popular media course on communicating science – open to any NERC-funded scientists. In an intensive two-day workshop, scientists can experience all aspects of media, from writing press releases to being put through their paces in front of the camera.

Email: [requests@nerc.ac.uk](mailto:requests@nerc.ac.uk)



## Out of the blue

A DVD entitled *Out of the Blue*, which highlights the variety, function and commercial potential of marine and freshwater microbes, was launched in 2006. NERC's Blue Microbe knowledge transfer network, an offshoot of the Marine and Freshwater Microbial Biodiversity programme, produced the film, which has been distributed to around 1500 policy-makers, businesses and educators. Clips can be downloaded from: [www.bluemicrobe.com/publications.htm](http://www.bluemicrobe.com/publications.htm)



# Knowledge exchange team



## Science-to-policy facilitators

RAISING AWARENESS of the value of NERC science to policy-makers is important, but providing opportunities to be involved in all stages of research, from planning to disseminating the final results, is key to ensuring the final outcomes are relevant and useful to policy. To help with this task, NERC has science-to-policy facilitators who provide a focal point for the NERC community (which includes both researchers and the end users of our science). They help to:

- raise awareness of policy-relevant science amongst policy-makers;
- act as 'translators' to ensure that the outputs of NERC science are presented in an accessible form for policy-makers;
- facilitate links between researchers and policy-makers.

To learn more about how science is used to make policy contact general enquiries (right).

KNOWLEDGE EXCHANGE is fundamental to NERC's strategy. All staff and NERC-funded scientists are encouraged to think about how people will use their science, right from the outset. They are supported by a dedicated knowledge exchange team which promotes effective dialogue between scientists and science users (such as policy-makers and industry); provides better systems to share data, skills and knowledge; and stimulates and supports commercialisation. For more information on our activities, please visit our web pages [www.nerc.ac.uk/using](http://www.nerc.ac.uk/using) or contact the team.

## Contacts

### General enquiries

[knowledge@nerc.ac.uk](mailto:knowledge@nerc.ac.uk)

Tel: 01793 411712

### Commercialisation

[idea@nerc.ac.uk](mailto:idea@nerc.ac.uk)

Tel: 01793 442610

### Knowledge exchange funding schemes

[keschemes@nerc.ac.uk](mailto:keschemes@nerc.ac.uk)

Tel: 01793 411526

### Using NERC data

[data@nerc.ac.uk](mailto:data@nerc.ac.uk)

Tel: 01793 411567

**Our research centres**

British Antarctic Survey  
[www.antarctica.ac.uk](http://www.antarctica.ac.uk)

British Geological Survey  
[www.bgs.ac.uk](http://www.bgs.ac.uk)

Centre for Ecology & Hydrology  
[www.ceh.ac.uk](http://www.ceh.ac.uk)

Proudman Oceanographic Laboratory  
[www.pol.ac.uk](http://www.pol.ac.uk)

**Established collaborative centres**

National Centre for Atmospheric Science  
[www.ncas.ac.uk](http://www.ncas.ac.uk)

National Oceanography Centre, Southampton  
[www.noc.soton.ac.uk](http://www.noc.soton.ac.uk)

Plymouth Marine Laboratory  
[www.pml.ac.uk](http://www.pml.ac.uk)

Scottish Association for Marine Science  
[www.sams.ac.uk](http://www.sams.ac.uk)

Sea Mammal Research Unit  
[www.smru.st-and.ac.uk](http://www.smru.st-and.ac.uk)

**Time-limited collaborative centres**

Centre for Population Biology  
[www.imperial.ac.uk/cpb](http://www.imperial.ac.uk/cpb)

National Centre for Earth Observation  
[www.nerc.ac.uk/research/areas/earthobs](http://www.nerc.ac.uk/research/areas/earthobs)

Centre for Earth Observation Instrumentation  
[www.ceoi.ac.uk](http://www.ceoi.ac.uk)

National Institute for Environmental eScience  
[www.niees.ac.uk](http://www.niees.ac.uk)

Tyndall Centre for Climate Change Research  
[www.tyndall.ac.uk](http://www.tyndall.ac.uk)

UK Energy Research Centre  
[www.ukerc.ac.uk/Home.aspx](http://www.ukerc.ac.uk/Home.aspx)



The Natural Environment Research Council (NERC) funds independent environmental research in the United Kingdom. The priorities we develop with our researchers and stakeholders provide a focus for the marine, polar, atmospheric, earth, terrestrial and freshwater science communities. The research is often multidisciplinary and in collaboration with other national and international partners.

NERC runs a fleet of research ships and scientific aircraft. We have bases in some of the world's most hostile environments and invest in satellite technology to monitor environmental change on a global scale. NERC has research and collaborative centres that maintain and develop UK national capability across the disciplines that make up environmental science. We fund centres and universities to carry out research, train and support a world-class community of environmental scientists.

NERC is one of the seven UK research councils which have formed a strategic partnership called Research Councils UK (RCUK).

**Natural Environment Research Council**

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