

ENVIRONMENT

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MELT
DOWN
DOWN

Is the global community responding swiftly enough to climate change? Martin Ince talks to Professor Nicholas Stern, the UK's leading climate expert >

If the world is going to wean itself off fossil fuels, lifestyles and economies will need to change dramatically in coming decades. But Nicholas Stern warns that if we cannot manage this feat, there will still be change. The big difference is that it will be unequal, unplanned and unmanageable. Professor Stern, more formally Lord Stern of Brentford, heads the ESRC Centre for Climate Change Economics and Policy and the Grantham Research Institute on Climate Change and the Environment at the London School of Economics. From January 2013 he will also be President of the British Academy, giving him yet another platform from which to express his robust views on the need for faster responses to climate change.

Originally a development economist and with strong links to Africa, he is in mourning on the day we meet for his friend and ally Meles Zenawi, the recently deceased Prime Minister of Ethiopia. This background means that for him, climate change is an ethical matter as well as a question of economics and technology. He agrees that climate change involves severe equity issues and that as time goes on with too little action, they get worse. "When you discuss equity as it relates to climate change, there are two main types of response," he says. "In developing nations, economists say the issue is about sharing resources. In the developed world, they start talking about intergenerational equity."

To Professor Stern, both of these aspects are important. He starts by pointing out that intergenerational equity is not some theoretical idea. "We need to recognise that if there is big climate change, we cannot assume there will be economic growth. The climate will be too hostile. That means that the population could be poorer several decades from now than we are today. That is a severe equity issue, and growing even more severe during this century. The people it will affect most have already been born. They are our children and grandchildren. We know them."

GLOBAL ROLES

However, Professor Stern senses that the issue of resource sharing on a global scale is becoming less problematic. The issue here is where the burden of adapting to climate change will fall. Originally, there was concern that the rich, developed countries, which use most of the fossil fuels, would attempt to pass the costs of change on to the poorer nations with ambitions to grow their economies. But Professor Stern believes that the \$100 billion cash transfers decided upon in recent negotiations, and the establishment of the Green Climate Fund to allocate at least some of the money, could ease some of these problems, but there are real question marks over whether the rich countries will provide much resource through this route.

As evidence, he points to the 12th five-year plans of both the Chinese and the Indian governments. By coincidence, both are now current. The Indian plan recognises the new possibilities of energy conservation and of falling prices for solar electricity. Professor Stern says:

“ONE REASON WE NEED TO ACT IS THAT OTHER NATIONS REACT TO WHAT BRITAIN DOES”

“The Indians have seen the opportunities, which extend far beyond climate change. A renewables approach is cleaner, more secure, safer and more biodiverse. It also produces these benefits quickly.”

In the same way, he feels that significant figures in the Chinese system now regard the switch away from fossil fuels as “a race they would like to win”. As he sees it, China has realised

how important the effects of climate change may be, and has also realised its global role in solving the problem.

One issue, as Professor Stern sees it, is that the next major international agreement on climate change is not due to happen until 2015. On past form, that means that the strong actions required to manage climate change may not happen fast enough. “The big equity story about this,” he says, “is that even a warming of 2° Celsius will have very severe consequences, particularly for small island states. Even now, it is recognised that strong action, even stronger than current commitments, would mean only a 50/50 chance of avoiding a 2° Celsius rise.” This size of increase in the world’s average temperature is widely regarded as the acceptable target. But Professor Stern warns: “If you

PREVIOUS PAGE POLAR BEARS ARE JUST ONE SPECIES UNDER THREAT FROM GLOBAL WARMING
BELOW IN THE SUMMER OF 2012 ARCTIC ICE COVER WAS AT ITS LOWEST LEVEL EVER





believe that there is a 50/50 chance of a 2° Celsius increase, you inherently believe there is a significant chance of a 3° Celsius increase, which would be extremely damaging and that would have severely inequitable effects. And there are respectable people out there who think we have missed our chance of [limiting the rise to] 2° Celsius.”

To many people, particularly in developing countries, an ethical approach in past climate negotiations has meant ‘common but differentiated responsibilities’, interpreted in a rather rigid way, with the commitments of rich countries being binding and those of developing countries being voluntary. The more recent negotiations have embodied the idea of ‘equitable access to sustainable development’, which is much more dynamic and collaborative.

ECONOMIC BENEFITS

He says: “The idea some people have that nothing is happening is wrong. Indonesia, Brazil and other major nations are becoming more active. And now that the Chinese have realised the importance of these issues, the US will need to respond. Even now, US states and cities are taking action despite the lack of movement at a national level. We no longer have a situation in which only rich nations seem to have obligations, and their inaction can block progress.”

Another spur to change, Professor Stern thinks, is the growing acceptance that dealing with climate change brings big economic benefits. This is a theme he pioneered in the British government’s Stern Review, published in 2006. He says: “The argument that high-carbon growth is reckless gets steadily stronger, as the magnitude of the risks gets

more apparent. For example, millions of people will move from their present homes if you have a warming of 5° Celsius or more, to temperatures not seen on Earth for at least 30 million years. Obviously the Treasury becomes more cautious about investing in action when you have an economic crisis. But this is the right time to invest, because there is less pressure on resources. Half the cost of a solar power array is in the installation. So even if it comes from China, you get real jobs here as well.”

He adds that this new world is a fertile one for new research. “We need to know what equitable access to sustainable development means for trade patterns and resources. At the moment, most people might regard it as wrong to buy a carpet made by child labour. What about taxing goods that have been made in an inequitable way? We also need to know about what low-carbon investment really means, for example for energy grid structures.”

Professor Stern, who sits on the non-party cross benches in the House of Lords, ends our talk with muted praise for the coalition government, especially its climate legislation. He adds: “One reason we need to act is that other nations react to what Britain does. For example, if we start to see beyond the costs of change and pay more attention to the benefits.” And he stresses: “There is a lot happening, but it is still too slow.” ■

www.ccepc.ac.uk

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ABOVE, LEFT TO RIGHT FLOODING HAS BECOME MORE PREVALENT WORLDWIDE, AND EXTENDED DROUGHT CONDITIONS MORE COMMON AS THE GLOBAL CLIMATE CHANGES; FOR FURTHER DETAILS OF THE STERN REVIEW GO TO WWW.HM-TREASURY.GOV.UK/D/EXECUTIVE_SUMMARY.PDF



PROFESSOR NICK PIDGEON

Director of Understanding Risk Research Group, School of Psychology, Cardiff University. In 2012 Professor Pidgeon was awarded an Honorary Fellowship of the British Science Association

OPINION: SHALE GAS

FRACTURED RELATIONS

Does shale gas as a fuel have a future? Professor Nick Pidgeon explains why understanding public acceptability will be key

Over the past two years a new energy controversy has broken out in Britain, triggered by a small earth tremor attributed to exploratory drilling for shale gas off the coast of Blackpool. Hydraulic fracturing, or 'fracking', is a technique for recovering natural gas found in shale deposits, and involves the injection of water and chemicals at high pressure into underlying rock formations. As gas reserves in the North Sea decline, government policy is looking at new sources of energy, and shale gas, some argue, could be one way to reduce the UK's future dependency on imported gas.

The Royal Society recently concluded that the risks of hydraulic fracturing are likely to be low if systems for extraction are well managed. But the technique is used extensively in the US where it is already proving controversial with communities concerned about ground movements, groundwater contamination and other impacts. In the UK the future for shale gas extraction may well hinge upon this key question of local public acceptability.

We know that people's attitudes to environmental and technological risk issues involve a range of concerns and value-based questions that go beyond formal measurement of risk, including perceived threats to valued places or community, and distrust of regulation. Risk controversies at the interface of the environment and technology are rarely about 'risk' alone. But with little direct evidence to go on, gauging the public attitude to fracking will be complex. The first consideration is that 'the public' is not a single entity, but comprises many groups with different views on the balance between risks and benefits. Some might prioritise climate change, others will view energy affordability and reliability of supply as more important, or be averse to any suggestion that a potentially polluting development involves scientific uncertainty, however small it might be.

We know that many people hold negative views of hydrocarbons compared to various other sources of electricity generation. In nationally representative surveys funded by the ESRC, renewable sources such as solar, wind and hydropower are consistently favoured by people, gas occupies an intermediate position, and

nuclear power, coal and oil are generally least favoured. These surveys, together with in-depth qualitative research, show that hydrocarbons are seen as the major cause of climate change, but they are also perceived, rightly or wrongly, to be dirty fuels, which are detrimental for communities near power stations.

Work at Cardiff for the UK Energy Research Centre exploring public attitudes to future energy



SOURCES OF ENERGY SUCH AS SHALE GAS COULD BE ONE WAY TO REDUCE THE UK'S FUTURE DEPENDENCY ON IMPORTED GAS

system change has also used deliberative methods, where members of the general public debate future energy scenarios. This work showed that people saw non-conventional hydrocarbons, including tar sands and shale gas, as yesterday's technology - a finite resource that would inevitably run out - incompatible with their visions and hopes for a more sustainable energy future. The idea of capturing and storing carbon dioxide from fossil fuel power plants didn't find much favour with the participants. It's a relatively untried technology, which would also need to be developed alongside any major exploitation of shale gas in Britain. Shale gas, then, starts its life with baggage.

LOCAL OBJECTIONS

Things become more complicated when we consider responses at a local level, as the recent events in Blackpool have illustrated. At this level a shale gas development will inevitably pit the objectives of national government - to achieve affordable and reliable supplies of energy - against those of any local communities asked to bear disruptions alongside possible uncertain environmental or health risks. 'Local' objections are often denigrated by developers and the media as an example of a NIMBY (Not in My Back

People see non-conventional hydrocarbons such as shale gas as yesterday's technology



Yard) response – people support an energy development in principle, as a common good, but then object to it nearer home because they see local detriment and little benefit. Several ESRC-supported research projects in social psychology and geography have shown that NIMBY is a misleading label that oversimplifies what might be genuine local concerns, and risks alienating communities that may have to face long-term disruption and environmental damage.

There are many reasons why local communities might see shale gas extraction differently from government or developers. There may be legitimate worries that promises of environmental restoration at the end of a scheme will be unrealised, or that initial small developments will lead to more locally damaging expansion of the industry later on. Our work on attitudes to renewable energy also shows that an important concern is the protection of particularly valued landscapes. Major energy developments can even threaten local feelings of community identity and cohesion, which generates intense opposition.

A NEED FOR COMPENSATION

Above all, distrust of large outside companies or government agencies will always mean that their actions and statements will be scrutinised by local communities, as will details of regulation and risk management. Some concerns are overcome by offering communities direct compensation (as in the Scottish Islands over many years with North Sea oil), or by giving communities directly a degree of local co-ownership of an energy scheme (as happens with some smaller successful wind farm developments). Focusing only on communicating the concepts of risk (probabilities, damage estimates, and so on) is therefore unlikely to meet people's actual concerns about shale gas extraction and the many potential impacts, uncertainties and questions that it will raise for local communities. Public engagement must aim for a genuine dialogue with affected public(s), and one that aims to build trust.

The public acceptability of shale gas development in Europe may ultimately depend on how we respond to the emerging academic and policy debates about accelerating global carbon emissions. Climate scientists are now forecasting that we face a significant risk of breaching a 4° Celsius global temperature rise by the end of the century if we don't make radical moves to curtail burning of fossil fuels, and reduce our own per capita energy use. Such a rise would be double the internationally agreed threshold for 'dangerous climate change' and usher in incalculable human suffering and environmental impacts. As the effects of that warming become apparent, we may all need to re-evaluate the role that should be played by unconventional fossil fuels such as shale gas. ■

www.understanding-risk.org

On average, British farmers are likely to benefit from hotter weather



CLIMATE CHANGE

THE HEAT IS ON FOR FARMERS

Warmer, drier weather could increase farm productivity, particularly in the coldest and wettest parts of Britain

A STUDY BY THE Centre for Social and Economic Research on the Global Environment (CSERGE) at the University of East Anglia (UEA) has found that most of the farmers operating in Britain will benefit from climate change.

The research results indicate that in under four decades, by 2050, on average, changes in climate will have increased Britain's farmland output between five to nine per cent. The largest gains are expected in upland areas of Scotland, Wales and the North of England, where farming is currently constrained by cold weather and high rainfall. Here the warmer, drier weather generated by climate change will generally improve farm productivity and accompanying land value. But some localised losses can be expected, particularly in the east of England, where lower rainfall may increase the risk of drought.

FARMLAND VALUES

Researchers Dr Carlo Fezzi and Professor Ian Bateman analysed the main drivers of farmland values, noting that even after controlling for other factors (market prices, technology, soil quality, and so on), climatic conditions (represented by rainfall and temperature during the growing season)

remain the fundamental drivers of farmland price. By using a unique farm-level dataset from Britain, the researchers were able to estimate the relationship between temperature, precipitation and farmland values. The research shows that as temperature rises so do farm values, provided that rainfall is sufficient to satisfy the increasing crop requirement for water. On the other hand, a lack of precipitation means that warmer weather depresses land productivity and values.

While most studies show that climate change will have a negative effect on worldwide agriculture, the research suggests this is not the case in all areas of Britain. It shows that the increase in temperature will actually increase farm values in the wetter areas of Britain, but will have the opposite effect in the drought-prone areas.

But while the analysis shows that the overall effect of climate change on British agriculture is positive, this does not mean it will be beneficial globally. The combined impact of climate change and population growth means there is a significant risk that world food prices will rise and increase the cost of imports into the UK. ■

www.cserge.ac.uk

The nuclear disaster at Fukushima has helped rekindle the nuclear debate



NUCLEAR
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16%
IN 2012

current 17 nuclear reactors are to be decommissioned. Moreover, the proportion of nuclear-generated electricity has fallen from 25 per cent in 1990 to 16 per cent in 2012.

Dr McCauley's research finds that the question is less about whether we expand nuclear energy: the political conundrum in UK politics is how or whether to make the case for nuclear surviving as part of the energy mix. The Conservative party did not initiate the rationale for nuclear. It was the Labour party that moved government policy towards a long-term pro-nuclear stance and the 2007 white paper on Meeting the Energy Challenge offered the private sector the opportunity to build a 'new nuclear future'. The coalition and Liberal Democrat Energy Minister reaffirmed this commitment in early 2012, but it is now uncertain if this rationale will continue.

The UK question is set within a global context of nuclear expansion. Both developed and developing (most notably China, Japan, India and South Korea) countries have invested in nuclear energy. International agreements have called for climate change adaptation through reducing carbon dioxide emissions, and EU policies have concentrated on a desire to diversify fuel sources, reduce dependence on fossil fuel imports and develop immunity to power disruptions.

Local politics are also integral to UK government policy on nuclear energy. The proposed siting of new nuclear power plants in Somerset, Suffolk, Gloucestershire and Cumbria is challenging local stakeholders to ensure the successful implementation of national policy. And the nuclear waste issue continues to pose serious problems for local politicians. The multi-level politics of nuclear energy places the UK between a pro-nuclear global push for low-carbon energy sources and an anti-nuclear local agenda. ■

www.st-andrews.ac.uk/gsd

NUCLEAR ENERGY

CHAIN REACTION

Will nuclear continue to be part of the UK energy mix?

THE UK HAS COMMITTED to expanding nuclear power but to what extent is this choice sustainable? Research by Dr Darren McCauley from the University of St Andrews explores the politics of nuclear energy in the UK.

The Fukushima disaster in March 2011 brought the risk of nuclear energy to the fore, but despite the meltdown and equipment malfunctions, supporters of nuclear energy argue such a series of catastrophic events is unlikely in the UK. A post-earthquake tsunami off the north-east coast of England appears unthinkable, and if the UK is serious about tackling climate change, domestic secure nuclear power must be included in the energy mix.

But anti-nuclear campaigners maintain that the event highlights how unsafe nuclear energy is, with its brief history littered with disasters from Windscale in Cumbria in 1957 to Chernobyl in 1986. The economic argument is strong too as the subsidies needed for an effective nuclear policy are too large in an increasingly austere world and a cost-benefit analysis of nuclear power is etched on the public mindset. How should politicians react?

The UK coalition government is committed to expanding the use of nuclear power through 19 new-generation nuclear power plants. This headline at first appears striking, but in reality all but one of the

BIOMAPPING

Stress in the city

A pioneering study explores the relationship between urban planning and human happiness

CONGESTED STREETS, poorly-lit neighbourhoods and run-down shopping centres have a strong influence on how people feel in a city. How we feel affects our sense of safety in urban areas, and influences residential communities' sense of pride and cohesion. It has traditionally been difficult to measure the effect that urban planning has on human happiness, but an interdisciplinary study run by Cardiff University is exploring a solution.

Funded by the ESRC's Wales Institute of Social & Economic Research, Data & Methods (WISERD), Dr Jon Anderson (School of Planning and Geography) and Professor Chris Taylor (School of Social Sciences) are using biomapping sensors to measure how the human body responds to the urban environment.

Sensors measure a body's stress via the electrodermal activity of the skin; each sensor records high levels of conductance during states of attention or anxiety, and low levels during states of relaxation or calmness. The project involves research participants wearing sensors in a range of urban environments, and sites of high and low stress are recorded. Geographical positioning technology is then used to produce maps that detail 'stress hotspots' in the city.

Such maps offer a unique insight into how urban environments influence human wellbeing. Each of us knows that we feel at home in some places within the city, and in others we feel uneasy

or even afraid. Good planning and design need to take into account how the built environment affects human happiness, and biomapping sensors are a vital tool for quantifying our emotions.

The researchers are working with vulnerable groups such as the elderly and the young, as well as pedestrians and cyclists – who often experience the city very differently to those in cars and other vehicles – to produce a range of 'stress maps' that pinpoint the causes of both positive and negative responses to the built form of the city.

These causes, including subways, poor traffic management, inadequate cycle lanes and poor pedestrian crossings, will form the basis for improved policy recommendations for city planners, architects, urban designers and developers. But the potential of this innovative approach could be even more far-reaching: from how children experience their journeys to school to how the built form can influence shopping behaviour. In these ways, state-of-the-art science is helping to make our cities as safe, secure and socially cohesive for as many people as possible. ■

www.wiserd.ac.uk

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BIOMAPPING
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OUR
EMOTIONS



Vulnerable groups of people are affected in different ways by the urban environment

IRRIGATION OF THE NATION

How people use water, especially in their gardens, could affect future water and drought management

UNDERSTANDING THE WAY that people use water is becoming increasingly important in Britain. In 2011/2012 droughts threatened many parts of England, and highlighted the vulnerability of Britain to water shortages and climate change as well as population and other social changes.

Research by Alison Browne (Sustainable Consumption Institute, Manchester University) and Martin Pullinger, Will Medd and Ben Anderson (Lancaster Environment Centre, Lancaster University) looks broadly at how people use water. Through a 1,800-person questionnaire across the South and South East of

England the research team also reveals the ways that water use is embedded in everyday lives and examines what people do in their kitchens, bathrooms, toilets, laundries and gardens.

KEY FACT

MORE PEOPLE WATER WITH A WATERING CAN OR BUCKET THAN ANY OTHER METHOD

The results suggest that hosepipe bans and garden water use may be less relevant to management of water supplies and drought alleviation than is often thought. The research found that for people who have a garden

(nearly 40 per cent of people have no outdoor plants or lawn to water), most water it based on a weather variant pattern (some measure or proxy of how dry things have got) or a simple regular schedule. And low-tech rules: more people water plants, flowers, lawn, fruit and vegetables with a watering can or bucket than any other method.

The analysis revealed five different types of

gardeners. The amateur enthusiasts generally water gardens with low technology (buckets, watering cans, water butts) and are enthusiastic garden users, seeing the garden as a place for

fruit/vegetables, flowers/plants, an outdoor living area and a place for birds and wildlife. They are likely to plant annuals, bedding plants and wash garden furniture/paths in the summer months. This group represents seven per cent of those who have a garden (four per cent of all households).

The casual gardeners are gardeners who water their outdoor areas with low technology solutions but always from the mains supply, and are likely to see their garden as a place for flowers and plants only. This group represents 29 per cent of garden owners (19 per cent of all). The green-fingered gardeners also use a low-tech watering system but almost always from a water butt or water recycled from inside the home. These gardeners see their garden strongly as places for fruit and vegetables, flowers and wildlife. They plant annuals in the spring but tend not to do any other preparations. This group represents nine per cent of garden owners (six per cent of all).

The hands-off gardeners do not water the garden at all. They are more likely to see the garden as a place 'still being developed', are less likely to see it as an outdoor living area, but do tend to tidy the area up in springtime. They represent 29 per cent of garden owners (19 per cent of all).

The high-tech enthusiasts make up a large and active set of gardeners (26 per cent of those with gardens but still only 16 per cent of all households). They water from the mains, but usually are more 'high tech' using hosepipes, sprinklers and irrigation systems. They tend to water because of the weather and on a regular schedule. In springtime they tidy and plant annuals.

This research highlights the diversity of ways that people use water in their homes and also how the same volume of water can be used by different households in many different ways. The research team works collaboratively with a range of NGO, policy and business stakeholders and plans to use the research findings to shape government policy on water use, and assist water companies in their water efficiency and water supply management programmes. For more information a full report is available at www.springerlink.com/content/136727818516705v ■

www.sustainablelifestyles.ac.uk
www.sprg.ac.uk

This research has been funded by the EPSRC (Engineering, Physical Science Research Council), the ESRC, DEFRA (Department of Food and Rural Affairs) and the Scottish government. The following organisations contributed: WWF-UK, Environment Agency, Waterwise, UK Water Industry Demand Forum, UKWIR, Thames Water, Anglian Water, Essex and Suffolk Water, South East Water, Veolia Water, Sutton and East Surrey Water, and Sembcorp (formerly Bournemouth Water).



Are you a low-tech gardener who uses a watering can?

AGRI-ENVIRONMENT SCHEMES

Farmland of opportunity

More training for farmers will result in better outcomes for the natural environment

AGRI-ENVIRONMENT PAYMENTS of around €2.5 billion a year go to farmers across Europe to reward them for looking after the natural environment and to compensate them for economic losses where this results in lower yields. But research and a Special Report published by the European Court of Auditors in 2011 raise questions about the effectiveness of such schemes. Research by an interdisciplinary team working on a project within the Rural Economy and Land Use Programme (Relu) found that schemes do have the potential to bring about environmental gains, if implemented correctly.

Two options were investigated under the Entry Level Stewardship Scheme – the basic agri-environment scheme in Britain. Both options pay farmers to improve wildlife habitat by growing wild flower mixes on areas

of farmland. The first aims to boost winter food supplies for birds; the second provides pollen for bumblebees and butterflies. The researchers looked at 48 farms where the schemes were being implemented, over a period of five years. They found that, in the right conditions, including a light soil and a sheltered location, wild flowers could thrive, leading to bigger populations of farmland birds or insects.

So what has been going wrong? The experience and skills of the farmer played a major role. It demonstrated this by giving half the farmers involved some training and follow-up advice. The farmers who undertook training gained in expertise and knowledge about how to get

the best results, enjoyed the course and became more committed to the environmental aims. And the schemes implemented by these farmers resulted in larger numbers of target species.

Professor James Bullock from the Natural Environment Research Council (NERC) Centre for Hydrology and Ecology, who led the research, explained: “Farmers must have proper advice to implement schemes; it’s also important for them to be engaged with the environmental objectives, and to have a full understanding of how their actions will achieve those objectives.”

“**A RELATIVELY SMALL AMOUNT OF TRAINING COULD PAY DIVIDENDS**”

“We concluded that a relatively small amount of training could pay dividends by harnessing the existing knowledge and enthusiasm of farmers, and extending that to improve their agri-environmental management. There could also be tremendous benefits for policymaking if the expertise of farmers was more readily fed back into the design of such schemes.” ■

www.ceh.ac.uk

NATURE

ROOM FOR IMPROVEMENT

How can research help us get the best out of nature?

TWELVE NATURE Improvement Areas (NIAs) are being funded in a flagship initiative announced in the government’s Natural Environment White Paper. What do they promise for England’s wildlife, and can they ‘improve’ what we already have? Research by the Rural Economy and Land Use programme (Relu) may help. Among the aims set out for NIAs was a ‘joining up’ of organisations, of people working together to fulfil specific objectives, and of people with their environment. An important aim is to enhance both rural and urban dwellers’ experience of nature, and to give us all a better appreciation of its processes. This should also help us to understand and adapt to climate change.

Relu research supports these aspirations in a variety of ways and the programme is including stakeholders across a range of projects. For example, farmers and residents in Loweswater worked with researchers to address problems of algal bloom in the lake. With the success of such community action, projects have developed a range of tools and approaches to help.

NIAs provide a significant opportunity for landscape-scale initiatives, because they aim to join up habitats and provide space for

wildlife to thrive. Relu research has shown how important scale is when thinking about our natural capital. The composition of the whole landscape is more important for many species than what crops are being grown; we know, for example, that having woodland within a farm will strongly enhance the capacity of arable areas to support wildlife.

NEIGHBOURLY LOVE

Agri-environment schemes, involving payments to enhance agricultural land for wildlife, can also play a part, but farmers co-operating to increase numbers of target species will work much more effectively than individuals acting in isolation. If you want to be wildlife-friendly, your neighbours’

farming systems may be just as significant as how you manage your own land.

Getting the best value we can from Nature Improvement Areas is important for people as well as for wildlife. Natural processes underpin production of food, clean water, storage of carbon in soil and flood management, and contribute greatly to our physical and mental wellbeing.

Interdisciplinary research is helping to provide a better understanding of how these interact, how landscapes within the Nature Improvement Areas can be multi-purpose, and also by offering the new partnerships innovative ideas for collaborative action. ■

www.defra.gov.uk/environment/natural



Woodland within a farm will enhance wildlife in arable areas

 COMMUNITY SPIRIT

FLOOD MEMORIES

Experience of past floods can prepare communities for the future

SEVERE FLOODS ARE high-profile media events when they occur, and can have devastating consequences, but what is remembered by those affected a few years later? An interdisciplinary research project by Professor Lindsey McEwen, Dr Franz Krause, Dr Owain Jones and Dr Jo Garde-Hansen at the University of the West of England, Bristol, and the University of Gloucestershire, is investigating the role of memory in community resilience. Are local communities with shared memories of past floods practically and psychologically more resilient during and after current flood events, and in preparing for the increasing risk of future floods?

By comparatively researching three differently composed and situated communities that experienced flooding on the River Severn, Gloucestershire, in July 2007, the research team is seeking to find out how major floods can leave a legacy of community memory and flood risk knowledge. The project aims to develop understanding of how flood memories can provide platforms for developing informal/local/lay knowledges and creating

social learning opportunities that could increase a community's capacity to adapt. The research explores how communities remember and archive recent flood experiences; how such local flood knowledge is materialised, assimilated and protected (in photographs and social media, for example); and how this knowledge is shared and changes in value over time.

Flood memories can be held and shared in and between individuals, and families'

KEY FACT

EXTREME FLOODS ARE DIFFICULT TO PREDICT AND PROHIBITIVELY COSTLY TO PREVENT

formal and informal community networks and structures. Interviews with floodplain residents emphasise the importance of memory as a process, and particularly the value of regularly rehearsing memory. Flood memory is captured and shared by individuals and communities in diverse ways – from traditional approaches like storytelling and physical flood-marking through to the use of smartphones and social media. Other themes that emerge are the importance of childhood memories of 'learning to live with floods' and a 'watery sense of place', which incorporate flood risk as part of local character and heritage.

A SENSITIVE RESPONSE

Those interviewed displayed contradictory reactions to flooding. Some actively remember floods, with memories as a catalyst for action or campaigning, while others prefer not to remember floods, because they associate them with painful experiences or they think they are completely protected by engineering structures to prevent floods.

The research will consider how developing memories of flooding and a 'watery sense of place' in ways sensitive to people's and communities' experiences and emotions can be supported and developed by agencies responsible for the development of flood risk and flood response policies, and community resilience. One project outcome will be guidance packs produced with communities and other organisations involved in flood risk management that show how to support flood memory and its links to local knowledge. ■

www.glos.ac.uk/floodmemories
floodmemories.wordpress.com



Research into flooding in Gloucestershire in 2007 will help future communities



Spending time with your friends at home is a low-carbon intensity pastime

ALAMY

NEWS IN BRIEF

GREENER HAIRDRESSING

Hairdressers use a lot of energy, water and chemicals. Despite increasing concern about the importance of sustainability, there is little awareness in the hairdressing sector. A study by the University of Southampton aims to engage hairdressers in developing their own sustainability practices, and as 'catalytic individuals' to share practices and ideas for responsible chemical, energy and water use across social networks.

www.southampton.ac.uk

CLIMATE LESSONS



The effect of wind and pressure on the sea can cause dramatic changes in sea level known as a 'storm surge'. In 1953, over 300 people died on the east coast of England when such a surge caused severe flooding. Research by a team at Lancaster University is exploring how a group of scientists in Liverpool tried to predict such events between 1919 and 1959 and the impact of their work on today's society. The aims of the scientists' work, how it was carried out and how it was funded was at times closely connected. For example, during World War II a naval request for a storm surge forecasting formula prompted Liverpool Tidal Institute researchers to focus on statistics as a fast way of meeting the request.

www.lancs.ac.uk

RELIABLE ACCESS TO WATER

In 2012 more Africans will have access to mobile communication services than improved water services. A project with the government of Zambia and UNICEF will examine how a new technology developed by Oxford University that automatically texts information on handpump use can improve access to water services for the rural poor. The project will generate technical data on handpump performance, and interview and survey rural water users. Workshops and interviews will be held with government, NGOs and donors.

www.ox.ac.uk

CARBON FOOTPRINTS

TIME WATCH

How we use our time affects our carbon emissions

AS COMMUNITIES STRUGGLE to reduce carbon emissions, a new study by Angela Druckman, Ian Buck, Bronwyn Hayward and Tim Jackson at the University of Surrey explores whether changing the way people use their time can make a difference.

The study estimated the carbon emissions per hour of different types of activities outside paid and voluntary work time. The researchers found that leisure activities are generally associated with lower carbon emissions than non-leisure activities. For example, activities such as eating and drinking (including preparing food and washing up), and commuting, emit nearly 4kg of carbon per hour, compared to around just 1kg of carbon per hour for leisure pursuits. Sleep is, by contrast, the lowest carbon-emitting leisure activity, generating a tiny 0.1kg of carbon per hour.

The study shows that a significant proportion of carbon is 'locked up' in basic systems of household provision: the way we travel, cook, care for ourselves, our clothes, our homes, and for others. In particular it shows that leisure pursuits that involve travel, such as trips to the theatre, tend to emit more carbon per hour than leisure activities in and around the home. The study, which is expected to be published soon in *Ecological Economics*, also highlights gender differences. Women's carbon footprint overall tends to be slightly higher than men's because they spend more time outside the workplace, and

devote more of that time to household chores, which tend to be relatively high carbon per hour. By contrast men on average spend more hours in leisure each week and choose to socialise outside the home, emitting more carbon in travelling to and from their sports and recreation activities.

Home-based leisure, such as reading, playing games, or simply spending time with friends and family, are all relatively low-carbon intensity pastimes compared to those that involve travel, so a possible strategy for reducing carbon emissions is to shift leisure activities towards those that take place in or near the home.

The authors suggest that, in principle, people might actually be able to work less and hence live better quality, 'slower' lives, with smaller carbon footprints. But they warn against simplistic expectations, such as simply reducing work hours will automatically reduce carbon. Reducing carbon emissions also depends on who works less,

“**WOMEN'S CARBON FOOTPRINT OVERALL TENDS TO BE SLIGHTLY HIGHER THAN MEN'S**

how incomes are affected, and what people do instead. Under conditions of constrained household income, people (women particularly) may find they are required to spend more time in high carbon-per-hour domestic tasks to support the household, with a

consequent loss of discretionary time for less carbon-intensive leisure activities.

Improving understanding of how our choices about time-use influence our carbon footprint is not just academic. It can also help generate more successful strategies in our quest towards a lower carbon future. There is also much potential for increasing human wellbeing and reducing carbon emissions if we all got more sleep. ■

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PROFESSOR PHILIP LOWE

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OPINION: RURAL ECONOMICS

MAKING NATURE PAY

Should we be paying for the 'ecosystem services' that rural land provides? Professor Philip Lowe looks at putting a price on our natural assets

Payments for Ecosystems Services or PES is an increasingly used term. But does it offer a way of putting the protection of nature and the services it provides on a more secure footing, or does it reek of a society that puts a price on everything but knows the value of nothing?

The idea of putting a price on natural services, such as pollination by bees, for example, does seem bizarre. But if bees didn't pollinate there would be costs to the agricultural and horticultural industries. How do we, as a society, pay those costs? Should there be a charge on individual consumers or do bees provide a public benefit that we should pay for through taxes? And how do we put a price on less quantifiable services provided by nature?

Payments from the public purse to protect wildlife are established via instruments such as agri-environment schemes designed to compensate farmers for the lower crop yields that result from implementing wildlife-friendly practices. This shift from the post-World War II approach of increased production at any cost, suggests that as a society our values are not static. By this measure, in the past few years the value we give to biodiversity has increased, whereas the value we give to British food production has, apparently, gone down. However, agri-environment payments aren't based on beneficial outcomes, but on the actions undertaken by farmers and these may not always be as effective as we would like.

WHAT VALUE WATER AND CARBON?

Payments we make for water relate more closely to the actual benefits we receive, but not as closely as the private water industry might wish. We are encouraged to have water meters in our homes so that we pay for what we use, but many households resist this, and as a society we will not usually countenance consumers being deprived of a water supply, even when they don't pay their bills.

The latest area being explored for PES is carbon storage. Recognition of our need for this service is growing, and climate change is likely to increase momentum. Like water, climate regulation looks set to become a necessity



Should taxes pay for the benefit provided by bees?

for our continued existence. What are the implications of that and what will it mean, say, for our upland communities - will they suddenly gain economic advantage, or will their future be taken out of their hands if society decides that carbon storage by upland peat bogs is a public good, not to be left to market vagaries?

Land, and the rights and responsibilities that land ownership incurs, underlie these debates, and few arguments have more political bite



THE IDEA OF PUTTING A PRICE ON NATURAL SERVICES, SUCH AS POLLINATION BY BEES, DOES SEEM BIZARRE

than what we can or can't do with land, and its functions as a private/public good. As long as we live in a society where private land ownership exists, the market will have a part to play and private investment does have the potential to improve the supply of the ecosystems services upon which we depend. But because some of these assets are essential for life, and they are

underpinned by the actions of individual land managers, we cannot risk leaving everything to the market. After all, landowners are used to restrictions in the public interest, for example to protect water catchments. PES should not simply be a substitute for regulation, or reward land managers for doing what they would be doing anyway. Such payments must deliver additional public benefits and not undermine, but reinforce, responsible land management. That means ensuring that payment schemes are properly designed and thought through. At the moment water supply and carbon storage do seem to offer the most practical scope for realising public benefit from the approach.

FUTURE SUCCESS

Research by Relu has found that there are lessons to be learned from the experience of other countries. In Australia and the US, for example, accessible data made openly available to the public has been shown to be a key element that can drive water quality improvements by allowing consumers to monitor effectiveness and value for money.

Peatland restoration offers opportunities for multiple benefits of carbon sequestration, savings on water purification and biodiversity. Reformation of the Common Agricultural Policy may also provide potential for matching public and private investment in agri-environment schemes. But we must avoid losing accumulated 'green' benefits of the past few years in blind pursuit of a market-based economy.

We are at a point where policy decisions will be key to the future success or failure of PES, but we have to ensure that the very useful research being carried out on the valuation of ecosystem services is properly linked to policymaking. We also need to build on existing knowledge with further, interdisciplinary research into the ways in which cause and effects link within ecosystems, the varying local effects of land management systems in different localities, and the ways in which land managers may be encouraged to work collaboratively across landscapes. Above all, we must not lose the momentum. ■

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