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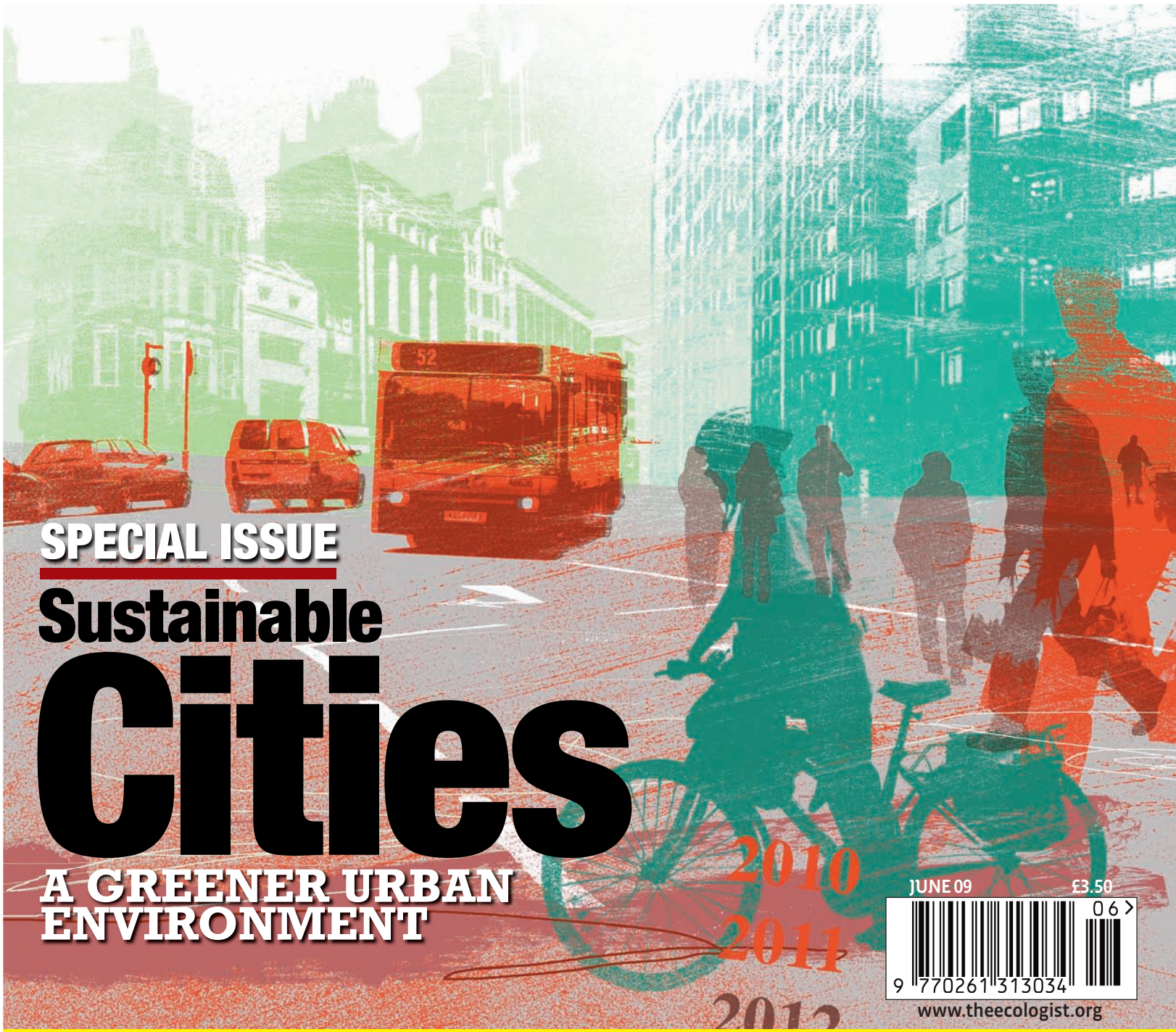
JUNE 2009



SPECIAL ISSUE

Sustainable Cities

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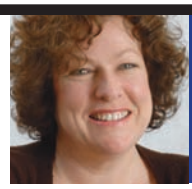

EDITORIAL

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Eco-urbanism

If you are reading this, chances are that you live in a city – one, perhaps, on its way to becoming a megacity with a population that exceeds 10 million or more. If not, it is likely that you, along with most of the world's population, soon will be.

Statistics from UNESCO suggest that 50 per cent of the world's population, some three billion people, now live in towns and cities. And while many of us see cities in a rather depressing light, for instance as places of isolation, urban poverty and crime, cities can also be our principal sources of social change and communication, centres of cultural expression, innovation and intercultural exchange. They both drive and respond to environmental change, and can, with forethought, become models of sustainability. Sadly, most of the world's cities still fail to live up to their potential.

Of the many topics that the *Ecologist* has covered over the years, a green plan for the urban environment has received perhaps the least attention. Environmentalism is so often associated with country living that it is sometimes easy to lose sight of the fact that cities are human ecosystems. They are man-made but they also grow organically, and in many ways they are the most efficient habitats for humans on an increasingly crowded and resource-constrained planet.

It was with this in mind that we contacted the Prince's Foundation for the Built Environment – the educational charity set up by the Prince of Wales to teach and demonstrate the principles of traditional architecture and urban design – to ask how one would begin to put together a roadmap for a greener urban environment.

Cities both drive and respond to environmental change, and can, with forethought, become models of sustainability

The Government has made a commitment to zero-carbon buildings by 2016 and has begun revising building regulations to move towards that goal. What is clear is that energy use is at the core of any sustainable city plan, whether it is the energy to heat and power our buildings or that which is used to bring food to urban inhabitants or keep them mobile, or the embedded energy in their construction and renovation.

Embracing this will inevitably alter the way we approach buildings and urban design. Even so, we need to get beyond the love of green gadgets and eco bolt-ons for existing buildings to a place where urban sustainability is driven in a ground-up way, not just because it might ensure a better future for us all but because it improves the quality of life for city-dwellers, as well as saving them money in the here and now.

This month's comprehensive special grew out of a day-long roundtable session involving ourselves and the authors of the articles, in which we sought to define what it will take to design cities with sustainability, community, a sense of place and the resilience to withstand any climatic or cultural changes that may arise in the future.

The result is a full and fascinating exploration of where we are, where we need to be and what stands in the way of helping our cities realise their full potential. I am most grateful to our guest editor Hank Dittmar, chief executive of the Prince's Foundation for the Built Environment, who acted as a guiding light for in this long-overdue *Ecologist* special, and hope that readers find it both an inspiration and an education. I certainly did.

On a different note, some of you will already be aware that the *Ecologist* is relaunching online in June. You can expect some big changes to our website, which will help you stay abreast of everything going on in the environmental movement. To find out more about our plans please turn to our news section (page 11) to get the full story.

SPECIAL ISSUE

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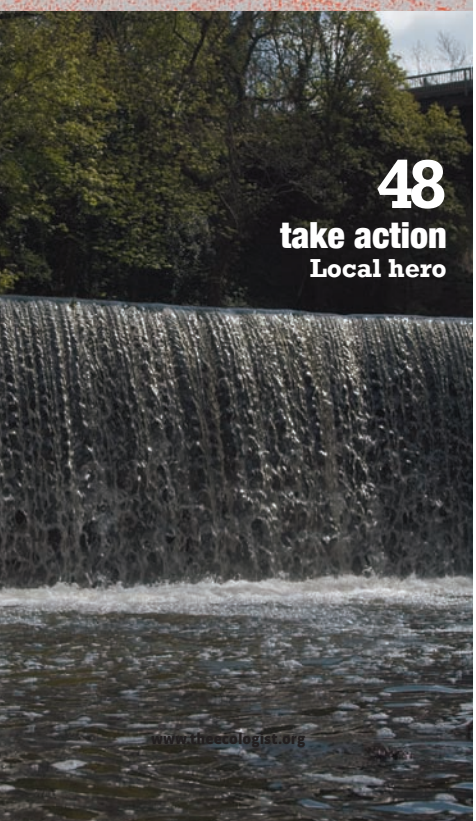

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DAILYLIFE

COVER ILLUSTRATION CLARE NICHOLAS

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Money to the bee

Amid warnings that Colony Collapse Disorder threatens apiarists and crops alike, the Government pledges £10 million for research into the plight of the honeybee, despite accusations that it is 'ignoring existing scientific evidence'

Bees are once again in the headlines, following the Government's announcement in April of research funding worth £10 million, which is to be spent on trying to understand more about the causes of Colony Collapse Disorder, the phenomenon that has seen a 30 per cent decline in the number of honeybees in Europe over the past two years.

So serious is the situation that international beekeeping body Apimondia has said that if a solution cannot be found, European apiarists could be out of business within a decade – a huge issue for farmers of the 35 per cent of European food crops that rely on bees for pollination.

Apimondia blames two factors for the decline of bee populations: the use of insecticides – which weaken the bees' immune systems – and the presence of the Varroa parasitic mite – which finishes them off.

Gilles Ratia, president of Apimondia, told Reuters: 'Politicians are more susceptible to the big lobbying of the chemical industry. We beekeepers can talk and talk, but we don't receive much consideration.'

A similar stand-off is emerging in the UK. While the Co-op group has banned its farmers from using controversial neonicotinoid pesticides on crops, the Government has refused to blacklist the chemical.

This drew an angry response from the Soil Association, which wrote to environment secretary Hilary Benn accusing the Government of 'ignoring existing scientific evidence'.

'The Government prefers to blame "very wet weather" and poor management by "less experienced beekeepers" than face their own responsibility to control bee-killing chemicals that have been used on up to 1.5 million acres of farmland in the UK,' said Soil Association policy director Peter Melchett.

MP John Penrose, who recently chaired a debate in Westminster on the plight of bees, is worried that a large tranche of Government funding will simply be used to develop a new database of beekeepers – something that he believes will replicate work already done by the British Beekeepers' Association.

Writing for the political website epolitix.com, Penrose dismissed the idea as a 'bureaucratic waste of money'.

'Given the awful track record of delays, cost over-runs and failures of Government-sponsored database projects, you might have thought they'd think twice about another one,' he said.

PHOTOGRAPH: GETTY IMAGES

NEWS ROUNDUP

INSIDE THIS MONTH...

ON THE WEB

Some of the key environmental stories from the past month that you may have missed. Visit www.theecologist.org/news to read and follow-up...

» Government suggestion unhealthy foods be put on top shelves angers retailers, but report linking climate change to obesity highlights urgency

» Cattle ranchers bigger culprits in Amazon deforestation than soy farmers, new NGO study shows

» Government promises £5,000 sweetener for electric-car buyers, but experts say that behaviour change and emissions limits must come first

» Herbicide glyphosate – also known as Monsanto's 'RoundUp' – could cause brain, intestinal and heart defects in foetuses, find scientists

» Remember purple GM tomatoes? The NHS isn't impressed with the way they've been publicised, and says the research is full of holes

» Soot from cooking stoves is the new 4x4, with estimates suggesting it is responsible for 18 per cent of global warming

» European Commission admits its fisheries policy is not working and calls for rethink, saying oversized fishing fleets are the big problem

» New coal plants must capture at least 25 per cent of CO_2 emissions, says Government; environmentalists remain sceptical about benefits

NEWSLETTER

See www.theecologist.org

» **Weekly news, exclusive web articles, images, videos, podcasts and previews of content from the magazine, our weekly e-newsletter is vital reading for those who can't wait for the next edition...**

Smoke-screen politics

Green Party leader slams Government's 'embarrassing' application for delay in meeting EU air pollution limits

The UK may be a leader on climate change but it certainly isn't when it comes to air pollution. That's the opinion of Green MEP Caroline Lucas, who has taken the Government to task for applying for yet another delay in meeting EU limits for emissions of particulate matter (PM10) which should have been met in 2005.

In January, the European Commission announced its intention to take the UK government to court over the issue, and its environment commissioner, Stavros Dimas, had already warned that applying for another extension would go against the 'spirit' of the air-quality regulations.

'It is embarrassing for a government trying to position itself as a world-leader on environmental policy that ministers have not yet been able to adequately protect human health through the implementation of effective strategies to meet the EU's basic targets to reduce pollution,' Lucas said.

Although the general trend for PM10 pollution in the UK is in slow decline, eight specific areas of the country – including parts of Greater London, Glasgow and Swansea – have exceeded either daily or annual EU limits.

In London, one of the worst-hit areas of the country, official estimates suggest that air pollution may have contributed to the deaths of 3,000 in 2005 alone. The mayor of London has proposed a series of measures to improve the situation, including an increase in the number of hybrid buses used in the capital, making traffic-flows smoother, encouraging more cycling and walking, and opposing the expansion of Heathrow airport.

But Caroline Lucas is concerned for the rest of the UK, saying Defra 'has no real plan' for tackling PM10 emissions from transport and industrial plants.

The controversy came as the results of a major US study tracking the changes in air quality in 51 cities over 25 years revealed that clean air was responsible for at least 15 per cent of increased life expectancy.

Conversely, said Douglas Dockery of the Harvard School of Public Health, the heavily polluted air in rapidly industrialising cities could shorten lives by some three to four years.

GM research yields 'little confidence'

Former US government biologist Doug Gurian-Sherman has released a damning new report on the track record of GM crops, examining more than a decade of data from commercial use of the technology in the US to conclude that there is 'little confidence' in the technology feeding the world in the foreseeable future.

In *Failure to Yield*, which is published by the Union of Concerned Scientists, Gurian-Sherman conducts one of the first long-term analyses of GM crops to reveal that herbicide-tolerant soya and maize crops have resulted in no yield increase.

For Bt maize – which is engineered to produce a toxin to deter insect attack – the report says that the GM trait is responsible for only between 3-4 per cent of the 28 per cent yield increase seen between 1991-1995 and 2004-2008.

Gurian-Sherman goes on to warn that second-generation GM crops, most of which aim to improve plants' response to external stresses such as drought or flood, may have 'complex genetic effects' that 'will not always be identified by testing under current regulations'. He warns that even when the crops appear to behave as intended they may still cause significant environmental or human health effects.

The report also points out that those countries most in need of crop-yield increases – notably in the less industrialised world – would benefit more from a transition to organic agriculture, which has been shown to increase productivity by 100 per cent and at considerably lower cost than intensive, industrial systems.

Elsewhere, the tide continues to turn against GM technology. In April, the French government food agency (CNC) gave the green light for the introduction of a 'fed on non-GM feed' label, which will appear on meat and dairy products. The ruling was a victory for environmental democracy group 'Que Choisir', which had lobbied for the label on behalf of consumers.

In Germany, however, a national ban on GM maize variety MON810 – on the grounds of scientific research that showed the crop led to reproductive problems in mice – has landed the German government with a lawsuit brought by US biotech giant Monsanto.

A spokeswoman for Monsanto described the ban as 'arbitrary' and 'in conflict with EU rules'.

PHOTOGRAPH: ARTHUR WOODCROFT

ECOLOGIST FACT

Just three in 10 people understand car fuel economy and CO_2 emissions figures in adverts, finds campaign group We Are Futureproof in a YouGov poll

TUC MYTHS ON WORKING TIME INCENTIVES

The UK has consistently refused to abandon its 'opt-out' clause on the EU Working Time Directive (WTD), which would introduce maximum hours for workers. The official line is that this 'protects' the right of British workers to choose their own hours of work, but is this just spin to protect the interests of employers who profit from the environmental and health impacts of a long-hours culture? A new report from the Trades Union Congress (TUC) sorts out the myths from the facts...

MYTH: The UK economy needs long hours to succeed	FACT: Long hours actually impede productivity. The UK works the longest hours in the EU – 15 – but we are only 10th out of 15 in terms of productivity per hour.
MYTH: We should not be talking about limiting hours in a recession	FACT: On the contrary, this is the best time to plan for a future with a sensible work-life balance. During a recession the demand for long hours falls sharply, as many workers lose their jobs or go on to short-time working.
MYTH: Long hours are not a health and safety issue	FACT: Recent reports from the Health and Safety Executive, International Labour Organisation and the then-Department of Trade and Industry (DTI) found that those who regularly work more than 48 hours a week are likely to suffer an increased risk of heart disease, stress related illness, mental illness, diabetes and bowel problems.
MYTH: All those who work long hours are happy to do so	FACT: Recent research highlights widespread abuse of the WTD opt-out by employers. A 2004 DTI report found that only 34 per cent of long-hours workers had signed an opt-out, despite a legal requirement for most of them to do so.
MYTH: Globalisation means that we must work more hours	FACT: The UK's main competitive advantage is in 'high-road' businesses – in other words, in working smart. Relying on long hours is usually a sign that the business is not very smart, wherever in the world it is located.

Read the full report at www.tuc.org.uk/extras/workingtimemyths.pdf

Thumbs-up for Great British Refurb

An Englishman's home may be his castle, but he's not opposed to a little help when it comes to draught-proofing the portcullis and lagging the keep.

That's the conclusion drawn from recent research by the Department of Energy and Climate Change (DECC), which involved 270 members of the public in workshops across the UK to gauge interest in a nationwide efficiency upgrade of homes, christened 'the Great British Refurb' by the Government.

The research indicated householders are enthusiastic about 'whole-house' efficiency refurbishments, as well as generating their own micro-renewable energy. The Government hopes to have offered refits to seven million homes by 2020, and every UK home by 2030.

But the research was foreshadowed by a report from the Economic and Social Research Council (ESRC) and the Technology Strategy Board, which said refurbishing the UK's entire housing stock would be a 'Herculean task'.

'To complete the task in 40 years we would need to refurbish a city the size of Cambridge every month,' said Professor Kevin Lomas of the University of Loughborough. 'If we assume that each [refurbishment] would take a team of trained workers two weeks, we would need 23,000 teams of people to work at this rate non-stop for the next 500 months.' (See also 'Cracking the code', page 22.)

The ESRC authors also warned that there is a gulf between what energy-saving technologies are designed to achieved, and how householders use them. Central-heating timers – widely regarded as an energy-saving measure – actually tend to lead to an increase in the use of boilers, the researchers said.

IN BRIEF

Melting borders

Climate change has led to the introduction of one of the world's first 'mobile borders', between Switzerland and Italy.

The border was originally defined according to where the watershed line was on a series of glaciers, some just below the world famous Matterhorn. But rapidly melting border glaciers have changed the location of the watershed.

The two countries have agreed to redraw the 750km border then leave its maintenance to a panel of experts to revise as the glaciers continue to melt.

Between 2007 and 2008 most alpine glaciers retreated by at least 25m, with the Gorner glacier on the Swiss-Italian border retreating by nearly 300m. The glaciers are expected to be all but gone within the next 30-40 years.

Shell on trial

Oil giant Shell will stand trial in New York on 26 May for complicity in the torture and killing of Nigerian protester Ken Saro-Wiwa and others in 1995.

Shell had tried to avoid trial by claiming the US court had no authority to cover alleged crimes committed overseas. But Judge Kimba Wood of the US District Court for the Southern District of New York rejected the complaint.

Saro-Wiwa and his companions were allegedly killed with Shell's involvement for being outspoken opponents of gas-flaring from its oil wells in the country.

Saro-Wiwa's son, Ken Saro-Wiwa Jr, said: 'As my father always insisted, one day Shell will be on trial. That day is coming.'

Forests for the Future

Much is said by Western governments and international bodies about how to tackle deforestation, but too often the knowledge and experience of those living closest to forests is unheard or ignored.

Now indigenous communities across Indonesia have collaborated to publish an online book, *Forests for the Future*, which describes how forest ecosystems have been sustainably managed through the generations. Its authors pin many of Indonesia's problems on a frantic dash for economic growth in the 1960s, leading to large-scale logging and soaring greenhouse gas emissions.

The book argues for a 'shift away from the failed paradigm of a forestry industry based on companies exploiting large-scale concessions [to] a model of community-based forest management that brings direct benefits to local people'.

See http://dte.gn.apc.org/GNSCON.htm

A bad crop for maize

Is King Corn soon to be toppled from its throne? Some 784 million tonnes of maize were produced worldwide in 2007, according to the UN Food and Agriculture Organization, of which 332 million tonnes were harvested in the US.

But a new report from NGO Environment America suggests that global warming could land US maize farmers with a loss of $1.4 billion, simply through the yield decreases anticipated from higher temperatures.

In the report, *Hotter Fields, Lower Yields*, Timothy Telleen-Lawton of the Wisconsin Environment Research and Policy Center points out that climatic changes since 1981 have already had worldwide costs of $1.2 billion, and that additional effects from storms, pests and diseases, and increased weed-growth could make the losses even more dramatic.

He argues that maize should be seen as the 'canary in the coal mine' for expected crop-productivity losses, and calls for radical cuts in CO_2 emissions to avoid the predicted decline in yield.

Maize's credentials are also under attack from another direction, however, with mounting evidence that maize-derived sweetener high-fructose corn syrup (HFCS) causes problems beyond those associated with a high sugar intake.

In a study published in the *Journal of Clinical Investigation*, scientists revealed that although everyone involved in a trial where participants were asked to consume sweetened drinks for 10 weeks gained weight, those drinking products sweetened with HFCS gained around twice as much fat around their organs – generally thought to be more dangerous – than those who were given drinks sweetened purely with sugar (glucose).

In addition, the group given the drinks containing HFCS saw a 14 per cent rise in their cholesterol levels, and their sensitivity to insulin fell by 17 per cent when compared to the glucose group.

The study was released in the same month scientists at the University of Minnesota discovered that the other key use for maize – producing ethanol biofuel – might be even less green than was already feared.

Published in the journal *Environmental Science and Technology*, their study found that producing one litre of ethanol could use anything from five to 2,138 litres of irrigation water. Worse still, the scientists found that as demand for ethanol increased with the introduction of biofuel subsidies, maize farmers began to farm the crop in areas that required more irrigation, leading to a 246 per cent increase in the amount of water used for ethanol production between 2005 and 2008.

They conclude that 'concerted and immediate action needs to be taken in order to prevent a problem shift from energy supply to water sustainability'.

England's £700m factory farming bill

Taxpayers living in England are subsidising intensive and factory farming to the tune of £700 million each year, according to a new analysis conducted by Friends of the Earth.

In *Feeding the Beast*, the environmental group calculates that via the EU Common Agricultural Policy (CAP) England alone is paying €402 million a year subsidising cereals destined for factory-farmed livestock; €413,376 on international 'export refunds', which keep prices high for exporters; €30 million on intensive pig and poultry operations; €154 million on dairy farming; and €216 million on subsidies to encourage intensification of lowland grazing – a grand total of £720,410,036.

'If we are to ensure a new era of sustainable and secure food production in the UK, Europe and globally, the CAP's purpose and mechanisms must be overhauled to deliver real change,' the report's authors write. 'Funds for the meat and dairy sector must urgently be redirected to support sustainable low-input livestock systems.'

Friends of the Earth suggests a variety of reforms to the CAP when it is overhauled in 2013. A key proposal is to increase domestic production of sustainable animal feeds – including grasslands, protein crops and dried fodder crops – to help reduce dependency on soybeans frequently sourced from former Amazon rainforest in South America.

Improving crop rotations to include nitrogen-fixing crops such as beans and peas would not only cut down on the need for artificial fertilisers, but also help provide sustainable sources of animals feed, the report says.

Meanwhile, a report by the Rural Economy and Land Use Programme, based at Newcastle University, warns of the potentially perverse effects healthier diets could have on rural communities.

Scientists working on the programme warn that although unhealthy eating costs the UK economy as much as £1 billion a year, healthy diets with reduced levels of meat and dairy products could bring about 'extreme' changes for hill farming communities, with collapsing economies and migration pressures as displaced rural workers seek jobs in towns.

See http://tinyurl.com/d7zakb

Monsanto PCB trial

Evidence heard at a court in Jefferson County, Kentucky, has revealed that biotechnology company Monsanto deliberately chose not to tell residents near its West Anniston plant that it had polluted the local river with polychlorinated biphenyls (PCBs), and that these posed a serious health risk.

In video testimony recorded in 1998, former Monsanto employee William Papageorge was asked whether any Monsanto official had ever warned the public about the dangers of PCBs.

'Why would they?' he replied.

Papageorge added that he and other Monsanto officials had decided that 'there was no rational reason' to inform to the public, even though fish from a nearby river contained high levels of PCBs and were regularly caught and eaten by locals.

The trial, which is one of 47 cases filed against Monsanto's subsidiary Pharmacia at the court, comes as new research published in the journal *PLoS Biology* shows that even low levels of PCBs can affect brain-cell development in children, leading to neurodevelopmental and behavioural disorders.

‘I think it should be a crime to be wasting energy. It’s clearly a moral crime against the climate, and I think we should be having a discussion about whether it should become an actual crime.’ **Dr Richard Dixon, director of WWF Scotland**

Novel ideas for doting on digital

It isn’t just the advertising industry that drives us to consume unsustainable amounts of new products – humans have a continual desire for novelty that needs to be satisfied.

And although we can become very attached to some material possessions, which we then treasure for years, we tend to be much less attached to the more energy- and resource-intensive products we buy, such as digital and computer devices.

Now, researchers at Indiana University’s School of Informatics have begun looking at ways we can be encouraged to ‘reappreciate’ our digital goods, and reduce our tendency to grow bored with them.

In papers presented at the Computer Human Interaction Conference in Boston, Massachusetts, graduate student James Pierce demonstrated novel ideas such as a table that records the number of heavy objects placed on it during its lifetime, a lamp that is lit by shaking its shade and dimmed by rocking it back and forth, and a clock that occasionally ‘grows bored’ and temporarily displays the wrong time before correcting itself.

Other ideas designed to give digital devices a history include a passport that records a holder’s personal narrative upon entering a new country, and a TV that produces digital artwork based on every programme it has ever displayed.

‘Animate objects’ such as these, Pierce believes, encourage owners ‘to interpret and reflect on these objects as possessing human-like needs and desires rather than treating them as purely functional’.

To read the papers, visit www.jamesjpierce.com/animate_objects.html

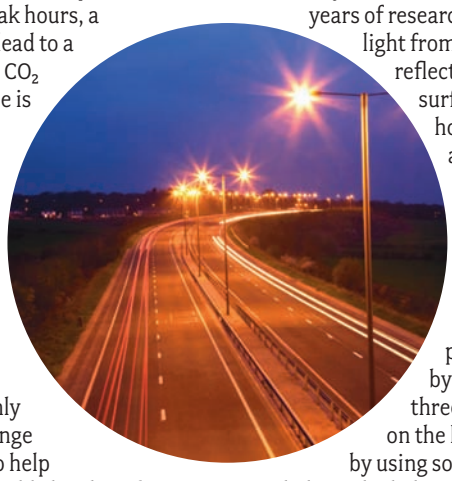
Dark skies on the M27

In a bold move to save energy, the Highways Agency is to start turning off more sections of motorway lighting between midnight and 5am – and the majority of drivers are apparently in favour.

From 23 April, lighting on the M27 between J7 and J8 near Southampton will be turned off during off-peak hours, a move that is hoped will lead to a 40 per cent reduction in CO_2 emissions. The technique is already used on the M4 and M5.

According to a survey by car sales group Motorpoint, 57 per cent of motorists are in favour of the scheme, and would like to see it rolled out nationally.

But the news is not only good from a climate change perspective – it will also help reduce the UK’s considerable burden of light pollution.



And the problem could be tackled even further if street-lighting engineers adopt a new mathematical model of light pollution constructed by Dr Chris Baddiley, scientific adviser to the British Astronomical Association’s Campaign for Dark Skies.

Baddiley’s model, built following seven years of research, helps explain how light from streetlamps is reflected differently by the surfaces it illuminates, how it is scattered by atmospheric conditions and how different designs of streetlamp cause varying degrees of pollution.

He found that in rural areas, light pollution could be cut by a factor of between three and five, depending on the height of the lamp. And by using so-called ‘full cut-off’ lights, which direct light straight downwards, benefits could be even greater.

THIS MONTH

30 years ago

What does it mean to speak of Britain becoming a post-industrial society? It must, at the very least, mean a future which in some crucial respects breaks with the present pattern of industrial societies.

All industrial societies tend towards certain ends. They are large-scale, hierarchical, centralized, mechanized, bureaucratically-governed, and based on specialization and the technical division of labour. A post-industrial society ... would move towards the small-scale organization, towards more autonomous units, towards structures of work and authority in which individuals recover the use of skills... alienated to the machines and the professional hierarchies.

... Post-industrial society does not disown science and technology, the motor... But it acknowledges limits – material and moral – to the Promethean impulse; and it gears itself towards a world in which growth is considered in qualitative rather than quantitative terms.

Dr Krishan Kumar, ‘First in, first out: Will Britain pioneer the post-industrial future?’, *The Ecologist*, May-June 1979

Online relaunch

As many of you know, the *Ecologist* is to relaunch online, with the last printed edition on sale 19 June.

On the same day our fantastic new website will go live, offering more of the news, features, comments and investigations you’ve come to expect from the magazine. By moving online we hope to save resources and reach a wider audience at a time when environmental issues are becoming more complex than ever. An article explaining the move is available at **http://tinyurl.com/cubwqw**

➤ Sign up for our online newsletter at **www.theecologist.org**. Subscribers will receive a letter in the July issue with details of their subscriptions and you can find a page of FAQs at **www.theecologist.org/pages/subscribe.asp**

➤ The special July issue will ask tough questions about where the eco agenda should be heading, and announce details of our exciting online plans.

Pumping it up

The 'Searaser' uses the power of the ocean to pump water inland for electricity generation. **Mark Anslow** reports on the simple invention that could soon be making waves in the renewables

Alvin Smith had his eureka moment not in the bath, but in the swimming pool. 'I was swimming round the pool, making little waves, and it struck me how much power there was in the displacement of the water,' he remembers. 'You think of a 500-tonne boat: a wave comes along, lifts that whole boat, and then drops it down again. You must be able to harness some of that, I thought.'

His subsequent invention would have made Archimedes proud, and should be making the renewables industry very excited.

Dubbed 'Searaser', it consists of what looks like a navigation buoy, but is in fact a simple arrangement of ballast and floats connected by a piston. As a wave passes the device, the float is lifted, raising the piston and compressing water. The float sinks back down on the tail of the wave on to a second float, compressing water again on the downstroke.

What is particularly clever about Searaser, however, is its simplicity. Where most marine energy devices have sealed, lubricated innards and complex electronics, Searaser is lubricated entirely by seawater, has no electronic components and is even self-cleaning. Smith describes it as 'Third-World mechanics', but this belies the sophistication of the concept.

'The beauty of it is that we're only making a pump, and bringing water ashore,' he explains. 'All the other technology needed to generate the electricity already exists.'

Searaser is designed to pump water either straight through a sea-level turbine to generate electricity, or up to a clifftop reservoir, where the water could be stored until needed, then allowed to flow back down to the sea through turbines, generating electricity on demand.

The second option is the one about which Smith is most passionate. By effectively storing the energy generated by Searaser to be used on demand, his system would solve a problem that dogs almost all renewable technologies – their variability. Energy that can be summoned at will is not only more valuable, but also allows the grid to compensate for other, less easily controlled renewables such as wind and solar.

Early trials of the prototype Searaser, one of which was completed in April, have proved encouraging. Despite being less than a tenth of the size of the version he hopes will eventually be supplying power to our homes, Smith's homemade machine managed to pump some 112,000 litres of water a day during the trial, at times operating from waves a mere 6in high.

The eventual machine will be capable of generating 1 megawatt of electricity – enough to supply some 1,700 homes – at prices that the team behind Searaser believe will be lower than most other renewable technologies.

As an intermediate step, a trial of two mid-size machines should go ahead towards the end of this year, with a university invited to monitor the trial and provide independent accreditation of the results. Although these machines won't generate electricity (they will simply pump water through a flow meter to determine their potential) they will demonstrate whether the technology can work for prolonged periods and in rough conditions.

For Smith, however – a man who could use a welder by the age of eight – the incremental steps between prototype and commercial deployment seem almost an irritation. His vision is already far advanced, and includes using the pressurised saltwater generated by Searaser to produce drinking water, using the same reverse osmosis process used in conventional, energy-hungry desalination plants.

'All you'd have to do is reduce the size of the piston and increase the size of the floats to increase the pressure,' he explains.

He has also put plenty of thought into how he would persuade planners and landowners to allow him to build reservoirs on top of cliffs to provide the energy storage for Searaser.

'The planning will frighten everyone,' he says, 'but if you were trying to produce as much energy from wind turbines, they'd be very visible; a reservoir you'd only see from above.'

Smith has also put thought into how the reservoir could be made as water-tight as possible – vital to avoid saltwater leaching into soils. By double-lining the reservoirs and including an outlet pipe in between the two linings, you would instantly be able to see if the uppermost lining had a puncture by watching the end of the outlet pipe.

'If you saw any water coming out, you'd know you had a leak and you could drain down the reservoir and sort it out,' he says.

Beyond being simply functional, however, Smith believes the reservoirs could be beautiful, providing recreational spaces for watersports or sites for shellfish farmers. 'I bet the birds would love it, too,' he adds.

Although Searaser is clearly a commercial project and Smith hopes to see a return on his patents, he is also keen to see the technology deployed abroad, given that its simplicity lends itself to installation and maintenance in the less-industrialised world.

'It's a modular system: a community could start off with two or three machines, and expand as necessary. It can go round the globe, it really can,' he says.

www.searaser.com

The Searaser uses water displacement to pump water uphill

Mark Anslow is the *Ecologist*'s News Editor

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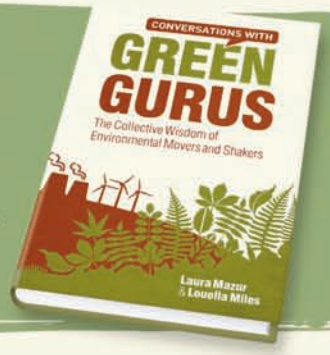

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With more than half of us living in cities, the Earth is now officially an urban planet – and yet the metropolis is still as integral a part of nature as we are. Guest editor Hank Dittmar presents a series of articles on the green cities of tomorrow, and explains why they hold hope for us all

The human

The environmental tradition has historically been about embracing and preserving the wild places, and environmentalists have often viewed cities as dirty, polluting, unfortunate habitats that pose a great threat to nature. This tendency to position nature and humanity in opposition derives from both the popular rejection of the Victorian city, its polluting factories and foul sewers, and from the roots of environmentalism in saving threatened species and preserving habitat and scenic beauty. Environmentalists responded by regulating industrial and urban discharge into water and air, through planning laws to preserve countryside and reclaim industrial land, and through preserving and conserving farmland and wild places as green lungs for the planet.

The result has been, at least in the global north, cleaner water, purer air and dedicated parks and nature reserves. At the same time, however, huge global population growth, and the move from subsistence and market farming to industrial agriculture have together brought about an urban explosion, and cities have become a dominant feature in both the human and natural environment.

A few facts will help to make the needed connections. In 2007, the Earth officially became an urban planet, with more than half the world's population living in cities for the first time. Globally, the 21st century will be the urban century. According to the United Nations Environment Programme, of the global population increase of 2.2 billion by 2030, 2.1 billion will live in urban areas, and by 2030, more than 60 per cent of the world's population will be urban dwellers. Despite our self-image as a nation of villagers, the UK population is overwhelmingly urban, with 90 per cent of us living in urban places, according to the United Nations.

Two issues arise here. First, if all these urban dwellers adopt the suburban living patterns and lifestyles of the United States and Western Europe, the problems of climate change, resource depletion, waste and pollution will be greatly exacerbated. Second, many if not most of the urban dwellers in the global south live in grossly overcrowded slums, rife with cholera and other diseases, and where infant mortality, malnutrition and lack of secure land tenure are endemic problems. These slums may be environmentally sustainable, inasmuch as their contribution to climate change is negligible, but only because their residents have next to nothing.

Global urbanisation is thus both a social and environmental issue, and the challenge of raising global living standards while reducing carbon emissions is a knotty and worldwide problem– for all of the traditional reasons about pollution and overcrowding, plus challenges of public health, nutrition and engagement in civil society.

People all over the world are moving to cities for a reason: by and large they are seen as offering the opportunity for a better life, because they provide the chance for employment, training, access to healthcare, to education and to the online world. In other words, cities are efficient places for humans, and increasingly are key to a successful human ecology. For when we look at urban places, we find not only solutions to the personal transport part of the climate problem – density, connected streets, accessible public transport, more efficient buildings and mixed use – but also solutions for the broader social challenge of truly sustainable development.

This issue of the *Ecologist* proposes that cities are, in fact, part of nature, and that in the 21st century, the planet's survival may depend upon making them the preferred habitat for humans, and doing so in a way that results in more efficient use of resources, better land conservation and habitat protection, but also improved living conditions for the human species.

The articles that follow look at some basic questions, such as how we feed our cities (page 19) and how we travel within them (page 24). They tackle designing cities with climate change and community in mind (page 16). They address the way that 'greener' building codes sometimes result in less green buildings (page 22), and ask what green buildings should be made from (page 27) and look like (page 29).

Thinking of cities as habitat for humans (and songbirds, insects and small mammals) means organising cities in ways that offer different choices in our day-to-day lives: greener ways of living; of moving around – or not having to move around so much; of delivering food and services. Responding to the urgent crises of climate change is often seen as a burden, and as a threat. People fear that life in the future will be more limited, and that being green means making sacrifices. We don't believe that's so: the shift to green cities could well add to our quality of life here in Britain; in fact we might eat better, be healthier and have just as many choices as before. They are just different choices.

Hank Dittmar is the chief executive of the Prince's Foundation for the Built Environment

ILLUSTRATION: CLARE NICHOLAS

habitat

3°C of adaptation

Building a more sustainable future is vital if our societies are to survive in a post-fossil-fuel future – but the way we build must itself first change. **Susan Roaf** looks at the role of green design and low-energy development in a warming world

As more people consume more resources, pollute more and are increasingly addicted to the rapidly vanishing fossil fuel resource, the news from the warming world gets worse daily. Oil and gas are vital to the way we generate energy, grow, fertilise and refine food, make materials, move goods and people, keep ourselves warm or cool and do the work of our increasingly unequal and energy-hungry societies. But the cost of our oil-dependent lifestyles is proving too high, and as oil prices soared towards $150 a barrel in July 2008, food and energy costs rocketed, house prices and the global economy collapsed.

Experts around the world, such as Ross Garnaut in Australia and Nicholas Stern in Britain, have warned us that failure to act on climate change 'would haunt humanity until the end of time'. As top-down politics increasingly looks to be failing society, there are many different bottom-up movements experimenting with models to 'transition' towards viable 21st-century societies and economies. But *quis custodiet ipsos custodes*? Who is guarding the guardians? Apparently no-one.

Building designers and developers, for some inexplicable reason, have been able to get away with producing ever more exposed, vulnerable and energy-profligate buildings. This, despite a common understanding that buildings themselves are the greatest source of greenhouse gases on the planet and are our first and greatest defence against the elements. Again and again, so-called 'sustainable' designers present their huge glass-box buildings that anyone with an iota of intelligence can see are environmental nightmares. Voices are increasingly raised against this systematic greenwashing by designers who are either fundamentally ignorant or unethical.

Passive buildings – using windows, walls and floors to collect, store and distribute the sun's heat in the winter and reject it in the summer, and maximising daylight for interior illumination – are not 'machines for living in' but ecosystems in themselves. They need people to understand how they work and to sail them like ships in the wind. A boat or plane cannot operate without pilots, so why should a complex building be capable of being run by machines alone?

Like boats or planes, buildings are one part of the complex three-way relationship between themselves, people and the environment. Nor are people machines for living in buildings. Designers of traditional vernacular buildings knew this, but many designers today have little basic understanding of the connection between buildings and nature.

So how can better decisions on ways forward to a truly sustainable future be made? First, there needs to be a clear, agreed understanding of where we want to be in the future, and an action plan with effective strategies to get there. Central to this action plan is the need to combine the best of the tried and tested traditional solutions with the best of the emerging low-impact technologies in a truly 21st-century vernacular of locally appropriate buildings and cities. Because of the predicted magnitude and proximity of the temperature changes ahead we need a routemap, and future targets must be realistic, radical and woven into a continually evolving process of progress review and improvement.

The mean global temperature today is already around 1°C warmer than the 1860-1990 average, and under the Intergovernmental Panel on Climate Change A2 scenario for business-as-usual, will rise to 2°C as soon as 2045. It took 150 years for the temperature to rise 1°C, yet it will take only three or so decades from now until the 2°C threshold is passed. After that, as climate change rates rise exponentially, the +3°C global warming mark is passed after only 20 more years. The world is currently exceeding the A2 emissions scenario by some way. Many believe humanity has already passed the point of no return in terms of mitigating such high levels of temperature increase, and that the only hope now is to adapt to them while fighting a rearguard action against the threat of climate chaos. An effective routemap for adaptation might look something like the following:

1°C: Denial

It is necessary first to recognise the scale of the problem. At the 1°C warmer point, where temperatures stand today, there is still widespread 'denial'. While many decision-makers espouse 'sustainable development', they patently still act otherwise. The Government and building and design professions continue to trumpet 'sustainable communities' and 'zero-carbon buildings' while supporting the interests of developers and manufacturers in applying regulations, policies and strategies for promoting – for instance – cheap, poorly performing buildings and buildings on flood plains. At a time of rapidly rising unemployment, poverty and social unrest, we can no longer allow our futures to be captive to the vested interests of the few over the many.

The evolving statutory and voluntary tools are often actually designed actively to encourage increased levels of emissions or to ignore their potentially lethal impacts. Examples of this are the Government's failure effectively to regulate the financial markets before 2008 and to avoid the expansion of UK airports at a time of shrinking air travel.

Attempts to provide leadership in the field of sustainable development are similarly risible. In the 'energy and CO_2 emissions' subcategory of the UK Code for Sustainable Homes, 2.5 points are given for the 'reduced fabric heat-loss parameter' of the house, 2.5 points for the inclusion of a

ILLUSTRATION: CLARE NICHOLAS

cycle rack and 2.5 points for energy-efficient external lighting. How much cheaper to buy a low-energy light bulb than to construct a robust building? Under the current UK Building Regulations it is possible for a fully air-conditioned building with fixed windows to achieve an A-rating, but not for the same building, naturally ventilated with opening windows. In the US Leadership in Energy and Environmental Design (LEED) rating system, buildings must have central air conditioning systems in order to qualify for the efficient energy points that merit a Gold or Platinum rating.

To date, the most systematically effective tool devised to provide incontrovertible evidence of building performance has been the use of actual performance measurements in real buildings through the European Energy Performance of Buildings Directive (EPBD) process. This has demonstrated that the business-as-usual obsession with 'efficiency' has led to some very poor 'green' buildings. The genius of the EPBD approach is to look at the performance of the whole building as used. Inevitably, however, the lobbyists have been at work again, and as effectively as ever: even now the EU government is busy watering down the directive to require only modelled performance to be displayed, to address construction and investment industry concerns.

2°C: Sense and science

At a time when civil unrest grows, fuelled inevitably by rising fuel poverty (30 per cent of Scottish homes are now deemed to be occupied by the fuel poor) there needs to be a rethinking, a 2°C sense and science (S&S) approach. Credible solutions to many emission-related problems exist and have for decades been espoused by many, such as Amory Lovins, for instance, as the 'technical fix approach'. Lovins' work on 'factor four' reductions in resource use – predicated on the doubling of production output commensurate with the halving of resource use and related environmental impacts – is seen as a credible foundation on which a low-carbon and resource-efficient economy could be built. How this approach deals with rapid climate change is less clear.

The S&S approach is exemplified by the 'Beating the Heat' report published by Jake Hacker of Arup and Stephen Belcher, in which a range of building types, including homes, schools and hospitals, are systematically modelled in future climates, and modified and remodelled to review the cost and energy benefits of various different adaptational strategies. By looking at heat gains and losses, solar gain, windows, ventilation, temperature, humidity, wind speed, thermal mass, insulation, fabric performance and internal gains, buildings proved capable of being sensibly modified to remain habitable in a warmer future.

To achieve this the best buildings have an appropriate form, have thermal mass, are naturally ventilated and shaded from the summer sun, and generate much of their own energy. Efficient equipment plays a part in this mix but is not as important as getting the basic architecture of the building right, learning how buildings provide shelter and thermal comfort in reality, and using adaptive standards that are central to the design of truly passive buildings. The next step in that process is then to run the buildings, as far as possible, on clean renewable energy.

The S&S approach should be adopted universally today, and can be funded through conventional routes, by the construction industry, with governments and citizens themselves. S&S is the foundation on which can be built the 3°C community level and society centred solutions.

3°C: Solutions and strong communities

The scale of the adaptation required if we are to survive 3°C of climate change with our societies intact is enormous, and will require strong governments and strong communities alike to succeed. If we are to achieve a generation of truly low-energy buildings, to manage the retreat of communities from coastal and riverine flood plains, to retool our industry for the low-carbon, fossil-fuel-free future, we need strong and visionary government.

We are not talking about simply rearranging the deckchairs on the Titanic; we are looking at the need – in the face of growing global populations, increasing resource-depletion and the slowing and possible eventual collapse of the growth economies – to change the direction our lives and societies are heading in. This means a reordering of society in such a way that equality of opportunity and access to resources becomes a reality, and such that the impacts of climate change are not disproportionately loaded on to one sector of society to the benefit of others.

In his book *The Impact of Inequality*, Richard Wilkinson argued that social inequality has malign effects on public health, and that all societies fall on a continuum of degrees of social inequality. He posited that one way to cope with a challenge to society is explicitly to reduce the level of social inequality. During the war years, the Government explicitly created and imposed a greater degree of social equality, which made society better able and more willing to cope with the challenges facing it. Wilkinson has gone on to develop this idea in his 2009 book with Kate Pickett, *The Spirit Level: Why more equal societies almost always do better*.

Robert D. Putnam wrote of the US's declining social capital in *Bowling Alone* in 2000. He ably demonstrated that the past three decades of the 20th century had seen a fundamental shift in political and civic engagement, informal social ties, tolerance and trust in our communities. MK Smith points out in his article on Wilkinson in *The Encyclopaedia of Informal Education*: 'We are not talking here simply about nostalgia for the 1950s. School performance, public health, crime rates, clinical depression, tax compliance, philanthropy, race relations, community development, census returns, teen suicide, economic productivity, campaign finance, even simple human happiness – all are demonstrably affected by how (and whether) we connect with our family, friends, neighbours and co-workers'.

Many now question the priorities of our 'Maslow' society, where self-actualisation needs are at the top of our aspirational triangle and the need for food, air water, rest and freedom are at its base. It is actually those basic needs that are now threatened in many regions of the world, and farsighted movements see that rather than abandoning collective responsibility for their provision, working together at the local level may well prove to be the most effective way of achieving them.

The popularity of organisations such as Friends of the Earth, Greenpeace and the Campaign to Stop Climate Change has done much to develop and promote low-carbon and sustainable building and community thinking. Youth groups such as People & Planet are aiming to radicalise school and university students to become agents of change in their own futures. Perhaps the most successful of the current movements is that of the Transition Towns, which have benefited from a range of well-thought-out action planning processes at the group, community and the city level. Individuals often feel powerless when acting alone and top-down politics for the built environment simply does not seem to be working to protect ordinary people. Rather it too often promotes the importance of conventional wisdom, the status quo and overriding need to perpetuate the power of the market-driven economy.

Resources

www.garnautreview.org.au
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www.transitiontowns.org
www.buildingsplatform.org
www.usablebuildings.co.uk
www.bowlingalone.com
Beating the Heat:www.arup.com/_assets/_download/download396.pdf
http://peopleandplanet.org

A call to arms

It is the responsibility of our generation to rebuild our world in such a way that our children and children's children can survive decently in a post-fossil-fuel future in a rapidly changing climate. The scale of this apparently simple task is exacerbated by the fact that we are increasingly exceeding the capacity of many ecosystems to support human societies in the expectations to which they have become accustomed over the last century.

We are through the 1°C warmer stage in the evolution of modern society – it's time to be done with denial – while 2°C solutions must involve sense and science: low-carbon buildings, technologies, communities, economies and societies. In the built environment this requires a systematic root-and-branch review of the form and functioning of our related professions, and the policies, guidelines, regulations and standards they use to inform the form of our built environment.

We must *now* begin to put into place the 3°C solutions, however, to strengthen our communities and protect them in resilient, robust and safe low-carbon buildings. To do so involves a reordering of our social structures on a bedrock of equity of opportunity and resource allocation, because without it, no-one will be safe in a rapidly changing world. To do so requires us to reduce the exposure and the vulnerability of our populations to the growing economic, social and environmental hazards ahead, which in turn will require huge financial investment and difficult decisions. This requires all of us to act for the benefit of the greater good rather than 'self-actualisation'. That might be difficult.

Susan Roaf's eco-house in Oxfordshire is one of the most high-profile low-energy homes in the UK

Adapted from the forthcoming second edition of *Adapting Buildings and Cities for Climate Change* (Architectural Press), to be published September 2009

Susan Roaf is professor of architectural engineering at the School of the Built Environment, Heriot-Watt University, Edinburgh, where she teaches on the Masters courses in architectural engineering and sustainable community design

City, sitopia

We can continue to squander our resources and react to food crises as they happen, or we can fundamentally change the way food systems work, says **Carolyn Steel**

Feeding cities has never been easy. On the contrary, it could be described as mankind's oldest self-imposed dilemma. The problem is that even though people living in cities don't tend to produce their own food, whether they realise it or not, they still dwell on the land. The resultant distance (in all senses) between city-dwellers and their food is a paradox at the core of civilisation; resolving it is the greatest challenge of our time.

Cities have been around for some 5,500 years, yet for most of that period the number of people who lived in them represented a tiny fraction of the global population. In 1800, just three per cent lived in towns of 5,000 inhabitants or more. Today that figure is more than half. Three billion already live in cities, and a further three billion are expected to join them by 2050. If so many are to be fed on current principles, the threat to global reserves of oil, water, fish, soil and rainforest – to say nothing of the climate change associated with plundering those reserves – is stark.

A few statistics state the case: 95 per cent of the food we eat today is oil-dependent, yet peak oil is imminent; 70 per cent of global freshwater is used for agriculture, yet many sources, such as the China's Yellow river and Hai basin aquifer, are running dry; 75 per cent of global fish stocks are exhausted or overfished. Each year, 4.6 million hectares of tropical rainforest are destroyed to make way for agriculture; a further 10 million hectares of existing farmland are lost to salination and erosion. Food and agriculture account for an estimated one-third of global greenhouse gas emissions.

One could go on. Manifestly, current food systems are so destructive there is little chance of their lasting another 40 years – the only question is how and when they are to be replaced. In 2008, a 'perfect storm' of factors, including a failed Australian harvest, increased use of biofuels and an oil-price spike gave a taste of what may lie ahead if we carry on as we are. Food riots broke out in numerous countries, producer nations placed embargoes on food exports and 150 million people joined the ranks of the hungry.

A global summit convened at the UN Food and Agriculture Organization headquarters in Rome concluded that the era of cheap food was over, and that increased volatility in world food markets must be expected in future. The summit called for greater investment in agricultural technology to increase productivity, the stockpiling of grain to buffer against future shocks, and the liberalisation of trade barriers. What it did not call for is a fundamental questioning of the assumptions

ILLUSTRATION: CLARE NICHOLAS

'Sitopia is really a state of mind; a way of recalibrating the values by which we live. It privileges food'

upon which the current global food system is based.

Feeding cities is not just a question of food production; it is also one of culture, an aspect that is frequently ignored, yet is vital to our understanding if we are to find a way out of our current predicament. Seen from a cultural perspective, global food systems reveal a very different set of statistics. Four Earths would be needed to sustain the world on a US diet, yet half the food produced in the US is wasted. Half of those in Britain under the age of 24 never cook from scratch, and one in three meals eaten is a ready meal. Chinese meat consumption stood at 2kg per person per year in 1960; today it is at 60kg and rising fast. A billion people worldwide are obese, while another billion starve. Such statistics reveal the true complexity of the challenge we face.

Under scrutiny, very little about the modern food industry makes much sense. It is the product of an evolutionary logic that has everything to do with profit and little to do with the sorts of priorities – sociability, sustainability, equality, health, happiness – that most of us would probably sign up to as reasons for living in a civilised society. The real question is not how we are to feed ourselves in future; it is about the values by which we choose to live.

Deconstructing the good life

In an era of grabby headlines and Twitter it can be hard to connect to the underlying values that structure our lives. Yet many of our choices are based on inherited ideas we would do well to reconsider. Take the practice of living in cities, for example. Today, the notion that mass migration from rural to urban areas is both inevitable and inherently beneficial goes largely unchallenged. The trappings of urban life – a TV, a car, a washing machine – are thought easily to outweigh the disadvantages of rural poverty. What is less commonly acknowledged is that rural poverty is itself often the consequence of urban migration. In many places, living in the countryside is no longer an option precisely because the countryside has been transformed in order to feed cities.

Last April's G20 summit in London, where $1 trillion was pledged to kick-start the engine driving that transformation, is a case in point. Once again, the pertinent question (whether or not we might be better off without any such engine) was off the agenda. It would take a brave politician to announce to the electorate that their material aspirations were neither desirable nor achievable. Yet, globally speaking, that is clearly the case. In our rush to fulfil the lifestyle epitomised by 1960s US sitcoms, we have failed to see that both it and the so-called 'growth' that fuelled it were a fantasy. The worldwide trend towards urbanism – and consequent severance of people from the land – is an unfolding tragedy based on a fundamental muddle over what might constitute a good life. Like the Industrial Revolution before it, the global economy is a machine driven by its own internal logic. Social transformation is its byproduct, not its goal.

When cash injections and financial regulation are the only language we can find to discuss what is ultimately a matter of human dwelling on Earth, we have a problem. This vacuum at the heart of our thinking has left us in the grip of an inertia that is as much of a threat to our future as the cracked economic logic that sustains it. What we need is a new vision; a reassessment of the way we use space and resources to create an approach to dwelling that is not only ethical and sustainable, but also, crucially, desirable.

So how might we set about creating such a vision? The question is hardly new. For as long as people have been building cities, the concept of a theoretical ideal community – utopia – has been a way of imagining a better world. From Plato's republic and More's fantasy island to Howard's garden city, utopias have come in many guises. However, the genre is more remarkable for its consistencies than its differences. Persistent themes include bringing man closer to nature, the fusion of town and country, the sharing of labour, personal fulfilment, a strong sense of community. Times may change, but the strands of human life are remarkably enduring.

Utopia has much to teach us about aspiration, but as a practical tool for change it is useless. If we actually want to build a better world, what we need is a model that aims not at perfection but at something partial and attainable. That is why I propose an alternative: *sitopia*, from the ancient Greek *sitos* (food) and *topos* (place). If we analyse the broad themes of utopia, we find that food is implicated in them all. Just as in the real world, food is what connects everything together, making it a uniquely effective tool that we could harness to shape our lives better.

Urbanity originated just after the last Ice Age, when people in the ancient Near East first began to harvest grain, the food of all cities. The parallel emergence of agriculture and settled communities led, around 3,500BC, to the urban 'Big Bang', with the creation of the ancient Sumerian city-states of Uruk, Eridu and Kish in what is now southern Iraq.

These prototypical cities consisted of dense urban cores surrounded by highly organised farmland, the latter made fertile by irrigation from the diverted floodwaters of the

Euphrates river. Each was dominated by a large temple complex, which presided over public festivals that echoed the agricultural seasons, gathered in the harvest, and redistributed the grain among the people. The temples thus formed the cities' physical and spiritual cores, expressing the vital bond between city and country that remains, despite appearances, fundamental to all urban life.

Unfortunately for the Sumerians, their skill in irrigating the soil was not matched by theirs in draining it, so farmland gradually became salinated and infertile. After that, the civilisation that gave us writing and epic poetry descended into civil war and self-destruction. So the pattern has gone.

Whether it was Rome waging war on Carthage and Egypt to secure grain reserves, or Paris succumbing to revolution through its inability to do likewise, the fates of cities and civilisations have been bound up with their ability to feed themselves. Perhaps most significantly for our time, London never struggled in that way. Thanks to a helpful combination of geography, politics and timing, the city was always able to import its food with ease, incidentally providing Adam Smith with the model for his theory of free trade and its byproduct, consumerist capitalism.

An urban-rural rethink

Over the past 200 years, that approach has predominated. Industrialisation has made feeding cities seem easy, while in reality it has exacerbated, rather than solved, the problem. It has allowed us to build cities any size, shape and place, without considering (as our ancestors did) whether it made any ecological sense. Thus we have cities blooming in deserts and above the Arctic circle, totally reliant on external sources to feed them. The result is we now face a double challenge: we must not only find new ways to house the additional folk who will soon inhabit the Earth, but also adapt existing cities to make them sustainable.

However we choose to tackle these problems, both will necessarily involve the same thing: a radical rethinking of the urban-rural relationship.

Five and a half thousand years after the urban 'Big Bang', we still have much to learn. The world's first cities got so much right. They recognised the overriding importance of food. They were built next to their food sources and limited in size. They treated food as a sacred gift and never took it for granted. They collaborated to produce and share it. Their one fatal mistake was their inability to see into the future, and realise that their stewardship of the land was failing. Theirs was a flawed sitopia: a world created by food, dominated by it, and ultimately destroyed by it.

Today, few of the fundamentals have changed. Food remains our greatest priority, yet we aspire to live beyond mere subsistence: to write poetry, build monuments, seek meaning and pleasure in life. How to combine all of the above in an equable and sustainable manner remains our greatest dilemma. In order to answer it, we need to start thinking differently. Instead of asking how we can feed cities most 'efficiently' (a question that, by its very nature, can only yield one result), we should be asking what sort of communities we want to live in, and designing food systems to match. That is where the cultural aspect of food, so powerful in the ancient world, so debased in ours, is crucial. Sitopia is really a state of mind; a way of recalibrating the values by which we live. It privileges food because nothing is more important, but it also uses food to structure space and as a lens through which to see the connectedness of things.

Founding Sitopia

If we were to design a community along sitopian lines, what might it be like? Clearly, it would have strong urban-rural ties. There would be busy markets, independent shops and a strong demand for local and seasonal produce. Houses would have large, comfortable kitchens, and children would learn to grow food and cook from an early age, eating regular meals with their parents. There would be neighbourhood allotments, community farms, perhaps a local abattoir. Government regulation would intervene to prevent the formation of food monopolies, ensuring that regional and small-scale networks thrived, and farmers would get a fair price for their produce. Kitchen waste would be composted so that urban areas, whatever shape they took, would form part of the local organic cycle. Above all, food would be valued, enjoyed and celebrated as the central pivot of a good life.

In its ideal form, sitopia is clearly utopia by another name. The point is that sitopia is partial, so it can exist anywhere, any time, in any form. Indeed, wherever food is valued, sitopia already exists. Community allotments, food co-ops, farmers' markets, organic farms are all sitopian, as are international movements such as Transition Towns and Città Slow. Dongtan Eco-city near Shanghai, designed by Arup and due for completion in 2020, may become a sitopia of the future, with planned elements such as inner-city 'food factories', green roofs and municipal sewage farms.

Traces of sitopia and sitopian thinking are everywhere – the trick now is to join them up so they become more than the sum of their parts. Whatever form it takes, sitopia is always the product of our creativity, commonality and decency – the physical reflection of the way we choose to live, and what we value.

Carolyn Steel is an architect and author of *Hungry City: How food shapes our lives* (Vintage, £8.99)

Sustainable building is more complex than the one-dimensional responses suggested by government regulation. Sustainability consultant Dr David Strong tells **Pat Thomas** why the way we think about the issue needs to be demolished and rebuilt

Cracking the code

In the recent budget, the chancellor committed the UK to the world's first carbon budgets, which fix binding limits on greenhouse gas emissions over five-year periods, including carbon dioxide reductions of 34 per cent by 2020.

That target may be below the recommendations of Lord Turner's committee on climate change, but experts point out that it's still a gargantuan task – especially given that the bulk of the savings must come from our buildings, which single-handedly account for about half of the country's carbon emissions.

Take housing as an example. A recent report by the Economic and Social Research Council has shown that if the Government is to meet its carbon targets, virtually all of the UK's 24 million existing homes would need some attention to reduce their carbon emissions by the required amount. To do that job over the next 40 years would mean refurbishing a city the size of Cambridge every month. That's approximately 23,000 teams of people working on each building for a two-week period, and keeping that rate of refurbishment going non-stop for the next 500 months.

Dr David Strong, chief executive of sustainability consultancy Inbuilt, agrees that the scale of improvements needed to UK buildings is huge, but he has also been vocal in warning that the current focus of many of the Government's new codes and regulations for the building sector is too one-dimensional. In our rush to find carbon-cutting solutions, he believes, we risk missing the opportunity to achieve genuine sustainability.

'Over the past 12 months or so there has been an obsession with 'zero-carbon' buildings, and a whole raft of consultations on regulations that will get us there,' he explains. 'Of course I am a strong supporter of zero- and low-carbon buildings. The drive towards zero carbon is very important – it has had a powerful effect in galvanising the UK house-building and property development community, and in stimulating innovation. Similarly, assessing environmental impact is important. But there is much more to achieving genuine sustainability than zero carbon or notching-up good ratings under BREEAM [Building Research Establishment Environmental Assessment Method], LEED [Leadership in Energy and Environmental Design] or the [UK Government's] Code for Sustainable Homes.

'There is no "one size fits all" approach to delivering genuine sustainability. Success requires a clear and shared definition of targets and objectives. It is unique for every project. As well as environmental sustainability, any development must also satisfy economic criteria and deliver social benefit – spaces and places that are fit for people and the planet.'

Problematic technologies

Strong's views are uncompromising. A singleminded focus on just one aspect of sustainability will lead to perverse outcomes – and he can reel off many examples: so-called 'green schools' where learning outcomes have been severely compromised by such poor indoor air quality that pupils fall asleep; 'ecotowns' that have insufficient links to public transport, and iconic green offices that don't deliver a healthy or productive workplace.

He is equally scathing about the dangers of over-reliance on technology to solve the problem of energy-greedy buildings.

'Take air-source heat pumps, for example,' he says. 'I was involved in the development of the first generation in the late-1970s. They were an exciting new technology – a simple way to absorb heat from outside a building and use it to warm the inside.

'But there is a fundamental flaw that no-one is talking about. In particular, I am concerned with the way air-source heat pumps actually start to use more carbon than they save when outside temperatures fall below about 50°F – that's a significant part of a typical British winter.

'Our climate hasn't changed much since the first-generation air-source heat pumps were marketed in the 1970s – nor have the basic laws of physics and thermodynamics. De-icing, noise, operation in heavy snow conditions and reduced heat output at low outdoor air temperatures were major problems then, and despite recent improvements in technology, they are likely to remain problems now. I understand why people are so keen to find solutions, but what we desperately need is objective data before embracing and advocating these systems as a "renewable low-carbon technology".'

Another example of technology that has failed, he says, is small-scale microwind turbines bolted on to homes in urban areas. 'More often than not these become net consumers of energy rather than helping to save energy,' Strong says.

'Whole-system thinking'

So what is the solution? In the face of such a pressing need to transform the UK's building stock, just at the time when the economy can afford it least, what should be done?

The first task, Strong argues, is to think differently and more comprehensively about sustainability, and to adopt 'whole-system thinking'.

'It's about collaborative, multidisciplinary, integrated teamwork. It's also about working to find natural solutions to reduce our dependence on energy-intensive systems,'

he says. 'There are so many opportunities offered by nature to ventilate, heat, cool and illuminate our buildings for free.'

Whole-system thinking is integral to the ideas behind, for instance, Natural Capitalism, a movement much favoured by Strong and his colleagues at Inbuilt.

Promoted by Amory Lovins of the Rocky Mountain Institute, Natural Capitalism claims to show how it is possible to create a vital economy that uses radically less material and energy. Such an economy can free-up resources, reduce taxes on personal income, increase per-capita spending on social ills (while simultaneously reducing those ills) and begin to restore the damaged environment.

'Natural Capitalism shows us there is another way to reconcile economic growth with a genuinely sustainable future,' Strong explains. 'It's an approach that doesn't require political rhetoric and grandstanding, or seemingly endless rounds of consultation about new all-singing, all-dancing building codes and regulations.'

An interesting aspect of the Natural Capitalism approach also involves tackling *muda*, a Japanese word for which there is no direct English translation but which can be interpreted as meaning 'waste', 'futility' or 'purposelessness'.

The concept of muda was originally identified by Taiichi Ohno, the father of the Toyota Production System.

According to Strong: 'Managing muda is all about eliminating waste and promoting lean thinking. It's a concept that inspires and informs my colleagues at Inbuilt, and which we find time and again can be applied with elegant simplicity to the built environment.

'Muda sums up the whole raft of design blunders, planning inefficiencies, construction problems and disconnected thinking that besets many of our major building projects.'

In the muda for change

One of the worst offenders, in Strong's view, has been Portcullis House, promoted as a landmark scheme to provide MPs with highly sustainable offices: 'The original brief was laudable – the building was designed so that it would not consume more than 90kWh/m² (kilowatt hours per square metre) a year. Despite more than £240 million of public money invested in the building, however, a recent Select Committee report revealed it was in fact consuming more than 400kWh/m² a year. In my view the building has failed because the designers made it far too complex.'

Conversely, Strong is full of praise for the Elizabeth Fry Building at the University of East Anglia. 'This was designed and built more than 20 years ago, but is still an exemplar of genuine sustainability and is probably the most energy-efficient non-domestic building in the UK,' he says.

Another great example is the Brighton and Hove Library: 'Natural ventilation, passive cooling, no green bling – it's the perfect example of great architecture and excellent building physics.'

One of the keys to tackling muda and achieving lean thinking is simplification, and one of the ways it can be applied to buildings is through a form of eco-minimalism that takes inspiration from nature and natural systems.

'This is highly appropriate for these straitened times,' he says. 'Inbuilt is working with clients who want to do more with less, using passive design and biomimicry to achieve more cost-effective and sustainable outcomes.'

Strong points out that technology may provide some useful solutions to the challenge of climate change, but the risk is that we create yet more muda through an overcomplicated and fragmented approach.

'There are so many opportunities offered by nature to ventilate, heat and cool buildings for free'

'By designing-out technical complexity we minimise muda, reduce risk and add value,' he says. 'This ensures that the highest possible performance is achieved, at the lowest cost. Many low/zero-carbon buildings fail because they rely on complex construction methods and technologies. We strive to deliver elegant, uncomplicated solutions that are easy to construct, control and maintain.

'The best solutions are ones that are deceptively simple – "indistinguishable from magic", as Arthur C. Clarke said – and that fuse together all aspects of sustainability, including a biologically and culturally informed appreciation of what people are and what they want from their environment.'

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Pat Thomas is Editor of the *Ecologist*

A green roadmap

Sustainable transport offers not only a golden ticket out of our pollution- and traffic-choked cities, but also a means of improving the health and wellbeing of travellers and society alike. **Hank Dittmar** explores the greener way to go

People have always moved to cities for opportunities, and cities have always been places where jobs and services are concentrated. The inherent advantage of cities is accessibility to other people, to goods and to services – what might be called 'location efficiency'. People travel fewer miles by car in cities, consume less energy per capita in cities, and providing them with energy, water, transport and food is more efficient than in suburban or rural settings.

Particularly in the United Kingdom, our ambivalence about cities has led to a tradition in planning and development that sought to marry the advantages of urban life – convenient transport, good jobs, reliable power, water and services – to the ideal of life on the manor or in the village, with trees, capacious gardens and housing standing together in a manner isolated from work, shops and schools.

The Town and Country Planning Act promoted the separation of uses into distinct districts connected by roads optimised for speedy travel by car. This was called zoning, and in pursuit of quality of life it has tended to destroy the inherent environmental advantage of urban living, as it has forced travel by car from isolated suburban locations to accomplish the daily activities of our lives. And so the suburbs, which sought to merge the best of urban living with the best of country life, have resulted in cancelling out both.

Climate congestion

As a result, transport is a growing part of the climate change problem. As emissions from other sectors of the economy have declined in recent years, transport's carbon emissions have continued to grow from 14 per cent of Great Britain's CO_2 emissions in 1980 to 23 per cent by 1997. According to the UK's Environmental Accounts, 'household use of private vehicles' accounted for 40 per cent of greenhouse gas emissions in the transport sector in 2005.

Automobile byproducts, including brake and tyre particulates, air toxins and pollutants and road chemicals, run off into groundwater and are increasingly acknowledged as a major source of both ground and surface water pollution. Impervious surfaces such as roads and pavements also prevent rainwater from percolating into groundwater, leading to increased levels of runoff into canalised river systems and increasing the risk of flooding.

The recent Foresight *Tackling Obesities: Future Choices* report by the Government Office for Science looked at the alarming rise in the incidence of obesities in Great Britain, concluding that by 2050, 60 per cent of adult men, 50 per cent of adult women and approximately 25 per cent of all children under 16 could be obese, leading to increased chronic disease risk from diabetes, stroke and coronary disease, and economic costs to society and business of more than £49 billion in today's dollars.

The report noted: 'Human biology is being overwhelmed

by the effects of today's obese-ogenic environment, with its abundance of energy-dense food, motorised transport and sedentary lifestyles'. Indeed, although doctors recommend 30 minutes of moderate physical activity per day, the actual amount of time Britons spend walking and cycling has declined from 12.9 minutes in 1995-6 to 11.8 minutes in 2005-6, a decrease of eight per cent in just a decade. The Foresight report concluded that there might be a win-win solution:

'Many climate-change goals would also help prevent obesity, such as measures to reduce traffic congestion, increase cycling or design sustainable communities.'

Signs of change

All is not gloom and doom, however. In the past decade it is possible to see that progress has been made in providing greener travel options and getting people to use them. While London has led the way in shifting consumers toward public transport, walking and cycling, there is a Europe-wide trend toward increased intercity passenger rail travel, and there is some evidence of a decoupling of economic growth from its long relationship with growth in travel by car.

Pioneering projects such as Poundbury, the Prince of Wales's own development with the Duchy of Cornwall in Dorset, have shown that mixed-use, mixed-income development centred on walkable neighbourhoods can succeed in the marketplace. Poundbury challenged conventional paradigms for street design, reducing widths, eliminating road signs and forcing drivers to respond to the urban environment rather than tailoring the urban environment solely for the car. Its innovations and similar efforts by English Partnerships with the Prince's Foundation at Upton and elsewhere, have informed the Department for Transport's new *Manual for Streets*, which incorporates many of these ideas.

A step beyond the notion of once again making walkable streets and neighbourhoods is the idea of developing communities at public transport hubs, to improve access and reduce the need to drive for work or shopping. The Northstowe 'ecotown' outside Cambridge, promoted by English Partnerships and designed by Arup, is aligned around a rapid bus system, as is the Sherford New Community, designed by the Prince's Foundation and Paul Murrain.

A look at London

London has been in the forefront of cities dealing with sustainable transportation globally, due to its leadership in proposing congestion pricing and improvements in London's bus services alike. At the same time, London

ILLUSTRATION: CLARE NICHOLAS

has England's most widespread and accessible public transport, its areas of greatest density and a street network that precedes the development of the suburban cul de sac system. Residential density, street connectivity and access to public transport are the three variables, once one accounts for wealth and family size, that reduce driving, and hence, reduce greenhouse gas emissions.

One only needs to compare the share of total trips by public transport between London and other British cities to learn that Greater London outperforms all of them in terms of public transport use. In Great Britain as a whole, two-thirds (64 per cent) of all trips are taken by car, as compared to London, where less than half of all trips (43 per cent) are made by car.

A revival of rail travel

The long-awaited arrival of the first Paris train into St Pancras station in London awakened many to the renaissance in high-speed, high-quality passenger rail service on the Continent. This growing network is reducing journey times and improving connections all over Europe, and it is coming about as a result of European policy.

The shift has been promoted in order to provide a realistic alternative to short-distance air travel, as air trips of less than 500km are more damaging per kilometre than longer trips, due to the greater emissions from the take-off and landing cycles. Over shorter distances, high-speed rail competes well with air travel both in terms of time and convenience, and may be superior in terms of the quality of the journey.

As a result passenger rail-use has been growing across the European Union, but the rail patronage per inhabitant of the UK lags behind that of other leading European nations. Germans travel 865 rail-passenger-kilometres per inhabitant each year, the French travel 1,231 rail-passenger-kilometres per person annually, while the average UK resident travels only 674 rail-passenger-kilometres a year.

Demand for rail travel in the UK is projected to grow by an additional 30 per cent over next 10 years. In fact, in the past decade the rail system has regained all of the passengers it lost in the 40 years since the wholesale cuts to the national rail network that resulted from the Beeching report to Government in 1963.

Rather than extending the European high-speed rail network beyond St Pancras station to the north and to the west, Government policy has tended to focus on dealing with commute overcrowding and extending station platforms. While it is clear that improving the performance and capacity of existing services is critical – achieving a step change in rail-use and a shift from short-distance air travel and car-use to rail travel will necessitate integrated thinking and planning.

Looking ahead

What's needed is a linked set of policies and investments to promote not only greener travel modes such as public transport and cycling, but also the reduction of the need to travel through the locating of many of one's daily needs within walking distance and trip-substitution through telecommuting (see box, right).

There are a series of stark choices ahead of us. As the evidence about climate change has mounted, it has become ever clearer that the time for action is now. Common sense would dictate dramatic improvements to the overtaxed networks for rail, public transport and cycling funded from road-pricing or carbon taxes.

What's needed is courage and leadership. As we have seen, the vision for the urban environment is one in which quality of life is improved rather than degraded, and the changes are ones that can improve one's interactions with family, with colleagues and with community. The alternative can also be clearly seen: crowded roads and trains, longer commutes and higher costs to fix the problem if we fail to act.

Hank Dittmar is chief executive of the Prince's Foundation for the Built Environment and the author of *Transport and Neighbourhoods* (Black Dog Publishing, £7.99)

What needs to happen next?

If we want greener urban transport to be part of our urban future then our investment, as well as government policies, needs to encompass the following:

- Linking transport and growth, so that new housing is well served by public transport and within walking distance of shops. New communities or ecotowns must be located at major public transport hubs, and be built around the concept of walkable neighbourhoods.
- Congestion and road-pricing should continue to be a key tool, not only for the purpose of lessening congestion but also, through land-use strategies and travel behaviour change programmes, for the purpose of supporting the shift to greener travel modes and the reduction of the need to travel.
- Programmes to reduce the energy consumption of rail, bus and tram should be undertaken, along with programmes to regulate fuel economy, both through vehicle technology fixes and changes in driving behaviour.
- The growth in rail travel should be continued, with expansion of high-speed rail systems from Europe into the UK, including both a north-south high-speed link from St Pancras and a service running from London to the west. Public transport links to outer London stations should be considered to relieve bottlenecks coming into central London, and incremental improvements in speed and capacity should be continued, along with major investments in stations.
- Strategies to improve the walkability of existing neighbourhoods and introduce mixed-use should be implemented alongside programmes to retrofit existing buildings for energy efficiency. It is essential to reduce carbon emissions from buildings and transport alike.
- Travel behaviour change programmes, already being piloted by government, should accompany all new commercial and residential development, with introductory information and public transport discount packages provided to new employees and incoming residents alike. Studies have shown that the most effective interventions in travel behaviour occur immediately after relocation.
- The greenest travel modes are walking, cycling and avoiding travel altogether, and programmes need to be in place for these modes too. The creation of continuous cycle networks, interconnected walkable streets, the encouragement of flexible working, job-sharing and satellite and home-working will all play a major part in this change toward a networked, sustainable city.

Forget complex, high-end technologies – basic truths and natural, low-carbon materials hold the key to sustainable and truly energy-efficient homes, argues **James Hulme**

Material evidence

Taking lessons from traditional design, wide eaves protect this eco-house's lime-based render, designed for modern environmental sites and cost conditions

In recent years there has been a great emphasis on the role of technology to improve the energy performance of residential and office buildings, whether newbuild or retrofitted. No shiny 'eco house' is perceived as complete without wind turbines, heat pumps, an array of photovoltaic panels and walls packed with foam-based insulation behind plastic membranes.

The truth, however, is that in our drive for energy efficiency we may be overlooking some basic truths about traditional building performance that are the key to real sustainability. In particular, relying on high-end technology may give short-term results at the evaluation stage, but the very specificity of these solutions mean they are going to be rendered obsolete by changes in the building's use or configuration, or else fail in time due to their relative complexity and inability to be maintained simply. Membranes shrink or become damaged in routine alterations, while solar panels reach the end of their useful life after 20 years, even when specified for a building that should be around for 200 years or more. In the design of new buildings, clear distinction needs to be drawn between promoting the sort of smart technologies that sell new cars and those that will truly serve an activity that, above all others, is literally building our society out of its woeful carbon dependency.

Many experts now believe that true sustainability in the construction sector looks more like the solutions offered by natural, responsive materials, which are generally proven to have higher tolerances to climate variables. Instead of relying on technological fixes, the Prince's Foundation for the Built Environment is promoting, in a live build project with the Building Research Establishment, an approach to residential design using natural materials grown or from the ground, achieving energy efficiency through simple wall construction of sound thermal performance. The emphasis is on vastly simplified wall and roof sections, capable of being produced from sustainable low-carbon materials wherever possible, and built and subsequently repaired by local labour without dependence on complex factory construction systems.

Further to this, there is now some circumspection about the targets that the Code for Sustainable Homes has set the construction industry, and the consequences for issues such as the airtightness of buildings. High levels of airtightness are essential to avoid unwanted heat-loss in highly insulated, low-energy buildings. This means the design and performance of ventilation systems becomes critical to human health, however, as we can no longer rely on unplanned draughts for fresh air. The main problem with underventilated buildings is trapped moisture, which can lead to moulds, dust mites and illnesses such as asthma. While good ventilation is the primary means of dealing with this problem, natural materials designed into a breathable building shell can provide excellent support and back-up for a healthy building through vapour-open walls and roofs, and the hygroscopic buffering of internal moisture levels.

In both their production and life-cycle operation, a suite of natural materials is emerging that demonstrates excellent thermal performance when used appropriately, displaying good tolerances over a broad climatic range.

Hemcrete

Hemcrete is an innovative building material that uses the inner, woody core of the industrial hemp plant combined with a lime-based binder. Being cellulose, the hemp particles are a carbon sink and provide the insulation qualities; the formulated lime binder is a breathable (vapour-porous) matrix that renders the hemp fire- and vermin-proof, provides the strength and has a low-carbon footprint.

Depending on the relative mix ratio of these two constituents, the resulting mixture can be cast or sprayed to form highly insulating walls and roofs (using more hemp), and is also available as a 3N structural block (440 x 215 x 100mm) by using a greater proportion of binder – the blocks are carbon-neutral.

Most newbuild applications use a lightweight timber frame resulting in a fast build process forming a monolithic wall with the unique characteristics of insulation, airtightness and thermal inertia. Consequently, carbon-negative Hemcrete saves carbon emissions from the building 'in use' as well in construction. Hemcrete is also suitable for renovation of older buildings, and is entirely recyclable.

Aereated clay block

Updating the traditional clay brick, aerated clay block is now available from several manufacturers and is widely used in the European construction industry, despite being hardly known in the UK. Rendered externally and plastered internally, the blocks provide a method of building without cold bridging, and with internal insulation and high thermal mass. The blockwork is easy to construct and can be readily mastered without specialist skills, making it a suitable system for more localised building operation.

The system provides good airtightness in a vapour-open construction with no artificial membranes. The pure clay is highly durable and easy to adapt and extend. When manufactured in the UK the thermal blocks will have approximately 50 per cent less embodied energy and embodied carbon than a conventional block cavity wall meeting the same thermal performance.

Resilient and long-lasting, production of ThermoPlan Zeigel Block will commence in the UK this summer through a partnership between Natural Building Technologies, Ibstock and ZWK.

Natural roof-insulation materials

All experts agree that a well-insulated roof is critical for a building to achieve anything approaching acceptable performance targets in the future. What is less obvious is the capacity of natural building products to achieve this goal rather than highly processed synthetic materials. Supplied by Natural Building Technologies, Pavaroof is a solid, breathing roof system that has a very high thermal mass.

Pavatex boards are made of 95-99 per cent waste wood, bound together by its natural lignins under different pressures to provide a variety of boards for different applications (walls, floors and roofs). Pavatex boards lock up 1.2 tonnes of CO_2 for every tonne of CO_2 or product used.

The boards are applied over the structural elements of buildings to form a continuous, insulated, breathable shell. Airtightness is achieved on the inside of the structure with a large services void, thereby allowing internal fittings and services to be applied and later retrofitted without affecting airtightness. The boards also provide excellent acoustic insulation, typically resulting in an R-value of more than 50dB in roofs and walls. Finally the boards provide very good overheating protection because of their high thermal mass. A room in the roof insulated with wood fibre will typically have a peak summer temperature 4°C lower than a roof insulated with synthetic insulation to the same U-value.

The externally applied boards can be complemented in between studs or rafters by natural insulation such as Thermafleece sheep's wool insulation. Launched in 2001, Thermafleece is a range of insulation made from the wool of British hill sheep. It is a high-density, wool-rich insulation that is the first choice when maximum thermal and acoustic performance and breathability are required or when space is limited. Manufactured to the highest performance standards, Thermafleece is the only wool-based insulation to hold BBA (British Board of Agrément) certification.

The Prince's Foundation/BRE house uses Thermafleece insulation between 150mm rafters under 200mm of Pavatex wood fibre, achieving a U-value of 0.10W/m2K and excellent overheating and acoustic protection in a robust breathable structure. The roof will not need changing for 200 years.

Exploiting another lesson from traditional design to enhance long-term performance, the eaves of the house have been made generously deep to give adequate protection to the rendered walls below, as well as to withstand heavier downpours as a result of climate change.

Lime plasters and renders

Modern lime-based plasters and renders are being supplied for the Prince's Foundation house by Baumit, through its partner Natural Building Technologies. These maintain the traditional breathable and environmental qualities of lime, but are designed for modern site and cost conditions.

On a house with a 200-year lifespan, it is vital that the renders are robust and attractive. The main failings of renders on UK buildings occur due to the incompatibility of render and substrate, and poor application. Baumit lime-based renders are specifically designed for compatibility with the aerated clay blocks and come pre-bagged to avoid mixing errors. Furthermore they are spray-applied, ensuring correct pressure of application and a considerable reduction in application time (and cost). A silicate-based, self-cleaning topcoat called Nanopor will be applied as a finish coat.

Internally a modern lime plaster will be used as part of the airtight breathing wall construction. Resistant to mould, lime also helps provide a healthy internal atmosphere.

James Hulme is director of policy and research at the Prince's Foundation for the Built Environment, and manages the Natural House project, due to complete this summer, at the BRE Innovation Park, Garston, Watford. Additional information provided by Neil May of Natural Building Technologies

Other natural choices

While the average homeowner may not be in the position to commission structural work in block or lime cement, there are many other areas of home improvement and decoration where it is possible to effect positive environmental outcomes that will improve your carbon footprint and ensure a healthy environment. Appropriate floor coverings include Marmoleum and cork linoleum, both available from Scottish manufacture Forbo and made from natural materials and naturally occurring resins, reducing the likelihood of VOC (volatile organic compound) offgassing. They are also a deterrent against asthma, as they reduce exposure to dust mites and have natural bactericidal properties.

Replacement windows can have serious deleterious environmental impacts if poorly chosen. UPVC frames represent a cheap option for the unwary, but have high embodied energy in production and a short lifespan. Wood frames are more expensive but can be locally and responsibly sourced, allow for the expression of traditional carpentry techniques and, because they expand and contract in response to seasonal climatic changes, often outlive double-glazed units. English Heritage and the National Trust offer advice on sourcing suitable windows for historic properties.

When choosing paint for your home, manufacturers such as Farrow & Ball are now actively trying to reduce the impact of oil, with an emphasis on natural ingredients such as linseed oil and China clay, and by rejecting harmful ingredients such as ammonia and formaldehyde. VOC for most Farrow & Ball paints are so close to zero that the leading finishes are classified 'zero-VOC' when tested to US Environmental Protection Agency standards. A new generation of eco paints reduces solvents and oils without compromising quality of colour or finish.

A sense of place

What does vernacular – building design that exhibits a sensitivity to place – mean in an energy-constrained future? **Mark Hoare** and **Bill Dunster** present two views on form and function in the green building debate

Sustainable and sensitive

Our existing housing stock has poor energy performance, and we must improve it. In other ways the mass of prewar housing is fairly sustainable, often built with local materials and skills, and using materials with low embodied energy. Our traditional buildings are structurally straightforward and capable of fairly easy alteration and repair over time – and this, in part, is why so many old buildings survive.

Houses built before the widespread use of the car have the important advantage that they are often clustered around local facilities and – at least in towns – close to public transport. In a sustainable settlement, day-to-day needs should be found within a five- to 10-minute walk. This broader context of daily infrastructure has a huge impact on our ecological footprint. According to research by the BioRegional Development Group, in one of the most publicised green developments, BedZED, the largest carbon savings came from the introduction of car-sharing and an organic vegetable box scheme.

Of course, the design of individual houses is highly significant in reducing carbon emissions, but the holy grail of zero carbon should not become the principal determinant of design. Our houses are our nests, the places we raise our families, and places of social and cultural significance. There is a danger that in becoming singlemindedly obsessed with carbon, we reduce the design of a house to nothing more than an energy-engineering challenge.

According to basic green design principles, a house should be orientated to maximise winter solar gain and to exclude summer overheating. The internal volume will be configured in the way that best allows cool air to circulate in summer and warm air in winter, with minimal mechanical assistance. Water, energy and waste will all be managed responsibly. Spaces will be made for birds, bats and other wildlife. In many green buildings, these elements of the design work well, but the end result appears over-technological and not really part of its place. Technology (be it high-tech or low-tech) is important, of course, but an overly technological approach tends to be reductionist and tends to edit out subtlety or difference.

A green building must not simply be exemplary in reducing CO_2 emissions, it must also be robust, adaptable and beautiful if it is not to be demolished prematurely. It must be sensitive to the local environment and responsive to the local character, cultural diversity and ecology of its place without diluting its uniqueness.

Remaining sensitive to place is challenging, especially as energy performance and airtightness targets become more demanding. Factory detailing is increasingly replacing one-off site detailing, and buildings are becoming more and more alike in how they are put together. Standardisation does achieve higher standards in some respects, and results in economic and carbon savings in the short-term, but factory-finished items tend to be harder to repair in situ and I suspect will prove more expensive in the long term. The use of locally familiar materials, massing, finishes and colours helps considerably in counteracting these homogenising forces and maintaining the unique identity of places.

Not many of us yet value cultural diversity or local distinctiveness in the way we value biodiversity, but perhaps we should, even if we can't appreciate their inherent value. It might be hard to believe that a certain way of making gates or thatching ridges or laying hedges might make us more vulnerable in several generations' time, but we are at last beginning to grasp this notion when it comes to the threatened loss of a butterfly or bird. Are regional traditions of gate-making a quaint irrelevance or might we be glad to have kept them alive some time in the future when we have need of them more than now?

> 'The holy grail of zero carbon should not become the principal determinant of building design'

I recently copied a 19th-century gate that I found on a farm close to where I live. It seemed to me to be a brilliant solution not just for keeping our children away from the road, but also for keeping out small deer and rabbits. The gate could potentially be modified into a fencing design at some time in the future when wire netting costs the Earth or cannot be obtained and when small-diameter timber is readily available. My new gate is much more elegant, more sparing in the use of timber and probably more durable than any of the gates on sale at my local builder's merchant. It is a very simple design but much noticed by visitors.

Traditional design tends to be frugal. It favours low-embodied and local materials that are ideal to build with and repair. It also emphasises good passive design to reduce the need for the latest technology, rather than relying on the latest advances of technology to solve problems created by

the design. Natural ventilation, controlled solar gain and night-time cooling are all traditional design strategies that are ultimately more sustainable and easier to manage than higher-tech solutions.

Of course, sustainable buildings may need to accommodate solar panels or heat pumps, but these should be integrated in a way that allows for easy upgrades. Loose-fit design and adaptability are essential ingredients of traditional construction methods– which is why so many older buildings endure.

'Practical solutions for retrofitting existing buildings are most likely to emerge from traditional buildings'

Many established traditional building materials have high thermal mass but poor insulation value. However, newer materials such as lime-hemp, aerated clay block, aerated recycled concrete, recycled newspaper and sheep's wool insulations are compatible with and capable of enhancing the energy performance of more established materials. Many of these materials have evolved from traditional technology and been developed by those familiar with the older materials.

A major climate-change challenge is not how to build exemplary new buildings but how we upgrade our existing building stock to achieve our 2050 emissions targets. I suggest that practical solutions for retrofitting existing buildings are most likely to emerge from evolved versions of our traditional buildings. I also believe that the majority of owners of 'ordinary' buildings are more likely to absorb and transfer knowledge from new buildings that have a significant amount in common with (or look like) their own home or workplace.

Mark Hoare specialises in designing alterations to listed buildings and new buildings in sensitive settings. He is a trustee of the Prince's Foundation for the Built Environment and a member of the National Trust's advisory architecture panel. He is an associate at Robert Adam Architects

We are the 'micro generation'

When Ryanair is folk history, car pools are everywhere and we visit vegetarian greasy spoons in our lunch hours, the UK will have to run itself on the limited stocks of renewable energy available within its national boundaries. If every green grid offsite generation device ever dreamed up by an infrastructure engineer were built – with offshore turbines at minimum spacings over the entire continental shelf – we would still struggle to meet much more than 25 per cent of our current energy demand.

All of the offsite large-scale generating capacity would be needed for our stock of much-loved but energy-inefficient historic buildings, including recent buildings that superficially appear historic. This means almost all new construction needs to meet its own energy-generation needs from renewable energy generated onsite, or the lights start to go out.

In the UK we have approximately 600 dry kilograms of biomass allocated per capita – if we harvest woodland sustainably and compress agricultural waste straw – without losing food production. Shared between home, workplace and public buildings, that amounts to some 250kg per capita to run a household.

This tiny amount is what is needed by an automated wood pellet or woodchip boiler sized to provide top-up winter domestic hot water in a superinsulated ZED (zero-energy design) home built to zero space heating specifications and with solar thermal providing hot water all summer.

Put durable, fit-and-forget monocrystalline photovoltaics on the half of the roof facing south, and enough electricity is generated to meet annual electricity demand up to densities of 50 homes per hectare, a density band that represents 70 per cent of all the homes in the UK.

Higher-density urban developments can run off biomass combined heat and power (CHP) using similar fuel quotas, but only if BedZED standards for the building 'fabric' (the inherent qualities of the building materials and their surface configuration used in the construction) are achieved. This suggests that it is not realistic or sensible to claim limited renewable offsite generation capacity for new buildings, as you are effectively stealing an existing community's rights to a future powered by renewable energy.

It is important that we all understand today the shortage of national and international renewable energy supplies of the future, because we need to apply every renewable harvesting opportunity, both on and offsite, if we are to achieve an equitable, democratic future, and a workable long-term urban fabric with enough communal renewable energy to power public transport and food production and distribution.

Seen in this light – it is irresponsible not to plan new communities around onsite renewable energy generation. It is also fraudulent to pass off low-embodied carbon construction as a valid green building solution without integrated microgeneration.

Our understanding of such technologies is recent, some of the materials are modern, and the physics logic generating the building form will inevitably change traditional aesthetics. This process could be considered as a celebration and an evolution of a new 21st-century vernacular that will absorb elements of tradition, but ultimately produce a recognisable architectural language expressing optimism for a future that works without waste and pollution.

It becomes important to reduce the carbon footprint of the original construction using locally sourced materials and labour, and when combined with building integrated renewables this means that enough renewable energy is harvested over the life of the building to offset the carbon invested both to make and maintain the building fabric, and possibly even a share of a small electric car.

North- or east/west-facing homes use significantly more scarce biomass than a south-facing home with good passive solar gain and blinds and overhangs to prevent summer overheating. A south-facing garden will also greatly increase the productivity of homegrown fruit and vegetables.

'We must apply every renewable harvesting opportunity to achieve an equitable, democratic future'

Assuming an annual eight per cent fuel-price-rise – not unreasonable as peak oil, peak gas and peak uranium affect limited supplies of finite, non-replenishable reserves – a zero-carbon RuralZED home built today and fitted

with ZEDfabric monocrystalline photovoltaic panels will save a typical household £1,000 per year over 10 years – a sum that could make a big difference to the quality of a family's diet, or indeed their summer holiday.

Let's welcome a new architecture that helps avoid billions on fighting for fossil fuel reserves outside our national boundaries and avoids the need for the steady erosion of our civil liberties by a police state required to control scary nuclear technologies.

It is the adoption of contemporary patterns of energy and resource consumption within historic building fabric that fuels much of our international aggression for oil reserves. Even if the entire existing building stock achieved a 70 per cent reduction in energy demand through radical energy-efficient renovation, it would use up the entire stock of available national communal energy reserve even at the most optimistic 2050 levels.

This makes it critically important that when we are lucky enough to design a new building it does not further erode the limited national renewable energy reserves.

If an architect proposes to hide solar panels behind a parapet invisible from the street, or formal stylistic concerns start to create poor solar access, poor daylight and overshadowing or windshade, the energy-generation problems are automatically sent offsite to centralised fossil fuel power stations or worse.

It is almost impossible to fit meaningful levels of solar panels on, for example, a 'Georgian' Bloomsbury five-storey urban block typology at relatively high city-centre densities. So, yes, orientation is less critical at high densities, and city centres need to be allocated larger biomass quotas. However, the top three storeys of any city can easily be powered by the renewable energy harvested by the building envelope (the surface that provides shelter from the elements and encloses the internal volume), providing solar access, ventilation, daylight and wind are optimised by the urban form.

'Let's welcome a new architecture that helps avoid billions fighting for fossil fuels reserves'

This strategy alone could reduce the demand on scarce national energy reserves by 60 per cent, allowing scarce biomass stocks to go further. The architects of the past have no monopoly on beauty, natural materials, elegant proportions, walkable neighbourhoods or mixed-use streetscapes, and all of the qualities required by the highest standards of contemporary place-making can be expressed within a new climate-responsive solar urbanism that is firmly rooted in our time.

We need to encourage this new contemporary vernacular which does not apologise for embracing renewable energy technologies or require big, expensive energy infrastructure CHP and district heating investments that just are not going to be funded in a recession.

Bill Dunster is the founder of ZEDfactory, a 20-strong multidisclipinary association of architects, product designers, project managers, engineers, physicists and financial experts, all dedicated to providing viable low- and zero-carbon development solutions

CLIMB EVERY

The mountaineers who come to conquer Everest mistake their achievement – in the quest to overcome nature's ultimate natural obstacle, humans have already won, says Eifion Rees

The wars of mountaineers are fought on three fronts: against the mountain, against the elements and against themselves. In the rarified air, thousands of metres above sea level, they come to test their skills as climbers and the limits of their endurance as human beings. Armed with crampons, pitons, ropes and picks, they come, to paraphrase Sir Edmund Hillary, to 'knock the bastards off'. As the highest point on Earth, to conquer Everest is, in the western imagination, to overcome the ultimate natural obstacle to man's supremacy. No longer inconsequential, on Everest's summit men and women are literally on top of the world, looking down on creation. Like God. Or Karen Carpenter.

Somewhere over 7,000m you get closer to both. This is the 'death zone', the altitude above which the amount of oxygen in the air cannot sustain life. Mental and physical functions are impaired. Vital systems start to shut down. Human beings begin to die. It's hard to imagine that a mountain can too, but from our lowly positions, dwarfed by its 8,848m bulk, and through a collective effort in the true spirit of mountaineering – the climbers at the rock face, the support team in our cars, homes, factories and power stations – we are bringing Everest to its knees.

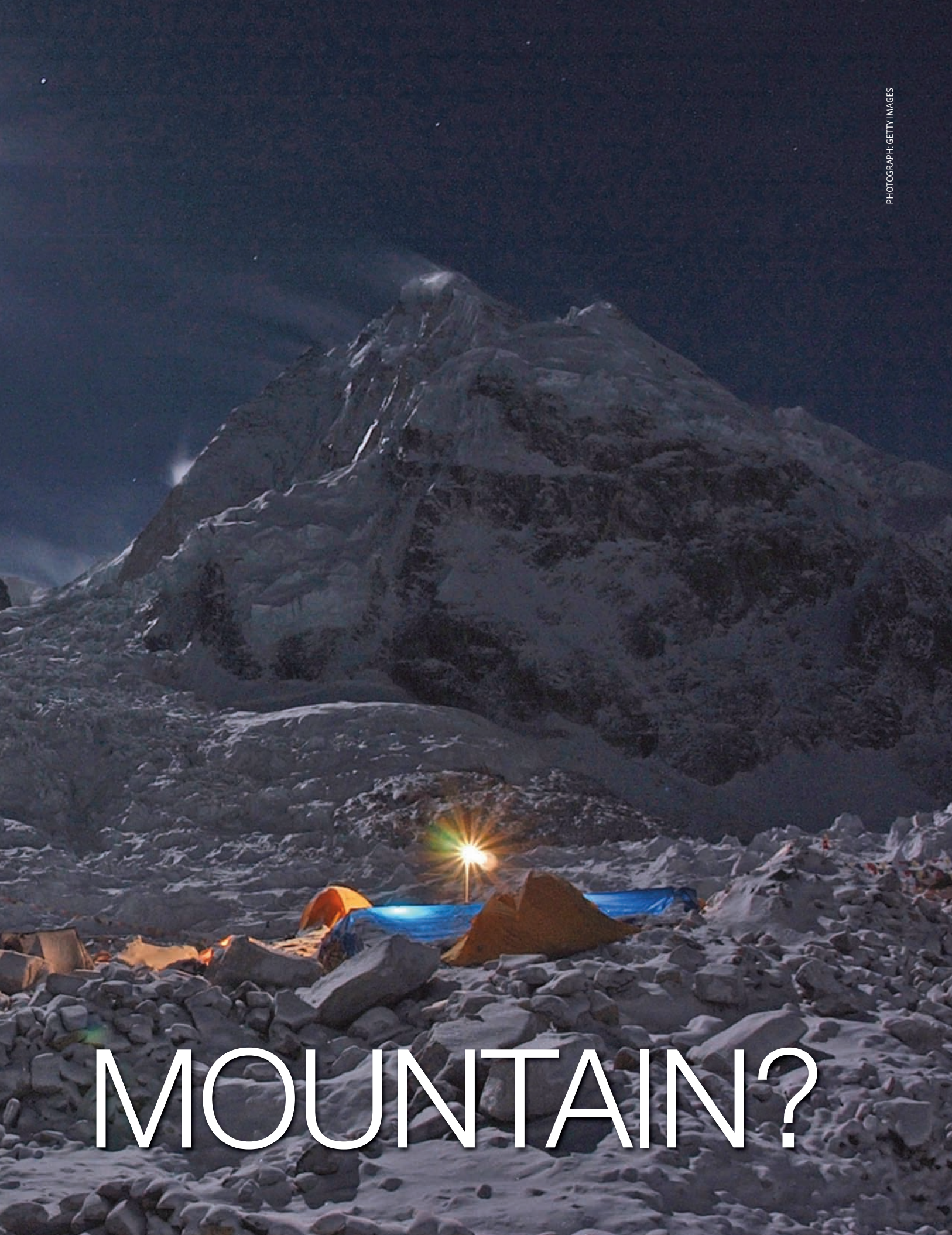
A thaw point

In May 2008, China closed access to Everest through Tibet in order to clear a way for its climbers to trek Beijing's Olympic torch to the summit. Nepal was pressured to deploy army and police to ensure nobody was above 6,500m for the 10 days the Chinese were on the mountain. Four climbers with pro-Tibet flags were deported from base camp. Images were relayed live from the top of Everest of jubilant climbers shouting 'long live China' and 'long live Tibet'. PR ambition doesn't get much higher. The Free Tibet campaign decried it as a stunt to underscore China's 'baseless claims to sovereignty over Tibet'.

To facilitate the venture, a month earlier China had completed a 150 million yuan ($21.5 million) project to widen and tarmac the 67-mile road to base camp. Despite assurances the proper environmental surveys had been carried out, there was concern that the permafrost had been damaged in the ecologically sensitive area, already markedly affected by global warming.

The Himalayas are one of the youngest mountain ranges in the world and still growing by 5mm every year. What tectonics giveth, however, climate change taketh away. On Everest's northern slopes, the vast valley of seracs – huge pinnacles of ice – that once covered Rongbuk glacier is receding. Pictures released by Greenpeace in 2007 show to what extent: a 1968 photograph of the ice valley has, after 40 years, become a desert of rocks. Like glaciers the world over, Rongbuk itself is faring no better: in 2002, a UN Environment Programme-backed team found it had retreated 5km up the mountain since Edmund Hillary and Tenzing Norgay's first summit. Speaking out on climate change in 2007, Peter Hillary said the base camp his father had used in 1953 had sunk 40m, from 5,320m to 5,280m, as a result of the great melt.

Glacier retreat threatens lives and livelihoods: a quarter of the world's population relies for water on the Ganges, Indus, Yangtze and Yellow, rivers whose sources are found among the shrinking glaciers of the Himalayas. The Tibetan plateau is called 'the third pole' and 'the water tower of Asia', but for how much longer? The UN Intergovernmental Panel on Climate Change (IPCC) issued a stark warning in 2007: 'Glaciers in the Himalaya are receding faster than in any other part of the world. The likelihood of them disappearing by the year 2035 and perhaps sooner is very high if the Earth keeps warming at the current rate.'



PHOTOGRAPH: GETTY IMAGES

MOUNTAIN?

A more pressing danger is flooding. A 2007 UN-supported study by the International Centre for Integrated Mountain Development (ICIMOD) presents evidence of significant glacial retreat in China, Bhutan, India, Nepal and Tibet. Receding glaciers leave behind glacial lakes, which fill so suddenly they overflow the moraine (debris carried and deposited by glaciers) that contains them, leading to glacial lake outburst floods (GLOFs). Nepal has suffered 15, the worst of which was triggered by an avalanche at the foot of Everest in 1985, releasing 350 million cubic feet of glacial water from Dig Tsho lake. A 50ft wave travelled down-valley for 50 miles, wiping out a $1.5 million hydropower plant and 14 bridges, inundating cultivated land and costing many lives. As many as 200 of the 9,000 Himalayan glacial lakes are GLOF risks, according to the report. As many as 40,000 Sherpas live at the base of Everest.

Blasphemy and binbags

Mountaineering is a peculiarly western phenomenon. As travel writer Robert Macfarlane points out in his book *Mountains of the Mind*, the pantheistic Sherpas of the Khumbu region of Nepal, for whom gods dwell in natural features, 'do not have a word in their language for the "top" of the mountain'. Before the first assault on Everest, in 1922, 'the notion of climbing the summit of a high snow mountain existed somewhere between downright lunacy and outright blasphemy'. Seven Sherpas were killed by an avalanche during that unsuccessful bid to climb Chomolungma, 'Mother Goddess of the World', the first reported deaths on the mountain.

Sherpas shy away from littering, burning rubbish, cooking meat and immoral behaviour on the mountain, but western climbers are not bound by the same religious propriety. Indeed, from the western perspective, the Mother Goddess has become merely a prize to be paid for, conquered, won. Everest, like nature itself, as cultural historian Richard Tarnas observes in *The Passion of the Western Mind*, is merely 'a mindless, passive feminine object, to be penetrated, controlled, dominated, and exploited'.

Nepal first introduced climbing fees to restrict numbers and protect safety and the environment, writes mountaineer John Krakauer in his book *Into Thin Air*, an account of the disastrous day in May 1996 when eight people died on Everest, but also to increase 'the flow of hard currency into impoverished national coffers'. The cost of a permit rose from $2,300 in 1991 to $10,000 in 1992 and, with numbers of climbers still growing, to $50,000 for a team of five in 1993, with a four-team limit per season. He writes, however, that: 'China charged only $15,000 to allow a team of any size to climb the mountain from Tibet and placed no limit on the number of expeditions each season'. With hundreds of its Sherpas out of work, Nepal cancelled the four-team limit in 1996, but upped the cost of a seven-climber permit to $70,000. In May 2008, it slashed permits by 75 per cent for summer and winter seasons, and by 50 per cent for autumn. The popular pre-monsoon spring season was frozen at $70,000, though the climb limit was increased to 15 teams a season.

Visitor numbers may have dipped this year – arrival figures into Kathmandu airport in January were down 15.8 per cent on 2008 – yet the climbers still come despite the financial cost, and Nepal's government still encourages them, despite the environmental cost. Between 1953 and the start of 2008, there had been 3,679 successful ascents by 2,436 individuals, with 264 summits in 2003, 330 in 2004, 460 in 2006 and almost 600 in 2007. Most of the 210 people that have died making the attempt remain on the mountain, monuments to their own achievement. As Bhumi Lal Lama, general secretary of the Nepal Mountaineering Association, told the *Guardian* in 2003: 'We are not in a position to give Everest a rest. We will be missing out on royalties. We can't afford that'.

With such a volume of traffic, keeping Everest clean was always going to be a mammoth task. The 400-strong Hunt expedition of 1953, of which Edmund Hillary was a part, included 20 Sherpa guides and 362 porters carrying 4,500kg of baggage. Since then, as much as 50 tonnes of rubbish has been left behind on the slopes: paper, plastic, cans, glass, clothes, tents, countless oxygen bottles and approximately 180 bodies. Attempts are being made to clean up 'the world's highest rubbish tip', however. China has installed rubbish bins and employed litter-pickers at base camp. Nepal charges all teams $4,000, refunded if all rubbish is removed and monitored by the Sagarmatha Pollution Control Committee. Japanese mountaineer-cum-refuse-collector Ken Noguchi claims to have picked up more than nine tonnes of rubbish over five expeditions.

Everest has become a victim of its own success: when the world comes to the mountain, its ills come too. In his book *High Crimes*, journalist and climber Michael Kodas observes more pernicious concerns than rubbish: pimps and prostitutes at base camp; extortion by guides; climbers ostracised and beaten for standing up to members of their own team; robberies and theft – 'oxygen tanks, stove fuel, and food vanish every year... much of it appropriated by Western mountaineers who have shown up at the mountain with few of those resources'. The Chinese climbers were taking no chances in 2007 on a dry run for their Olympic summit: they brought armed guards to protect their equipment.

'Because it is there': the petrified remains of George Leigh Mallory, rediscovered on Everest in 1999, 75 years after he and fellow climber Andrew Irvine were lost in 1924. More than 200 people have died on the mountain since that day.

'Most of the 210 people that have died making the attempt remain on Everest, monuments to their own achievement'

Fatal summit fever

Hillary and Norgay were the first to reach the summit of Everest, in 1953, but the mountain is a theatre that has hosted countless premieres: 1965, the first person to summit twice; 1975, the first woman to summit; 1990, the first married couple to summit together; 2001, the first blind person to summit; 2003, the youngest (15); 2008, the oldest (77). In 2006, Mark Inglis became the first double-amputee to summit, but sparked controversy when he and his party were among 40 climbers to pass underprepared and ailing English climber David Sharp on both their ascent and descent. Sharp died of extreme cold.

Inglis's is just one of many similar stories of climbers either refusing or being unable to help a struggling fellow climber. In the death zone it's hard enough to keep yourself alive, let alone anyone else. In the battle to survive at high altitude, the very qualities that make

us human are in danger of dying. Aspiring to be something more than human we become instead something less.

Traditionalists argue that the mountain has been sold to those rich enough to afford a golden ticket to the top of the world. Indeed, so expensive and commercial has the Everest experience become that lawsuits have been filed against companies that have failed, for whatever reason, to get clients to the summit.

People are drawn to Everest from all over the world, but its gravitational pull also affects those in its shadow. Tashi Tenzing, grandson of Tenzing Norgay, observed in the *New York Times* in 2003 that 'life for Sherpas has become increasingly complicated. Many of our young people are understandably tired of the hardship. The influx of Western tourists to Everest has exposed Sherpas to a new lifestyle, leading many to seek an easier, more cosmopolitan existence in the cities and abroad. Many Sherpa villages are now home only to the frail and elderly.' The rewards are high for those Sherpas that do climb – a guide can earn as much as $2,000 for a two-month expedition (western guides earn as much as $30,000) – though many die in the process.

Although 13 per cent of Nepal has protected area status, eight of the country's national parks 'are suffering from pollution and deforestation... directly related to the impact of tourism', according to the Royal Geographical Society. Sagarmatha (Everest) National Park, home to endangered species such as the red panda and snow leopard, was created in 1976 as a direct response to the deforestation caused by tourism, and became a Natural World Heritage Site in 1979. Firewood use increased proportionate to the influx of visitors, however, and more timber has been used to build bigger inns and lodges to house them.

The Kathmandu Environmental Education Project (KEEP) has been raising awareness about how tourism can exacerbate the effects of climate change, and aims to help minimise the negative effects of tourism. Foreigners are often more aware than locals of the effects on the environment, it says, and strongly advises trekkers, guides and porters against staying in lodges that burn wood for heating or showers.

'Continuous education on how to minimise impact in the mountains is vital to trekkers and mountaineers, as well as to local guides and porters,' says KEEP director DB Gurung. 'Deforestation in the area has slowed over the past 17 years as lodge owners and farmers learn about the benefits of using kerosene and solar power instead of wood. There is still a long way to go but things are improving.'

A mountain to climb

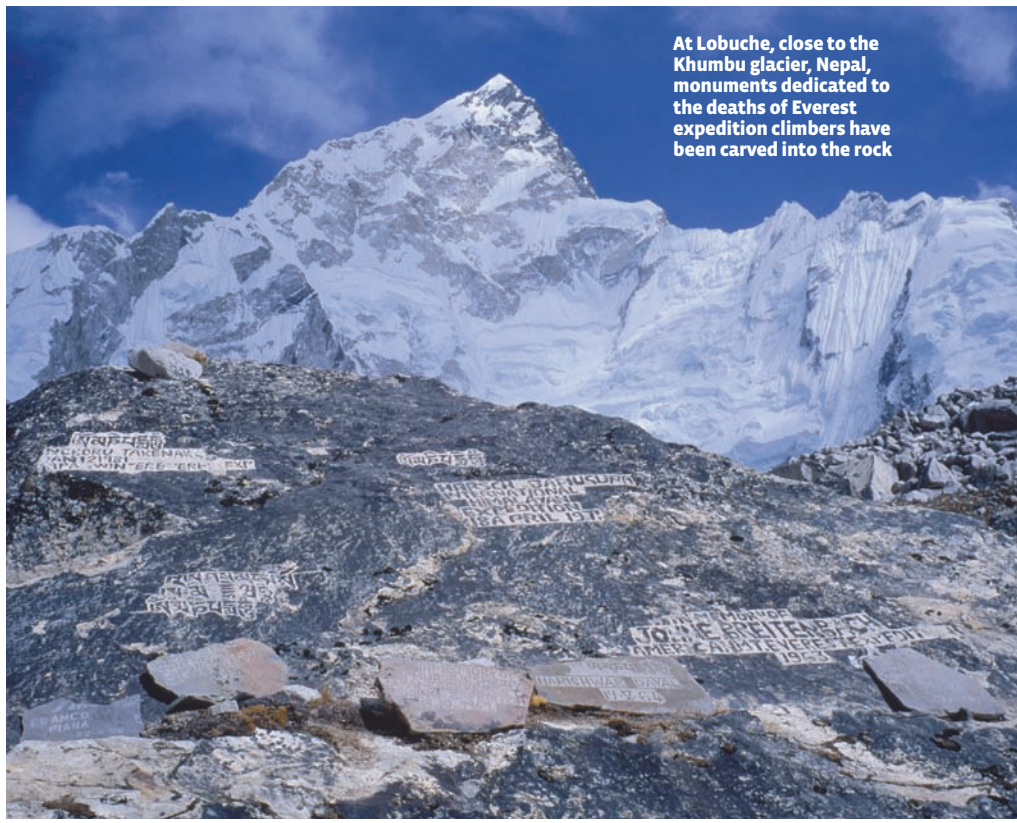
In 1960 Edmund Hillary created the Himalayan Trust, which has provided Sherpas with schools, hospitals, health centres, forest plantations, monastery repairs and improved means of responding to natural disasters. With its 'self-help' ethos and reliance on volunteers to keep costs to a minimum, all donations go directly to projects in Nepal.

Although Hillary was a proponent of plans to close the mountain to allow the area to regenerate, Fraser Williams, director of Trekking Encounters, KEEP's UK representative, is sceptical.

'There was talk a few years back about closing down the Everest region, but the reality is that this will not happen because of the negative economical impact,' he says. 'People are beginning to realise the impact of global warming, however. The first snow fell here in Kathmandu in February, six to eight weeks late, which is very significant for this region, and ice blocks are collapsing in areas and at heights not experienced before. Local people attribute this to global warming. We and other companies now have to start taking these changes very seriously. Bodies such as KEEP and ICIMOD are doing fantastic work on the ground, but what is needed is a specific mountain focus by all parties, including government, trekking companies and environmental agencies.'

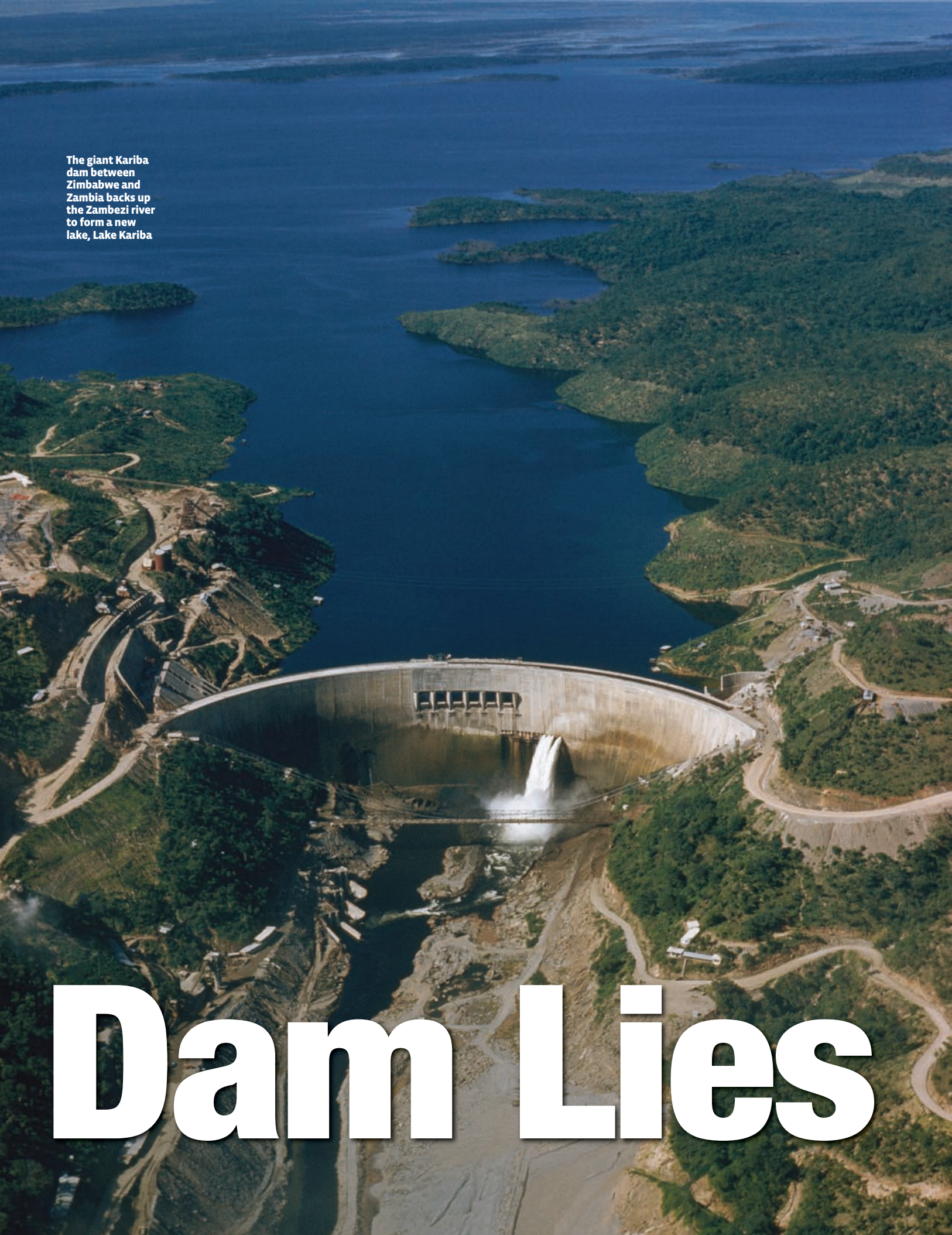
For the pioneers of the mountaineering age, global warming was not a known concern; it was inconceivable that mountains, permanent fixtures of the natural world, could be affected by mere human ambition. When asked in 1923 why he was returning to the place he called 'lord of all, vast in unchallenged and isolated supremacy', George Leigh Mallory uttered the most famous words in mountaineering history: 'Because it is there'. A year later it was Mallory who was not – it would be another 75 years before his body was discovered. Now, no longer isolated but constantly challenged and far from supreme, the Everest he knew is receding from us day by day.

Eifion Rees is a freelance journalist



At Lobuche, close to the Khumbu glacier, Nepal, monuments dedicated to the deaths of Everest expedition climbers have been carved into the rock

PHOTOGRAPHS: GETTY IMAGES



The giant Kariba dam between Zimbabwe and Zambia backs up the Zambezi river to form a new lake, Lake Kariba

Dam Lies

Dressed up as development and promoted by foreign interests and private companies, the vast dams clogging the veins of Africa are instruments of control rather than promised hydroelectric liberation. **Khadija Sharife** investigates

Since the dawn of time, history has evidenced that the greatest civilisations were born on the fertile banks of ancient river systems, ranging from Mesopotamia's Tigris and Euphrates to Egypt's Nile, China's Hwang or Yellow river, and the Elvis or king of rivers, the Indus.

Yet the rise of these scientific, commercial and economic powerhouses has not only resulted in technologies seeking to harness the power of rivers as an economic force for good, but also exclusively to dominate this vital source of life through centralised control.

Nowhere is the game of hydropolitical poker so lethal and receptive to drought, conflict and corruption as in Africa, a continent punctured by poverty, mal- and underdevelopment, unsustainable resource exploitation, capital flight, structural adjustment and, increasingly, climate change.

Presently, more than 60 per cent of Africa is dependent on mega-dams as a source of hydroelectric power, such as Zambia (96 per cent), Uganda (99 per cent), Mozambique (91 per cent), Ethiopia (89 per cent) and the Democratic Republic of Congo (99 per cent), in conjunction with a host of client states including South Africa, Zimbabwe, Togo and Benin. This is mainly because, in Africa, water is a shared affair, with waterways composing at least 40 per cent of regional borders.

Intensified drought (increasingly attributed to climate change) has ensured that Africa's dependence on hydropower simultaneously exports blackouts and energy shortages to countries such Togo and Benin, both crippled by Uganda's drought. Since 2007, drought has gripped the continent from the east to the south, bringing chaos in its wake.

Currently, Africa supplies five per cent of global electrification, and hosts more than 500 million people who survive solely on biomass, sunlight, paraffin and candles.

'Most of the Nile states are dangerously dependent on hydropower, including Burundi, Democratic Republic of Congo (DRC), Ethiopia, Kenya, Rwanda, Sudan, Tanzania, and Uganda,' says Lori Pottinger, head of southern African programmes at International Rivers. 'When a serious drought strikes, a hydro-dependent country also has to cope with water shortages and reduced agricultural production.'

And drought is certainly on the cards: geologists predict a 10-20 per cent decline in rainfall over the next 50 years, estimating that 75 per cent of African countries with an annual rainfall of 400-1,000mm are partially located in environmentally unstable zones. The UN's Intergovernmental Panel on Climate Change (IPCC) has declared Africa 'the continent most vulnerable to the impacts of projected climate change' described by South African geologist Maarten de Wit as '[like] erasing large sections of the rivers from the map'.

Despite the fact that drought – a climatic reality throughout much of Africa – will be severely affected by altered hydrological cycles, development experts at the World Bank have declared that Africa is under-dammed. The World Bank's energy specialist, Reynold Duncan, recently urged Africa to consider 'riskier' assets such as hydropower, stating that just five per cent of the continent's hydroelectric potential has been explored.

'In Zambia, we have the potential of 6,000 megawatts (MW), in Angola we have 6,000MW and about 12,000MW in Mozambique – we have a lot of megawatts down here before we even go up to the Congo,' he said. DRC's Grand Inga, the world's largest proposed hydropower scheme, is estimated to possess 40,000MW capacity – enough to power the continent.

This move – promoting mega-dams as development – is backed by development and commercial banks, foreign governments, African initiatives such as the New Partnership for African Development (NEPAD), presently motivating for 13 dam-projects, and resource-hungry 'middle kingdoms' such as China.

'Mozambique generates enough electricity to power the country, but only nine per cent have access to it'

The power that disempowers

Though Africa already houses more than 1,270 dams, the benefits have yet to positively impact on the majority. Mozambique, lauded as a success model, generates enough electricity to power the country, but less than nine per cent of Mozambicans have access to electricity. The bulk of the country's 2,072MW is exported to neighbouring regions and utilities – such as South Africa's parastatal Eskom – via cost-intensive, high-voltage transmission lines that account for as much as 50 per cent of total construction costs. The remainder is utilised by domestic corporations such as Mozal, Mozambique's aluminium smelter, which is operated by BHP Billiton, one of the largest mining concerns in the world.

'Most often, large dams provide electricity for foreign-owned industries, water for foreign mining companies and irrigation for large-scale farms,' says Lori Pottinger. 'Distribution lines are the most needed but least cost-effective part of an African grid system. Priority is given to big consumers – cities and industries, over poor households, low density, and rural areas.

'Long-range, high-voltage transmission lines are meant to connect two end-points, requiring costly substations to reduce the voltage and distribute along the way. These lines end up passing over thousands of villages.'

Mozambique's Cahora Bassa, proclaimed by a UN report to be 'the [dam] with the dubious distinction of being the least environmentally acceptable project in Africa', is also touted by development experts as southern Africa's largest hydroelectric dam. According to Paulo Muxanga, chairman of the dam's operating company, Hidroeléctrica de Cahora Bassa, the dam's limit has been reached; no additional energy is available for export.

This lack of available hydroelectric power now threatens the energy security of South Africa (the Climate Change Policy Framework 2009 had proposed the use of imported

PHOTOGRAPH: WILLIS D. VAUGHN/NATIONAL GEOGRAPHIC/GETTY IMAGES

hydropower as a solution to South Africa's energy shortages). To counter this, NEPAD and Eskom have joined forces in an attempt to fast-track construction of the China-backed Mphanda Nkuwa dam. The selected site is on the Zambezi, in Mozambique's Tete Province, just 70km downstream of Cahora Bassa.

The 1,600-mile Zambezi is the fourth-longest river in Africa, with the fourth-largest flood plain and a 1,390,000km² basin clogged by 30 dams, including Cahora Bassa and Zambia's Kariba dam. The latter controls 40 per cent of the run-off.

'The Kariba dam between Zimbabwe and Zambia was built 50 years ago to power industries in southern Rhodesia and the copper mines of northern Rhodesia,' says Terri Hathaway of International Rivers. 'Today, much of their electricity is transmitted 1,700km away to the copper belt.'

The Zambezi supports a population of 40 million people from 30 different ethnic groups. They are dependent on fish harvested in estuaries (the habitat of 80 per cent of the fish-catch globally) and flood-recession agriculture, which has been disrupted by the damming of the river's natural regime.

Thus far, more than 400,000 people in Africa have been displaced by dams. Globally, 40-80 million have been displaced. During the construction phase of Cahora Bassa, more than 42,000 people were involuntarily resettled, the figure rising to 57,000 for Kariba. More than five decades later, the bulk remain socioeconomically marginalised and lack access to the same electricity that was the pretext – in the name of the greater 'common' good – for displacing them in the first place.

Privatising the commons

Selective development appears to be the name of the new Great Game, with 'neo-colonial' powers such as China aggressively promoting mega-dams as a means of providing business to Africa-based Chinese corporations in need of power.

In 2006, the Mphanda Nkuwa contract was awarded to Sinohydro, the Chinese corporation behind the Three Gorges dam. The Export-Import Bank of China, the country's export credit agency (ECA), has guaranteed the project $2.3 billion: $1.1 billion allocated for construction purposes, with $1.2 billion for high-voltage transmission lines.

'Many of the dams being built by China, such as the Merowe dam in Sudan, are being undertaken to open up doors for China to get lucrative mining contracts, agricultural land, logging rights and other deals,' says Hathaway.

There is a secret underpinning the development of dams, however: the BOOT.

'It is not often reported in the media but this development process is driven by the BOOT model: build-own-operate-transfer,' says leading dam expert Professor Thayer Scudder, one of 12 commissioners on the World Commission on Dams and a former principal resettlement consultant for the World Bank. 'The corporations own these dams for a period of maybe 20 to 25 years because these countries are indebted.

'This development is driven by hydro-politics: multinationals, African governments, development banks. The rural people who need electricity do not benefit; distribution is controlled by the political elites.'

Mega-dams are justified and speeded up by structural adjustment programmes (SAPs) superimposed on underdeveloped regions courtesy of the outstanding debts contracted by venal elites such as those of Mobutu (the totalitarian former president of Zaire, now DRC). In 2006, developing countries owed debt to the tune of $2.9 trillion, servicing more than $570 billion per annum. SAPs and debt-cancellation programmes such as the Heavily Indebted Poor Countries (HIPC) initiative impose structurally exploitative, non-negotiable policies privatising state-owned utilities including electricity and water.

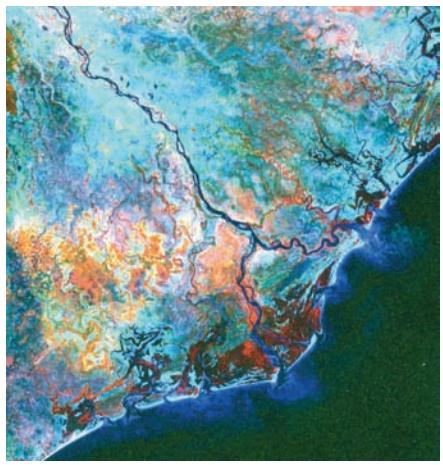
Yet even debt cancellation may sometimes be tied to corporate interests, as in the case of Ethiopia's Gilgel Gibe III dam, currently under construction. Eight to 12 weeks after the Ethiopian government awarded a contract to Italian company Salini, Italy cancelled €367 million in bilateral debt.

The contract was marked by a lack of transparency, awarded as it was without an international competitive tender exercise, breaching the procurement terms of the World Bank and African Development Bank. It is non-compliant with EU public procurement policies and also violated internal legislation governing Ethiopia's ministry of finance and development. Italy's own ministry of finance was still under investigation in 2008 for €220 million in loans provided for the Gibe II project.

Gibe III will generate an estimated 1,870MW, a fundamental component of Ethiopia's 25-year national energy master plan, with 50 per cent proposed for export. Seventy per cent of the proposed $3.4 billion in loans has already been reserved for electricity generation – minus transmission line and substation costs.

'The plan excludes from its investment requirements those costs related to "distribution, rural electrification and network reinforcement resulting from demand growth"', according to a 2008 report by International Rivers.

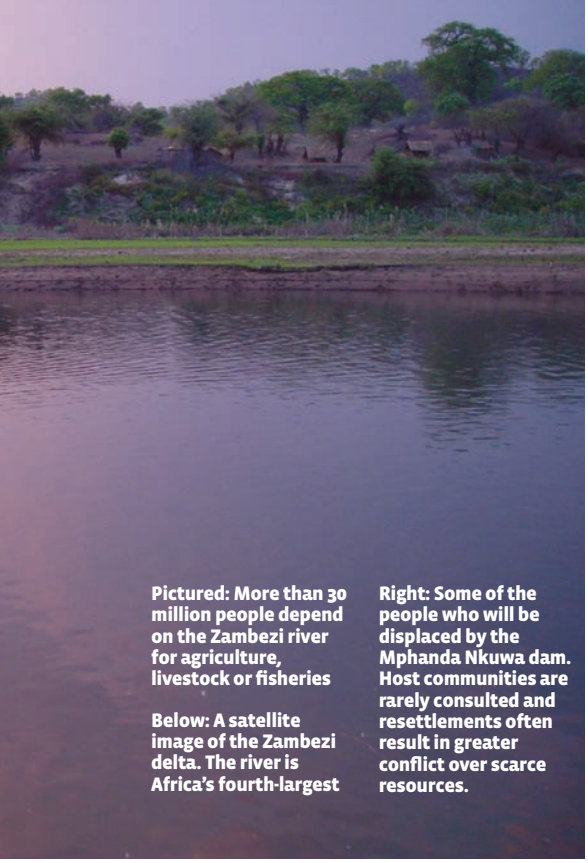
The massive finance required violates the terms of the HIPC debt-cancellation initiative, however, which stipulates that loans must be directly linked to poverty-reduction. In 2007, the International Monetary Fund reported that Ethiopia was once again at risk of accruing unsustainable debt.



A drain on development

In 2008, eight hydropower dams accounted for 85-89 per cent of Ethiopia's electricity, with five more currently under construction – Tekeze, Gibe II and III, Tana Beles and Amerti Neshe – estimated to generate a combined capacity of 3,125MW. Less than 12 per cent of Ethiopians have access to electricity. The bulk of Gibe III has been earmarked for export to neighbours such as Kenya and Sudan. China's Gezhouba Group Corporation scooped two contracts; Italy's Salini scooped three. Italy and China are also these projects' main financiers, despite the refusal of Italy's ECA to guarantee financially such socioeconomically and ecologically unsustainable projects as Gibe III.

The project itself began without a permit from the Environmental Protection Authority, which in 2008, after construction had begun, still hadn't received its Environmental Impact Assessment (EIA). Crucially, the EIA when it



Pictured: More than 30 million people depend on the Zambezi river for agriculture, livestock or fisheries

Below: A satellite image of the Zambezi delta. The river is Africa's fourth-largest

Right: Some of the people who will be displaced by the Mphanda Nkuwa dam. Host communities are rarely consulted and resettlements often result in greater conflict over scarce resources.

PHOTOGRAPHS: LORI POTTINGER/INTERNATIONAL RIVERS

appeared deliberately underestimated the number of persons that would be displaced, while marginalising the impact of the dam on the communities living downstream of Ethiopia's Omo river, including the total elimination of flood-recession agriculture in the river and delta (the EIA proposed 'rain-fed cultivation' – despite the fact that this is not a climatic possibility for the region).

Livestock herding, equally fundamental for the 200,000-500,000 agropastoral peoples from eight different ethnic groups living in the area – many of them armed in the battle for resources – would also be virtually eliminated due to a lack of surface water. The Omo flows south for 500km from the site of the dam, feeding the Omo National Park, an area of tremendous biodiversity populated by 15 different tribes, all directly dependent upon the river for sustenance.

The dam will impact on three countries in its immediate wake: south-western Ethiopia, south-eastern Sudan and north-western Kenya, resulting in the destruction of the riverine stocks, woodlands, biodiversity and the sustenance of surrounding peoples via a 60 per cent reduction of river flow.

Though dams are usually packaged carbon-neutral, the 20.4 million cubic metres of biomass soon to decompose in the reservoir area will generate significant greenhouse emissions. Each year, 52,000 mega-dams release 104 million metric tonnes of methane, a potent heat-trapping gas and the largest single source of human-made emissions.

Despite this, the Organisation for Economic Co-operation and Development (OECD), which consists of 27 high-income nations, has armed its ECAs with financial mandates prioritising mega-dams as environmentally sustainable tools for socioeconomic development.

Undamming the future

'There is nothing sustainable about large dams at all,' says Professor Scudder. 'There are millions of people in Africa that depend on the rivers for sustenance – they are the losers.

'Dams will be built, though. Renewable energy from solar, wind, thermal energy has to be explored as the best possible solution, and they work very effectively with little adverse consequences for the people. But many of the problems can be avoided.'

Scudder cites Swaziland's Maguga dam resettlement policy as a good example of political will on the part of the Swaziland and South African governments. Its compensation packages offer irrigation via a 23km canal, fenced grazing lands secured for resettled peoples, the construction of public roads for farmers and producers, cane fields in place of the 5,000 fruit trees made inaccessible due to relocation, education and health services in the host area, as well as hiring all labour for the project from the pool of displaced people.

'The solution must be multipurpose, integrating the needs of the population, such as job-creation, sustaining the river and livelihoods, access to electricity and irrigation, specifically concerning the displaced and downstream communities,' says Scudder. 'Other solutions include developing small tributary dams, with minimal impact on downstream communities. Obviously, they have to be strategically placed – too many and you dam up the circulatory system.'

By factoring in economies of scale, the high costs of the transmission lines required to power up the country via substations could be substituted by cheap, small, micro- and pico-dams such as Tungu-Kabri, which benefits 212 households in Mbuiri village. Malawi's 80-year-old Mulanje micro-hydro system powers up the Lujeri Tea Estate (the second-largest tea producer in Malawi); it generates 600kW, enough to power a village, and has yet to require any maintenance.

The best solution lies in integrating needs with each region's ecosystem services, such as solar power via panels, a decentralised, 'democratised' form of energy requiring little in the way of skills, thermal, wind and tidal.

Wind as a form of energy is being seriously considered by the Ethiopian Electric Power Corporation (EEPco), which released a report in 2006 stating that hydro-dependency presented a tremendous obstacle in light of Ethiopia's drought, and recommended diversification. Wind was identified as a viable source of energy for nine months each year, in contrast to water tables, which peak after June.

South Africa's Professor Vivian Albert has developed cost-effective 60W solar panels (currently in production stage) with an estimated price tag of less than $10 per panel. Just 20 square metres of installation is capable of powering up a house with an under-roof size of 180m² and all mod cons, including fridge, stove and computers.

Unlike oil, coal, mega-dams and uranium, renewable energies constitute important democratised sources delinked from capital-intensive extractive, and government- and corporate-controlled, industries. Commodified in the context of sustainable exploitation, these sources also ensure sustainable socioeconomic policies, recognising an Earth-centred, rights-based system.

Grammy-award-winning musician Ali Farka Touré, an ancestor of the ancient Malian empire that born of the Niger river, once told a friend of mine, author Joan Baxter: 'Without the river spirit I would be deaf and have no voice. I would cease to be'. This truth must inform the electrification process, specifically in the context of mega-dams. Without it, Africa will be damned in the name of development.

Khadija Sharife is an investigative journalist, researcher and visiting scholar with South Africa's Centre for Civil Society (CCS)

LIGHTS OF THE ROUNDTABLE

Julian Morgan-Jones, managing director of South-East Wood Fuels

Professor David Mackay, Cambridge University physicist and author

Juliet Davenport, chief executive and founder of Good Energy

David Strahan, journalist and author

Chris Wintle, sales and marketing director of Ecotricity

Doug Parr, Greenpeace chief scientist

We all know green energy is the future, and yet a wholly renewable future seems no closer than before. The *Ecologist* harnessed the power of several luminaries from the renewables world to find out what's going on. **Mark Anslow** reports

Derry Newman, chief executive of Solar Century

PHOTOGRAPHY: ARTHUR WOODCROFT

Nicholas Josefowitz, director of RenGen Energy

In many ways, this should be the best of times for the renewable energy industry: the Government has set the world's first carbon budgets, promising steadily falling CO_2 emissions; the subsidy paid to green energy generators, the Renewables Obligation, has been weighted towards emerging technologies to give new ideas a financial boost, and by 2010 we should finally see a continental-style Feed In Tariff for small-scale renewables, whereby householders get paid a guaranteed premium for every kilowatt hour (kWh) of green electricity (and, soon, heat) they produce.

So why, then, does the progress of UK renewable energy seem still to be so glacially slow? In November last year, BP announced that it was pulling all £5 billion of its renewable energy finance from UK projects in favour of the US, and in March of this year, Shell revealed plans to scale back all of its renewable investments except for biofuels.

Despite efforts to clear the logjam, there are also still nine gigawatts (GW) of potential wind power stuck in the planning system, of which some 5GW could be operational within three years if the go-ahead was given.

It was with this in mind that the *Ecologist* brought together eight renewable energy experts from businesses and NGOs alike, spread across the different technologies, to work out where the hold-ups for renewables really are.

Heat

It was widely agreed that while electricity receives the lion's share of government and media attention, the need for renewably generated heat for homes, businesses and industry is the 'elephant in the room' of the UK's energy strategy.

Doug Parr, Greenpeace's chief scientist, explained why he advocates the use of combined heat and power (CHP) plants, which deliver both electricity and heat to nearby houses, even if they are currently run on fossil fuels.

'If you have a CHP station that is supplying 1,000 homes then when you want to change to your different fuel... the logistical challenges of dealing with that are child's play compared to changing boilers in every single house,' he said.

But Parr was challenged by Professor David Mackay, a Cambridge University physicist and author of a critically acclaimed new book, *Sustainable Energy – without the hot air*. Mackay argued that, from a scientific perspective, it is 'a crime' to take a chemical and set fire to it simply to generate low-temperature heat. In place of district heating, he recommends the use of heat pumps, which run on electricity but concentrate ambient heat in the air or the ground to produce useful heat.

Julian Morgan-Jones, managing director of biomass supply company South-East Wood Fuels, said that there was a huge resource of waste wood from the construction industry available for use as a fuel, but that it is currently classified as contaminated by the Environment Agency.

'By far the biggest proportion of wood in this country is waste wood,' he said. 'If we had processes to sort the contaminated from the uncontaminated material we would have around eight million tonnes of extra biomass.'

Our experts also raised the findings of a report in February from National Grid, which suggested that the biogas generated through anaerobic digestion of all the UK's sewage and waste food and wood could supply half the nation's domestic natural gas demand. Mackay pointed out that this is a relatively small proportion of overall heat demand, however, and that a better use for the gas might be for cooking or heating buildings unsuited to heat pumps.

David Strahan, journalist and author of the book *The Last Oil Shock*, added that biogas might also be used to run heavy-duty engines that cannot easily be converted to run on electricity, or to run public transport.

Nuclear and renewables

Can the UK meet its carbon targets without resorting to nuclear power? Possibly, but not without a struggle, seemed to be the response from our assembled experts.

Doug Parr said that the risks and costs of nuclear power still outweigh its usefulness, and that we shouldn't discount the possibility of significant technological advances with current, small-scale renewable technology, where much smaller costs make innovation faster and easier.

David Mackay agreed that targets could be achieved without nuclear, but he argued that this would only be possibly through heavy use of concentrating solar power plants.

'The only thing that really scales up apart

A masterplan for the future of renewables

We asked our experts to put together a wish-list for speeding up the progress of renewable energy in the UK. Here are their ideas.

1 **A 'hearts and minds' campaign**
The brainchild of Julian Morgan-Jones, this would be an attempt to dispel some of the myths surrounding renewable energy, and to win public support. Its potential is not to be underestimated: when turbine manufacturer Vestas closed its Isle of Wight manufacturing plant in April, its CEO squarely blamed 'UK nimbyism' for its demise.

2 **A reformed planning system**
The Planning Act 2008 promised to streamline the building of large-scale renewable energy facilities. Unfortunately, it doesn't cover any installation below 50MW, which means community-scale renewables still face exactly the same obstacles as before.

3 **Reform of Ofgem**
The regulator better known for brow-beating the big energy suppliers over gas prices actually plays a key role in the development of renewable technologies, our experts said. Because it was set up purely with a financial objective – making sure power continues to be as cheap as possible – it has frequently stood in the way of greener options. Doug Parr suggested that 'carbon-reduction' be given an equal priority with 'price-reduction' in Ofgem's remit.

4 **A floor under the carbon price**
Although there are other mechanisms to support renewable energy, the rising price of carbon should be a powerful motor for change. Unfortunately, it has yo-yoed up and down so much that few investors have been able to make long-term decisions. David Strahan suggested that a floor price below which the cost of carbon would not be allowed to fall could help to encourage money to flow into renewable technologies.

5 **A long-term view**
David Mackay suggested the creation of a new political body that would have long-term responsibility for renewable energy, rather than operating on short, four-year electoral cycles or responding to the erratic whims of markets. Doug Parr said this could administer an overarching policy on renewables to ensure things remained heading the right direction.

6 **Upgrade the grid**
It was suggested that both the onshore and offshore grid network needed to be bolstered and made more accessible in order to encourage wind and marine energy, as well as make sure that remote sources of power from the northern British Isles could be delivered to energy consumers in the south.

7 **Rewarding installers**
Juliet Davenport warned that new regulations drawn up by the Government would stop businesses that had installed renewable technologies from counting the output towards their carbon targets. The Government says the energy has already been 'incentivised' once, under the Renewables Obligation. Davenport pointed out that this one decision has made BT think seriously about scrapping a proposed 250MW wind turbine building plan.

8 **Wind-neighbour tariff**
Should the 'hearts and minds' campaign fail, there was a suggestion that special, slightly reduced electricity tariffs could be introduced for those living close to proposed renewable energy developments. This might help soften objections to the installations, but would require a change in regulation that currently ensures everyone (in theory) pays the same rate regardless of where they live.

from nuclear is solar power from other people's deserts, so, the supergrid,' he argued. 'If we imagine having a choice between 50 nuclear power stations – 50 Sizewells – which would cover current electricity consumption in Britain... If we say "No, we don't want that", the alternative is we go to Libya, Algeria, Morocco, Tunisia and talk about building five Greater Londons' worth of solar power stations.'

Nicholas Josefowitz, director of RenGen Energy, which finances and installs renewable energy systems around the world, asked whether having Colonel Gaddafi controlling our electricity supplies was any better than having OPEC in charge of oil supplies. But David Strahan argued that a supergrid would be a more democratic system than our current energy infrastructure, with both imports and exports, and serious financial losses for anyone tempted to 'turn off the switch' on political grounds – unlike oil or gas, which can be stored, electricity must be sold immediately, or wasted.

Derry Newman, chief executive of Solar Century, reminded us that there is still plenty to achieve at home, and that the forthcoming Feed-In Tariff would be a 'step-change' in UK solar power.

'Around 2013, the cost, per kilowatt hour, of a domestic solar installation will be the same as what you pay to buy it from the grid,' he said. 'So that changes behaviour, when you get to that level. That's what happens in France – we sell to French farmers now, converting barns to 30kW solar systems, and the farmer makes more money from the electricity the barn generates than he does from the goats or sheep inside.'

'This should be the best of times for renewable energy in the UK, so why does progress seem so glacially slow?'

Planning

There are few people working in the renewable energy sector who don't have an opinion on the planning system, and our experts were no exception.

Juliet Davenport, chief executive and founder of green energy supplier Good Energy, called for a planning system that is fit for purpose.

'I don't think the planning system should be used to develop energy projects. There should be an energy planning system to use to develop energy projects, not something for putting up a shed in a back yard.'

Chris Wintle, sales and marketing director of Ecotricity, agreed with the need for a hybridised system that combined local and national priorities.

'Local consultation should determine whether you put up five or 10 turbines, where you position them slightly, or move them – those sort of things I think are very good,' he said. 'But now it's become a sport of "how can I stop these things happening?" There needs to be some power that can make a well-informed decision quickly.'

Some of the experts wondered whether community ownership of wind farms would help matters – a model that is common in Germany. But Wintle warned that community owners can make bad energy managers, and Davenport added that part of the reason for Germany's success had been a generous tax break to encourage investment in wind. Nicholas Josefowitz said that the reality of community ownership was not always what it seemed.

'The wind power [in Germany] doesn't get owned by the guy whose land it's on, or the local community,' he stressed. 'In general, it's doctors and dentists who invest in funds, and then those funds will go all over Germany and buy wind farms.'

Derry Newman pointed out that solar installations were much less often obstructed on planning grounds, and in many cases were actually seen as an improvement to a property. Even on a larger scale, he pointed to examples of how solar power could fit seamlessly into the urban environment – creating a solar canopy for a car park was one example.

Mark Anslow is the *Ecologist*'s News Editor

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Susan Agondeze, aged six, Masindi, Uganda.
Photo: Georgie Scott/ ActionAid

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Fishy business

Getting your head around the complex interactions between consumer demand, industrial practice and government policy in fisheries can be challenging at the best of times. But when things are coming to an angry head – as they have with the admission by the European Commission that its policies have not delivered – it gets even harder.

Thank goodness then for a brilliant new website, developed by graphic designer Justin Buckley.

www.eyeoverfishing.org uses interactive graphics to illustrate the tangled net of relationships between the different elements of commercial fishing, and allows you to 'zoom in' on specific areas or issues ranging from ecosystems to consumers to fisheries policy. A great application of chips to fish!

Grape Scott!

Urban viticulture seems to be catching. Now staff at organic muesli-maker Alara wholefoods have turned an industrial wasteland behind their factory into an organic garden full of pomegranate trees, beehives and 30 red rondo vines, a grape variety suited to UK conditions.

Managing director Alex Smith hopes the vineyard will be an inspiration for other Londoners to green urban wasteland.

Orchards

How's this for a sad fact: according to the National Trust, 60 per cent of England's traditional fruit orchards have disappeared since the 1950s, putting at risk not only our food security, but also many local varieties, as well as unique habitat.

The good news is that Natural England and the National Trust have just launched a £536,000 campaign to reverse this decline, by raising the profile of traditional orchards and local varieties, highlighting both their food production and biodiversity benefits.

The project will also work with the likes of Common Ground and the People's Trust for Endangered Species to create new orchards.

If you're interested in finding out more about the project, email **orchards@nationaltrust.org.uk**

BOOKMOOCH

Are you a big Amazon.com fan? Why not try the eco-alternative, **http://bookmooch.com**?

It's essentially a swap site for books, but nicely designed, with a good search facility, the ability to post 'wants' for titles you're looking for, and an innovative built-in currency known as 'points'.

You gain points for giving books away, and can then 'spend' them on books you want. You have to give away at least one book for every two you receive, otherwise you'll run out of points. An interesting take on the 'freecycling' concept.

SOLAR COOKER WINS FT CLIMATE CHANGE CHALLENGE

The FT Climate Change Challenge award **(http://tinyurl.com/dxkagz)** had some impressive entries, but the winner ticks boxes all the way from international development to permaculture.

The 'Kyoto Box' – a solar cooker made from cardboard, foil and glass, which can be made for less than €5 – was picked from nearly 300 projects to win the £75,000 prize, chosen by a panel of experts including Jonathon Porritt and IPCC chief, Dr Rajendra Pachauri.

By using sunlight to heat food or water, the Kyoto Box will reduce the need to collect firewood – a time-consuming, difficult and dangerous task for women in the less-industrialised world – and can help reduce the air pollution associated with open fires.

Poshswaps Yep, it's another exchange website, this time for clothes. Founded by Environmental Life Science graduate Ceri Heathcote, **www.posh-swaps.com** allows you to swap, buy and sell clothes, with a special section for vintage items.

It steals a march on eBay by having no listing or sales fees, and is specifically set up for clothing, meaning there are boxes allowing you to list an item's condition, style, colour, designer and even period.

Heathcote says that the site is both a response to fast fashion, and an attempt to get away from it.

'Looking stylish is not about following the latest fashions,' she insists. 'It is about wearing quality clothes to suit the wearer's lifestyle, personality, colouring and body shape. These clothes make people look and feel great without the guilt of causing unnecessary environmental damage.'

In the second communiqué from the canals of Britain, a narrowboat newbie finds the pace of life slowing to the speed of the water, offering time for reflection and a deeper appreciation of the great outdoors

Paul Miles

MAN ON A BOAT

Life on the waterways, in a narrowboat, is like camping – luxury camping with running hot and cold water, bathroom with shower (some boats even have baths), fitted kitchen and wood-burning stove, that is. Despite the creature comforts, however, it is the big outdoors that is the main attraction. In the morning, you ascend three little steps and open two little shutter-doors, slide open a roof-hatch and there is nature, in all its glory, surrounding you.

One day, just as I did this, two swans took off from the canal a hundred metres behind the boat. Their wings arched rhythmically against the water with the sound of a ghostly heartbeat, until they flew directly over me. I could feel the downdraught from their wingbeats, and had I reached up I could have touched their downy breasts. Once, as I sat on the roof of the boat, eating lunch in the sunshine, a robin brushed my shoulder and then flitted into the kitchen. Over the weeks, countless kingfishers have flown past in flashes of electric blue, herons have stood sentinel on the canal bank and trees have unfurled tight buds. There are moments of complete stillness when the canal reflects the sky and the trees.

I cruise along at three miles an hour, passing waving walkers, mellow brickwork of historic buildings and friendly fellow boaters. There is a metaphysical element to being on the canals. Time slows down and distances lengthen. To travel four miles and negotiate two locks in a day is an achievement. It recharges the batteries – literally – and heats the water. Canal-side villages that are near enough for joggers to run between seem, from my boater's perspective, to be a day or two apart. In some ways, the canal network is a 2,000-mile-long linear village. I slow down too, finding time to cut firewood, getting exercise, fresh air and free, carbon-neutral fuel all in one. (An estimated four million tons of forest wood goes unharvested each year in England, enough to provide heat for a quarter of a million homes.)

I cook soup on top of the stove, where wood I have just chopped glows in a red inferno, keeping the chill of spring evenings at bay. I make chutney, cooked for hours on the wood-burning stove. I'd like to say it was made from foraged hedgerow fruit, but instead I used apples bought from a village greengrocer. I do small amounts of work, but my innately lazy self is very at home. After years of living in

London, it is all remarkably tranquil. I spend endless hours listening to Radio 4 by the fireside, alone, quiet, in a parallel otherworld where speed and urgency no longer exist; not earning much, but not spending much either. I read and listen to music. Madame Bovary and Mr Bojangles become my companions, among others. I can't understand Mme Bovary's desire to flee the countryside and head for the city. Nina Simone's *Here Comes the Sun* plays loudly as dawn breaks over fields where I am moored in rural isolation.

When, before I took the plunge, I told a friend who used to live on a narrowboat about my plans, she enthused, 'It's such a big space'. I didn't understand what she meant. The interior of a narrowboat is 6ft wide. 'It's like camping,' she clarified. 'You feel like all the outdoors is your space.' She is right. There is a way in which, windows and side hatches to either side, skylights above me, sitting below water level in this narrow steel tube, I am literally immersed in nature.

Compact and communal

Back to nature it may be, but sadly narrowboats run on fossil-fuel diesel. A handful of people produce their own biodiesel from recycled vegetable oil, but so far I have been unable to get hold of any. Fuel use is not insignificant – after all, I am pushing my home along, even if it is on water. A 25-ton steel boat is not efficient in terms of emissions per mile. I have worked out, very roughly, that I have produced the same emissions in a 30-day, 55-mile journey as someone travelling 1,900 miles by train. In those 30 days the fuel did much more than provide propulsion, however: it also provided all my electricity and hot water. In fact, generating this was one of the main impetuses for moving every few days. (Life could of course be much cleaner and greener with solar panels, a wind turbine and composting toilet, all of which are features I will look for when I buy or rent another boat.) Extrapolated so far, though, my total annual emissions measure some 3.28 tons of CO_2, about a quarter of the average Briton and much less than my former lifestyle.

Although, it measures only 400 sq ft or so (compared to the average British house's 1,300 sq ft), my 68ft hire boat is bigger – and therefore more fuel-hungry – than I need.

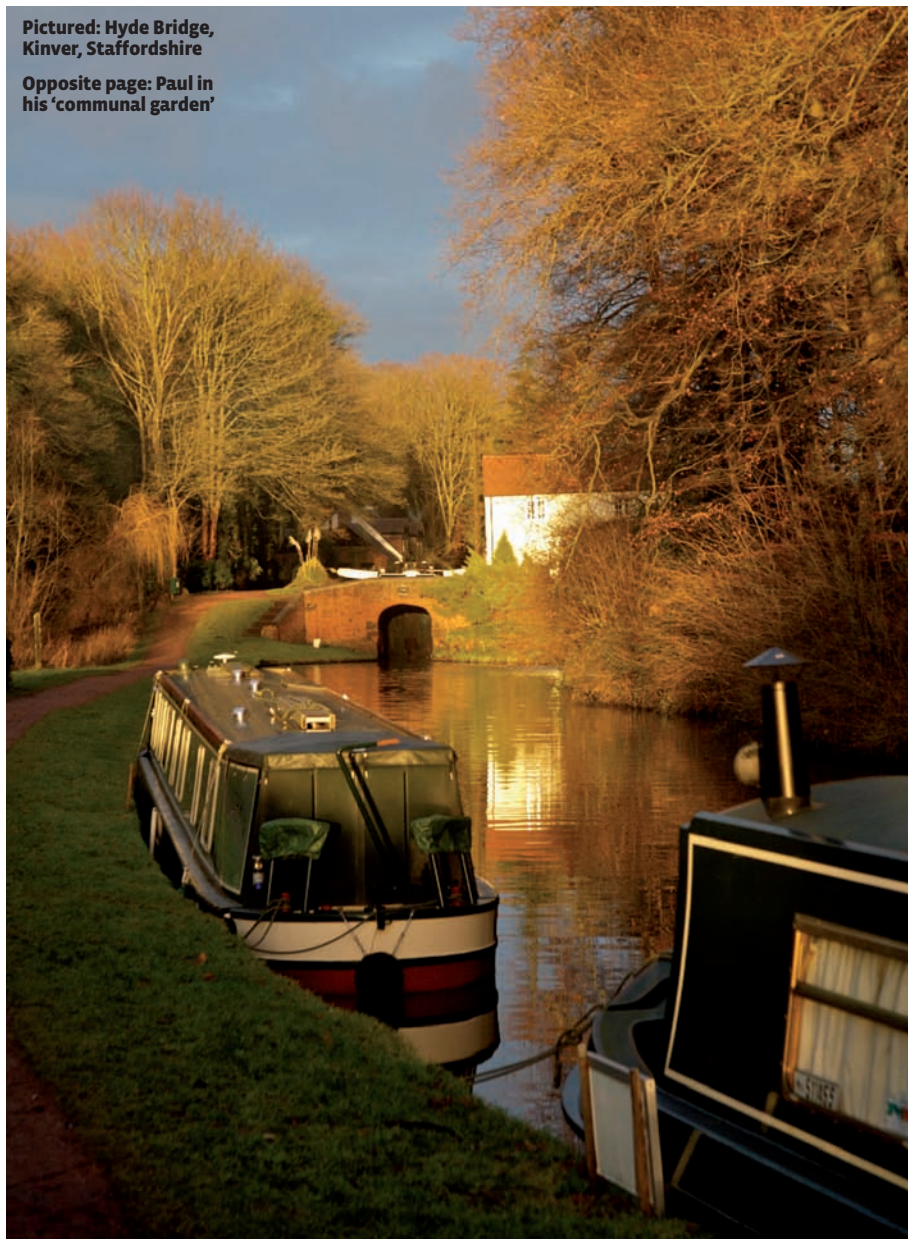
'There is a metaphysical element to being on the canals. Time slows down'

Compactness is the essence of living in a narrowboat. You have to be extremely organised and not a hoarder – both traits I will have to learn. Even my transit-van's-worth of life's possessions will have to be pared down severely. In the non-boating world, others are doing the same: small homes are becoming more popular. In the US, where traditionally bigger has always meant better, the Small House Society is promoting living in tiny spaces, thus using fewer resources and less land.

The beauty of living on a narrowboat is that, while my home occupies no land of its own, I share an enormous communal garden that stretches for thousands of miles along canals and rivers. I am reminded of philosophers such as Henry David Thoreau and Arne Næss, who spent much of their time in tiny cabins in big wildernesses, thinking and reading. I want to do the same. There's so much to learn about this world, why we're here and what we're doing. You need a lifetime just to reflect, let alone admire the scenery.

'The beauty of living on a narrowboat is that I share an enormous communal garden'

Paul Miles is a freelance writer and photographer



Pictured: Hyde Bridge, Kinver, Staffordshire

Opposite page: Paul in his 'communal garden'

Local Hero: Richard Body

Torrs Hydro New Mills

The UK's first community-funded hydroelectric scheme, Torrs Hydro is generating green energy as well as interest in H_2O power. Claire Baylis meets the man behind it

Unless you go weak-kneed at the mere glimpse of a windmill, energy generation probably isn't something you'd readily associate with romantic ambience. With its dramatic ageing archways, rustling trees and rushing water, however – complete with a few quacking mallards – the setting for a small-scale hydroelectric scheme in New Mills, Derbshire, is certainly atmospheric.

Harnessing power from the river Goyt, the scheme can be found by Torr Weir, on what was once the site of Torr Mill, which burned down in 1912. Its key components – a giant reverse Archimedean screw nicknamed 'Archie', a 'fish pass' and a neat little engine house – take up a small amount of space, but are attracting growing attention on a regional and national scale.

In terms of how the system works, 43-year-old Richard Body, an IT contractor and one of the scheme's four unpaid founding directors, puts it simply: 'Water obviously wants to go downwards, so as it flows into the screw, the weight of the water naturally twists it'. The screw turns at 30 revolutions per minute, and when it reaches the right speed the generator kicks in and electricity generation begins. Then – keeping it local with a capital 'L' – the electricity is converted from DC to AC and wired direct to the nearby Co-op supermarket.

Getting started…

Richard played a key role in getting the whole project off the ground, having heard about the potential arrival of hydro via a small article in the local paper in 2006. 'At that point, Water Power Enterprises was talking to the town council about it,' he explains. A social enterprise dedicated to setting up small-scale hydro schemes, Water Power Enterprises (WPE) was looking for potential sites in the north-west and north-east, and had heard New Mills might be suitable.

On hearing that WPE managing director Steve Welsh was due to present to the council, Richard invited himself along. 'As co-ordinator of the local Friends of the Earth

(FOE) group, I wanted to offer our support,' he says. Once there, he saw footage of a similar hydro scheme in Germany and was sold on the technology. Reintroducing hydropower locally just made sense, he says: 'Everyone must walk past a river at some point and think, "There must be so much energy in there, if only you could harness some of it"'. At this stage WPE still had to decide how such a project could be funded. It also had to get the town council, who owned the land, to agree to a lease.

Buy-in from locals was another key factor, so in January 2007, WPE hosted an exhibition at the local Heritage Centre to gauge public reaction. Over two days, 150 people registered their support. Keen to keep up momentum, Richard's FoE group hosted another meeting with WPE, for those interested in finding out more. It proved a pivotal gathering. 'At the end of that meeting we weren't very happy about what had been said about ownership,' explains Richard, i.e. that the scheme would potentially be owned by WPE. 'The community would benefit, but "in some way as yet undefined"'.

Unhappy with such 'haziness', a local steering group was set up to decide what the next steps would be. It was attended by renewable energy advocate Maggie Cole, 53, who also became a director. She was keen to see things progress, but also for them to do so in the right way. 'I felt it was really important that we did things in an equitable fashion for the people who lived here,' she says. 'We're a little town, we've given an awful lot, haven't got very much and certainly don't want people to take what we've got left.' By the end of their second meeting, the group had identified two key things they wanted. 'First, we, the locals, wanted to own the hydroelectric scheme,' says Richard. "Second, we wanted all benefits to come to the local community.'

They reported back to WPE and waited. Thankfully, utterly open to the idea of community ownership, WPE was more than happy. 'It fitted right in with our values,' says Steve Welsh. So WPE returned to New Mills with a plan, suggesting the scheme be set up as an Industrial and Provident Society (IPS), defined by the Financial Services Authority as 'an organisation conducting an industry, business or trade, either as a co-operative or for the benefit of the community'. The idea went down well.

'The basic concept of an IPS is very democratic,' says Richard. 'It's one person, one vote, irrespective of the number of shares you hold. The rules still give directors freedom to be able to run the business, but they're ultimately answerable to shareholders.'

On 20 September 2007, he, Maggie and two others signed up as directors. Torrs Hydro New Mills Ltd was born.

Opposite page: Richard Body in front of the Torr Mill weir

Above: Torr Vale Mill is a listed building that has fallen into disrepair

Pictured: The Millennium Walkway crosses the weir that once powered the mill

PHOTOGRAPHY: PHIL FISK

Splashing the cash

By late 2007, with the lease for the land, planning permission and an abstraction licence in the bag, it was time to start raising cash. 'One of the great things about an IPS, in terms of community ownership, is that you can write a prospectus or "invitation to invest", which is a fairly low-cost way of getting money,' says Richard. So once they had written the thing and had it verified by lawyers, they were good to go. The prospectus launched in November 2007. 'It said we wanted a total of £226,000,' says Richard, '£126,000 in shares, with a minimum shareholding of £250, then £75,000 in grants and £25,000 as a loan. At the time the only grant we had was £15,000 from the Peak District Sustainable Development Fund.'

The prospectus would remain open until

the end of January and initially things were slow, but in the last 10 days came a rush. 'We had another exhibition at the Heritage Centre and people just kept coming up to me with cheques,' says Richard. 'Each day I'd get applications by post, too.' They also ran "Torrs Tours" at the weekend for potential investors.

The response was heartening, says Maggie Cole, but what really surprised them were the addresses on share applications. 'They came from the community housing estates as well as the big houses and smaller terraced ones,' she says. 'So although people were saying, "It's just going to be snobs who live in so-and-so" it wasn't at all. In fact very few of those did.'

As well as pooling local cash, Richard says they did 'spectacularly better' than expected on grants, pulling in around £165,000 and also taking out a £70,000 loan, all necessary as the project ended up costing more than predicted.

Chris Shearlock, sustainable development manager for the Co-operative Group, which provided a grant as well as agreeing to buy the electricity generated, says the scheme proved irresistible: 'It's co-operatively owned and involved in fighting climate change, so ticks two really important boxes for us'.

A screw loose

With enough money raised, it was all systems go. The screw was ordered and the building phase was managed by WPE, with Western Renewable Energy (www.westernrenew.co.uk) as the main contractor. Construction began in March 2008, a stage that benefited the local community in itself, with 60 per cent of construction costs spent locally. Step one, says Richard, was to dig 'a very big hole', with an archaeological survey as part of the ongoing process. Then came the concrete walls and base to form the structure, while a 'fish pass' was also incorporated into the design. Paid for by the Environment Agency, it runs adjacent to the screw and encourages fish to travel up the river. 'Archie' arrived next, attracting around 300 onlookers, then the engine house and an amphitheatre, created using stones from the original mill.

With building completed, the locals finally took ownership on 4 September last year. Celebrations were short-lived, however.

'That night we had a huge downpour,' says Richard. 'Too much water is unfortunately worse than not enough, because it brings lots of silt with it. So the screw generated energy briefly then silt blocked everything up. A couple of the directors had to go into the river, clear it away and get the thing running again.'

But get it running they did. Indeed, when it's working, it's a pretty efficient system. 'The screw delivers 70 kilowatts (kW) of raw power,' Richard explains, though that does drop to an optimum of 63kW after it's gone

Above: Looking down on 'Archie', the hydro scheme's giant reverse Archimedean screw

Left: The alternator and cable that carries the newly generated DC electricity to be converted to AC

Below: Richard Body at the control panel

Right: Removing the stones and debris that collect in the outlet

through the gearbox and generator, losing a little more travelling to the Co-op. Typically, it sits somewhere between 40 and 50kW.

To-date the screw has generated 142,000 units, or kilowatt hours, of energy. On average it produces 60-70 per cent of the Co-op's electricity needs over a 24-hour period, and enough excess to sell back to the grid, which happens regularly during the night when the Co-op is shut.

Working with the right water levels is crucial, of course. Environment Agency requirements mean the screw can only be used if the river's water level is 31mm at the far end of the weir – 'so when it's too low, the sluice gate is shut,' says Richard. If water's too high it can also cause problems, though, and not just because of the silt factor: 'Because the river's narrower after the weir, the water level there rises more and the screw can't turn as quickly because it's moving standing water'.

Teething troubles aside, the group is still hopeful on the cash-flow front. Richard explains that they're working on the assumption the scheme will generate around 240,000 units per year, which he equates to roughly £24,000 of electricity. As for profits to spend locally, they hope for £2,000- £3,000 per year. 'But when the loan's paid off there'll be an extra £10,000 annually, so the benefit really starts kicking in,' he says. How profits are spent will be decided by shareholders, although boosting environmental sustainability will play a part. 'It could, for example, go towards insulation of community buildings or educational materials.'

New Mills to nationwide?

For now, they need to concentrate on keeping things running smoothly. A voluntary maintenance team is currently responsible for daily checks, which, says Maggie, can take anything from 10 minutes to two hours. 'You might just check the instrumentation, make a note in the log, maybe pull a couple of sticks out of the fish pass,' she says. 'But if there's a lot of stuff in the intake, you may spend an hour with at least one person in the water.'

Maggie admits it's been hard work and that setbacks have left her 'cheesed off' at times, but things should get easier. 'For example, I thought autumn leaves floated on the water – they don't. When they're in moving water, they churn around and you end up with football-sized lumps. But we know that now, so come autumn we'll know to do a particular type of clearing-out every day. We'll be ready.'

Ultimately, the benefits appear to outweigh the hard slog: the scheme not only provides the community with a new revenue stream and a boost to tourism, but also educational benefits. In terms of bigging up green power, one of great things about the screw is that it's so visible and is capturing the imaginations of so many. 'You can see it generating electricity,' says Richard. 'We're constantly visited by people looking to do something similar.'

PHOTOGRAPHY: PHIL FISK

Indeed, WPE has already set up a similar project in Settle, in the Yorkshire Dales, with construction due to start this month. 'We hope to do a site at Huddersfield this year too,' says Steve Welsh. 'There's a huge demand from local communities. We've already run five free workshops about setting one of these things up, with people attending from 31 different community groups.'

Chris Shearlock agrees that the New Mills scheme is replicable elsewhere – 'There are thousands of weirs like that, particularly in the north of England' – and the Co-op has given WPE a grant to help with development. It would also consider buying the electricity produced, though it's unlikely that elecricity would be wired direct to stores à la New Mills – it's an expensive process. 'We'd probably buy back a proportional amount from a supply company that has a contract with the hydro scheme,' he says.

The Government's introduction of feed-in tariffs (FITs) could obviously fuel growth of small-scale projects further. 'It would make a phenomenal difference,' says Richard Body. 'If we were building the scheme now and knew, for example, that instead of getting 10p a unit we'd get 20p from year one, it would make the business case, going to a bank, so much easier.'

'The scheme provides the community with a new revenue stream, a boost to tourism and educational benefits'

Friendly bankers aside, in terms of public buy-in alone, Torrs Hydro gives real reason for optimism. The number of shareholders has reached 220, 55 per cent of whom are locals, while most of the rest have a connection to the area. Together, they own just less than £126,000 of shares. 'I thought a lot of people would have said, "A hydroelectric scheme? What will that do for us?" but they didn't,' Richard adds. 'People understand renewable energy is free and it's green. The best bit is that it's duplicating, opening people's minds, making them see it is possible.'

www.torrshydro.co.uk
www.h2ope.org.uk

Claire Baylis is a freelance journalist

Some of the producers who have benefitted from the sale of the tissue products through Traidcraft's fair trade fund

Some of the raw materials and work in progress from the Traidcraft producers

Get to the bottom of unfair trade

Leading fair trade organisation Traidcraft is calling for people to change their buying habits to mark this year's World Environment Day on June 5th.

The British are the world's most prolific users of toilet roll with the average British person using 4,000 toilet rolls in a lifetime, equivalent to an estimated six trees.

Traidcraft hopes that surprising facts like these will encourage people to think about how changing from their usual brands to Traidcraft's recycled paper products could help the environment as well as change people's lives.

The pioneering fair trade organisation's domestic tissue range – toilet roll, kitchen roll and tissues – is 100% recycled. This means that no forests are cut down to provide the materials and the amount of paper ending up in landfill sites is reduced.

Recycling paper causes 35% less water pollution and in the case of Traidcraft's tissue range, even the water used in the recycling process is filtered and biologically cleaned without the use of chemicals.

As well as helping the environment, a contribution from the sale of each of the tissue products goes directly to a fund which Traidcraft uses to support fair trade producers from some of the world's poorest countries.

Thanks to money from the fund Traidcraft's producers around the world have already benefited.

Sugar suppliers Craft Aid in Mauritius are being helped to become Fairtrade certified, and Cipac – a honey co-operative in Guatemala – can now afford to start their technical assistance programme by employing a consultant to work with beekeepers to improve the quality and quantity of their honey.

Seeds Aplenty in South Africa has benefitted as they can now pay for packaging and marketing materials for their fair trade flower seeds allowing them to expand into local markets.

Traidcraft is inviting everyone to join its fight against poverty by making the simple switch from their regular brand of tissue products to Traidcraft's products, which directly contribute to transforming people's lives.

Traidcraft tissue products are available at www.traidcraftshop.co.uk, in selected retail outlets, including Booths, and by mail-order from 0845 330 8900.

Campaigning messages on the packaging designed to attract shoppers

ON THE FRONTLINE

This month: Ocean activists. By Andrew Wasley

In June, a groundbreaking film will raise the alarm about the shocking state of the world's oceans. In *The End of the Line*, former *Telegraph* reporter Charles Clover travels the world to investigate the impact of overfishing, concluding that blame for the crisis lies squarely lies at the feet of consumers who munch through 140 million tonnes of seafood a year. He asks us to imagine a world without fish and hopes to spearhead the world's biggest 'save the seas' campaign to date.

Such an ambitious initiative would be not be possible without the efforts of pioneering campaigners and activists who work doggedly to expose the often unreported abuses of the world's marine and coastal environments – from over-exploitation of fish stocks, illegal 'pirate' fishing and destructive trawling to aquaculture, whaling and shark-finning, as well as the threats posed by pollution and climate change.

Working at the sharp end, with few resources and little funding, they face myriad dangers – and in some cases have paid the ultimate price. Most famously, activists from the controversial Sea Shepherd group have frequently found themselves in the firing line. The direct action group has repeatedly been attacked, threatened and subjected to constant smear campaigns by governments and law-enforcement agencies that have branded them 'terrorists'.

Sea Shepherd made headlines last year when activists Giles Lane and Benjamin Potts were held hostage and beaten by Japanese whalers. Less well-known, Sea Shepherd campaigners were almost killed while trying to document the controversial Taiji dolphin hunt in Japan. Morgan Whorwood and Brooke McDonald managed to obtain graphic film of the slaughter of striped dolphins, killed for their meat, but desperate to seize the footage, fishermen attempted to throw the pair off a cliff into the sea.

Although they managed to smuggle the footage out – subsequently beamed around the world and temporarily halting the Taiji killing – the activists were forced to leave Japan after receiving death threats.

More recently, Greenpeace was forced to go undercover to expose an embezzlement ring involving crew members on board Japanese whaling ship *Nisshin Maru*. Their investigation revealed evidence that crew members were taking the best cuts of whale meat during last year's so-called 'scientific hunt' and smuggling it ashore disguised as personal luggage before passing it to traders for illegal sales.

Following the revelations, Greenpeace offices in Tokyo, and the homes of Greenpeace staff, were raided by Japanese police; two campaigners – Junichi Sato and Toru Suzuki – were arrested and held for their part in exposing the corruption. Despite international condemnation, the pair were charged with 'trespass' and 'theft', and face up to 10 years in prison if convicted in a forthcoming trial.

María Elena Foronda Farro knows about prison. The Peruvian activist has been a tireless campaigner against the social and ecological costs of fishmeal production for 20 years. Her outspoken campaigning saw both her and her husband falsely accused of belonging to a terrorist organisation and sentenced to 20 years in jail.

For more information
and to keep up with current campaigns:
www.greenpeace.org.uk
www.seashepherd.org

As the *Ecologist* revealed earlier this year ('Fishy business', January), the production of fishmeal – an integral ingredient in farmed salmon feed – is responsible for serious depletion of Peru's anchovy fishing stocks, and for causing air and water pollution that negatively impacts people's health and quality of life. Released after 13 months behind bars, Farro was awarded the prestigious Goldman Prize in 2003 for her campaigning work, and continues to be a thorn in the side of Peru's fishmeal industry.

Another Goldman recipient, Jorge Varela, of Honduran pressure group the Committee for the Defense and Development of Flora and Fauna of the Gulf of Fonseca has faced numerous threats on his life and repeated intimidation for his campaigning against shrimp/prawn farming.

Across the world, vast tracts of coastal forests have been destroyed to make way for prawn farms. Often built on land seized illegally and with force, they threaten coral reefs and marine wildlife with harmful pesticides and antibiotics, poisoning the water supplies of coastal communities, ruining agricultural land and reducing food supplies.

Varela is lucky to be alive. During the past decade, activists fighting the 'shrimp boom' in numerous other countries have paid a heavy price. In Thailand, campaigner Jurin Ratchapol was killed in the village of Paklok because of his outspoken stance against shrimp farms; in Brazil, Sebastian Marques de Souza, who led community opposition to prawn farms in Piaui state, was murdered; in Bangladesh, activists from Nijera Kori – a leading NGO fighting shrimp-farming – were attacked by thugs connected to the trade.

All this seems a long way from the our dinner plates here in the west; and in China, Japan, Australia and – increasingly – fast-developing nations such as India and Brazil, where consumption of seafood is rising rapidly. But it isn't.

If we care for the future of our oceans we urgently need to support those calling for a global network of protected marine reserves, and champion those fighting the continued hunting of whales (often in breach of international agreements) and other cetaceans. If we want to continue eating fish, we rapidly need to alter the habits of a lifetime and ditch any seafood whose origin we cannot verify or which comes without ethical certification. If in doubt, don't buy. It's that simple. Otherwise we won't need to imagine it – there really will be no fish left in the sea.

Andrew Wasley is a journalist with investigative agency Ecostorm and a producer for the *Ecologist* Film Unit

EI ECOLOGICAL INTELLIGENCE

Anyone who cares about the environment needs to be making more informed choices at the checkout. Laura Sevier meets an author promoting ethical shopping

It's not easy being an ethical shopper. On top of the basics of cost and quality there are myriad other considerations. Does it contain harmful chemicals? Is it organic? Was it produced locally? Is it ethically traded? Is it cruelty-free? Has it been sustainably sourced?

The overuse and abuse of words such as 'organic', 'sustainable' and 'carbon-neutral' means it's tricky to gauge the ethical merit of one product versus another. Where can we get the assurance that the products we buy are safe, for ourselves, our families, the planet and its other inhabitants?

Yes, we can be guided by eco labels such as the Soil Association logo, the Fairtrade mark and the European Energy Savings symbol, but while these are helpful indicators of how a product has been produced and its impact on the planet, we can still be faced with a dilemma. When buying honey, for instance, should we go for local, Fairtrade or organic?

Other indicators include carbon footprints – a handful of products, such as Walkers crisps, have had theirs calculated – and whether or not something is recycled or recyclable. The only way we can really know the true impact of a TV, fridge or washing powder, however, is by assessing it over the full course of its life cycle, from manufacture (and even before that, to the origins of its components and extraction or creation of their ingredients) to disposal.

Imagine if, with the click of a button on your computer or phone, you could know which frying pan, toy or pair of trainers was best for the environment, your health and for the wellbeing of those who made it? In other words, what if we knew, with the precision of an industrial ecologist, the hidden impacts of what we buy?

This is a question addressed in detail in a new book, *Ecological Intelligence*, by US psychologist and author Daniel Goleman. 'We need to become more intelligent about the ecological impacts of how we live,' he says. His book heralds a new wave in ecological transparency that goes beyond eco labels and carbon footprints.

'Ecological transparency becomes radical when its analysis encompasses the entire life cycle of a product and the full range of its consequences at every stage, and presents that information to buyers in ways that demand little effort,' he says.

'Radical transparency' covers three spheres: the geosphere (including soil, air, water and climate), the biosphere (our bodies, those of other species and plant life) and the sociosphere (conditions for workers).

How might this work in practice, though? Goleman cites the example of Good Guide Inc, based in Berkeley, US, and spearheaded by industrial ecologist Dara O'Rourke. GoodGuide (www.goodguide.com) is a software innovation that draws together more than 80 million separate evaluations of the impacts of substances, components, products and entire companies, pooling information from hundreds of databases. Instead of getting the raw data, shoppers receive the final evaluation divided into three dimensions: environmental, health and social. It can be tailored according to priority and offers 600 ways to evaluate impacts. People can look products up on the website or, if they have an iPhone, by using an iPhone application. While GoodGuide's product directory is largely geared toward a US consumer market, there are many products

available to shoppers in the UK (see box, below).

Will this extra information make choosing more confusing, though? 'I think it will simplify choice,' says Goleman. 'It will pierce through the "green mirage", where a company takes one aspect of a complex product, improves it and calls it green, but leaves the 999 other aspects untouched.'

As shoppers, Goleman suggests, we need to favour improvements and contribute to a process of industrial greening and perpetual greening. 'Ideally, we will come back to purely organic processes that do nothing that goes against the grain of nature,' he says. 'But we have a long way to go. That's true sustainability.'

From the Arctic Circle to the Sahara Desert, native peoples everywhere have survived only by understanding and exquisitely attuning themselves to the natural systems that surround them. It is this 'brand of wisdom' that Goleman defines as 'ecological intelligence': 'our ability to adapt to our ecological niche'. The trouble is that modern life diminishes such skills and wisdom. The routines of our daily lives go on completely disconnected from the adverse impacts they are having on the world around us. Given the complex global nature of supply chains, understanding the impacts of what we buy demands a vast store of knowledge – one so huge that no single brain can store it all. Ecological intelligence therefore needs to be a collective. 'We need to collaborate and spread awareness,' says Goleman.

He believes this can be done virally, on a massive scale, using e-circles, forums, Twitter and Facebook applications.

Do enough people care enough, though, especially in a time of cost-cutting and belt-tightening? Goleman is optimistic. 'I don't think the credit crunch matters. We all have to buy, and it's an illusion you need to pay more for a product that is ecologically beneficial.'

There are signs that the future doesn't look too bleak for ethical shopping. In the UK, the Co-Operative Bank's Ethical Consumerism 2008 report shows that despite the first tremors of the downturn being felt towards the end of 2007, overall ethical spend in the UK reached £35.5 billion in that year, up 15 per cent from £31 billion in the previous 12 months. A Soil Association report published in April this year showed that while organic food sales have been hit across all sectors, a core of committed customers appear to be staying loyal.

I ask Goleman what role he thinks retailers and governments should play in all this – shouldn't they too be responsible for our values? But for him it's all about consumer power. 'I think we need to be responsible for our values and we should take them to the store when we shop – and then retailers will respond,' he says. As for governments, he doesn't think they need to do a thing. 'It's all done with market forces and the magic of the free market. The good guys are the NGOs.'

He cites the example of Skin Deep, the Environmental Working Group's searchable database of toxic ingredients in cosmetic and personal care products (www.cosmetics database.com), a non-governmental, not-for-profit organisation that is 'forcing the profit sector to get its act together'.

Shopping out of the void

Before we get carried away in our sustainably sourced green trolleys, however, a word of caution. By itself ethical shopping does not tackle the root of the problem. As Jonathon Porrit, chairman of the Government's Sustainable Development Commission, said in a recent *Observer* interview, ethical shopping is not enough; our levels of consumption are undermining life-support systems on which we depend. Rather we should be cracking down on 'unnecessary consumption, conspicuous consumption and irresponsible consumption'. George Monbiot is another environmentalist who is sceptical of 'green consumerism'. 'No political challenge can be met by shopping,' he writes. 'It is easy to picture a situation in which the whole world religiously buys green products and its carbon emissions continue to soar.' Goleman too admits that 'part of shopping smarter is shopping less'.

Okay, so ethical shopping alone is not going to save the planet – everything we use and dispose of leaves a mark on the world – but we may as well make informed choices instead of shopping in a void. As Goleman puts it: 'The biggest collective blindspot is that we don't make the connections between the things we despair about – global warming, particulates, rates of asthma in inner cities – and how each of us makes our personal decisions about what to vote for with our dollars. What I saw was that information technology is about to pierce through that veil and let any of us know when we go shopping what the consequences will be.'

Ecological Intelligence **by Daniel Goleman (Allen Lane, £16.99)**

Laura Sevier is the *Ecologist*'s Daily Life Editor

Guides to shopping ethically in the UK

ETHISCORE
The Ethical Consumer Research Association Ltd (ECRA), publishers of *Ethical Consumer* magazine, has an online shopper's guide: (www.ethiscore.org). It is designed to help users quickly and easily identify the best ethical products to support, and the best companies to avoid. It is based on the Corporate Critic database, which contains information on the behaviour of more than 50,000 companies around the world.

THE GOOD SHOPPING GUIDE 7
(The Ethical Company Organisation, £14.95) This book will help you make more informed choices about which brands are best for people, animals and planet. Visit www.ethical-company-organisation.org

BEHIND THE LABEL
Ecologist Editor Pat Thomas's *Behind the Label* column takes a detailed look at the ingredients in everyday products and food – visit www.theecologist.org. See also her article on Eco labels: 'Behind the Eco labels'.

DAILY LIFE

Take part in Wildlife Week; watch a fishy feature film; share a car journey; read up on natural health; eat beetroot; build an Earthship; celebrate the summer solstice
By Laura Sevier

JUNE

Spotlight on...

The moon

IN TUNE WITH THE MOON

In his *Natural History*, the Roman scholar Pliny the Elder observed that fruit and vegetables picked when the moon was full were at their most good-looking and juicy. He also noted that fruit picked at new moon is 'less susceptible to rotting... and can easily and efficiently be dried'.

In medieval Europe, the moon was believed to have a strong influence over daily life. Gathering herbs, taking medicines and slaughtering animals were often regulated by the phases of the moon. Although now relegated to folklore, some people, such as biodynamic farmers and gardeners, still swear by planting and harvesting according to the moon. A method proven successful over 2,000 years of time deserves more than a label of folklore.

To find out more read *In Tune With the Moon 2009*, Michael Gros's daily planner for living and growing according to the moon (Findhorn Press, £8.99). Its author maintains, 'the moon not only has an effect on the plants we grow, but also on our bodies'. The book advises when to visit the dentist, cut your nails and even to eat and detoxify in harmony with the lunar cycle. Sound a bit loony? Give it a go and see if you notice the difference...

GAZE UPWARDS

2009 is the International Year of Astronomy, commemorating the 400th anniversary of Galileo Galilei's first observation of the night sky with a telescope.

➤ **There are hundreds of events happening around the UK – see www.astronomy2009.co.uk for more information.**

For more on moon-watching visit the Society for Popular Astronomy's 'Moonwatch' webpage, www.popastro.com/moonwatch/moon_guide

3 THINGS TO DO...

Green London Hundreds of cheap and free events will take place across the Capital from 4-28 June during the Love London Green Festival 2009 **www.lovelondon.org.uk**

Pick Strawberries and raspberries taste best freshly picked, so find a pick-your-own (PYO) fruit farm near you. There is a searchable map of UK PYO farms at **www.pickyourown.info**

Bike Look out for free cycling events near you during Bike Week (13-21 June), an annual promotion of cycling around the UK. Events range from cycle training and Dr Bike sessions for novices, to commuter challenges and group rides around local cycle routes. Many are open to families. **www.bikeweek.org.uk**

Live Music in the Woods

Listen to your favourite music in woodland locations around the country. The Forestry Commission (FC) annual summer music programme – the 'forest tour' – starts this month. Acts include Paul Weller, David Gray, Vanessa Mae and Jules Holland and his Rhythm & Blues Orchestra.

➤ **The live music programme provides valuable revenue to plough back into the FC's management of woodlands in a variety of social and environmental projects. For tickets call 01842 814612 or visit www.forestry.gov.uk/music**

this month

By Laura Sevier

30 May-20 June

Wildlife Week (triple bill)

Owl encounters, badger, butterfly and bird walks, rockpool rambles, nature art workshops, talks about moths, bats and visits to a working wildlife-friendly farm are just some of the events and activities taking place during Wildlife Week organised by the Wildlife Trusts. They manage 2,256 nature reserves covering more than 90,000 hectares. Contact your local Wildlife Trust – there are 47 in the UK. **www.wildlifetrusts.org**

PICK OF THE MONTH

QUASH HAND-SANITISER

One of the best ways to protect yourself from the transmission of a number of viruses – including flu – is to wash your hands regularly. Soap and water will effectively remove germs, but when you're on the move a hand-sanitiser can come in handy. Quash is the first hand-sanitiser made from 100 per cent natural ingredients, clinically proven to kill 99.9 per cent of germs.

Available in 15ml spray (£1.99) or 50ml bottle (£3.49), the alcohol- and synthetic-chemical-free formula means it won't dry and damage skin.

➤ **Available from Superdrug, WHSmith travel stores, selected Tesco stores and independent pharmacies or online at www.quashme.com**

8 June
The End of the Line

As much as 90 per cent of all the ocean's large fish have been fished out, and an international group of ecologists and economists has warned that the world will run out of seafood by 2048. *The End of the Line* is the first major feature documentary film revealing the impact of overfishing on our oceans. Fronted by investigative journalist Charles Clover it's filmed across the world, from the Straits of Gibraltar and the coasts of Senegal and Alaska to the fish markets of Tokyo (see also *On The Frontline*, page 53).

➤ ***The End of the Line* is released on 12 June by Dogwoof. There will be previews in cinemas around the UK on 8 June to coincide with World Ocean Day.**

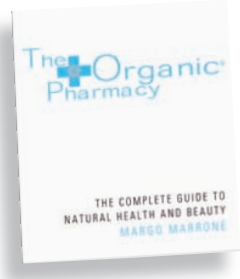
➤ **Join the campaign and find out more at www.endoftheline.com**

9 June
Share Lifts

Save money and cut your carbon footprint by sharing lifts. Liftshare has declared 9 June 'National Liftshare Day' to raise awareness of the benefits. Their free-to-use website can help you find a 'BUDi' to share a car, bike, taxi or walking journey.
www.liftshare.com

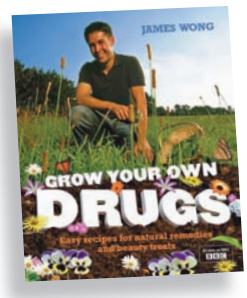
3 OF THE BEST... BOOKS ON NATURAL HEALTH

***The Organic Pharmacy* by Margo Marrone (Duncan Baird Publishers, £14.99)**



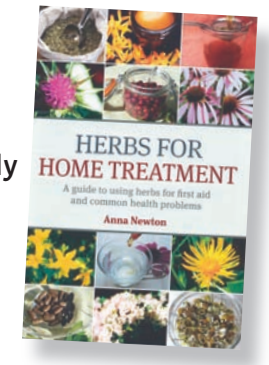
Whether you're looking for relief from stress, eczema or a bout of food poisoning, this book, written by Organic Pharmacy founder Margo Marrone, presents natural solutions based on herbs, homeopathy, nutritional advice and supplements.

***Grow Your Own Drugs* by James Wong (Collins, £16.99)**



'Over the years we have lost the knowledge of how to make the most of plants' health benefits in our daily lives', says ethno-botanist and TV presenter James Wong. Many of the remedies in this book, based on common flowers, fruit, vegetables, herbs, trees, roots and bulbs, are cheap to make and can be prepared in five minutes at home.

***Herbs For Home Treatment* by Anna Newton (Green Books, £14.95)**



This user-friendly guide will show you how to use homegrown herbs for first aid and to treat common complaints – as well as to improve your general health.

email: laura@theecologist.org with upcoming events

FOOD IN SEASON

Fruit
Blackcurrant
Cherry
Elderflower
Gooseberry
Loganberry
Raspberry
Rhubarb
Strawberry
Tomato

Vegetables
Artichoke (globe)
Asparagus
Bean
Beetroot
Broccoli (calabrese)
Cabbage
Cauliflower
Chard
Courgette
Cucumber
Dandelion
Endive
Fennel
Garlic
Kohlrabi
Lettuce
Mushroom
Onion
Peas (sugar snap, shelled, mangetout)
Potato
Radish
Rocket
Samphire
Shallot
Sorrel
Spinach
Spring greens
Spring onion
Turnip
Watercress

Strawberries can be frozen, made into jam or used as an exfoliant

➤ 3 ways to eat... beetroot

1. GRATE IT Add to green salads for colour and subtle sweetness – add fresh herbs and vinaigrette or a dollop of sour cream.

2. BOIL IT Twist the leaves off (they can be eaten like spinach) and gently scrub the skin, taking care not to pierce it or the colour will bleed out while cooking. Cook your beetroots whole. Place them in a lidded pan of water, bring to the boil then simmer for 1-2 hours, depending on their size.

3. BAKE IT Prepare as above. Wrap each bulb in foil and roast until they're tender (approximately one hour). Serve with sour cream.

Build an Earthship

Earthships are low-impact buildings inspired by the work of US 'biotect' Michael Reynolds. On this two-day course you'll learn how it's possible to live off-grid, to heat a building with the sun instead of central heating and to use natural, passive ventilation. It covers harvesting and recycling water, micro-renewable technologies and sourcing environmentally friendly materials. There's also a hands-on practical on ramming car tyres (which make up the walls of an Earthship) and earth rendering.

➤ **Earthship Brighton, Stanmer Park**
Courses for June are booked up, but further courses will be available in September
➤ **www.brightonpermaculture.co.uk**

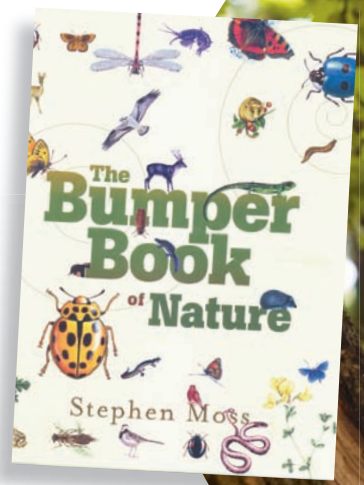
KIDS OUTDOORS!

➤ MAKE THE MOST OF THE WARM SUNNY DAYS AND LONG, LIGHT EVENINGS...

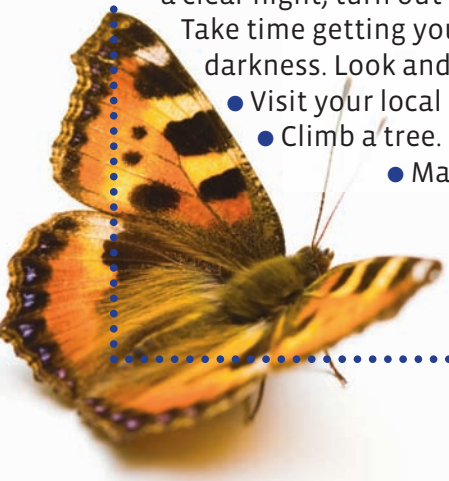
Less than 10 per cent of kids regularly play in woodlands, countryside and parks, says a recent survey by Natural England who are working on a new plan dubbed *One Million Children Outdoors*. The aim is to introduce a million kids to wild spaces over three years through a range of projects. Find out more at **www.naturalengland.org.uk**

➤ *THE BUMPER BOOK OF NATURE* BY STEPHEN MOSS (SQUARE PEG, £17.99)

Need inspiration? This beautifully designed treasure trove of nature activities, ideas and information will inspire kids to swap the TV or computer for the natural world outdoors – whether in the city, suburbs or countryside. Most of the ideas are free. Here are some ideas from the book:



- Lie down in long grass and stare at the sky.
- Wake up in time to hear the dawn chorus.
- Go out into your garden at night. Choose a clear night, turn out the lights indoors. Take time getting your eyes used to the darkness. Look and listen.
- Visit your local nature reserve.
- Climb a tree.
- Make a den – an excellent hide for nature-watching. Use fallen branches, bits of wood and old carpet or rugs.
- Spot butterflies.



this

email: laura@the ecologist.org with upcoming events

month

21 June
Summer Solstice
The longest day of the year

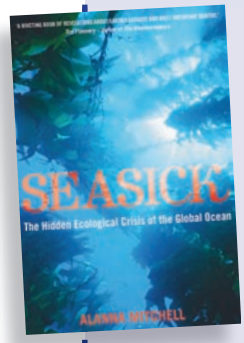
10 GREEN BOTTLES

A seasonal recipe series by Anna Shepard

Lemonade There's nothing more civilised on a sunny afternoon than a jug of homemade lemonade. The best thing is that you can make it to your taste rather than succumbing to super-sweet commercial varieties. Plus, it will keep for several days in the fridge. Grate the zest from one lemon (it's best to use unwaxed lemons, but if you can't find any, a good scrub with a vegetable brush will remove most of the traces of wax), taking care not to grate the bitter white pith. Place in a jug with three tablespoons of sugar. Cover this mixture with boiling water and stir to dissolve the sugar. Squeeze three lemons and add the juice to the jug. Add cold water to taste and then leave in the fridge for an hour or more.

➤ **NEXT MONTH... NASTURTIUM VINEGAR**

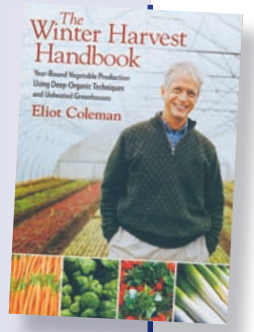
OUT NOW



Seasick
Alanna Mitchell
(Oneworld, £12.99)

Even the most enthusiastic of environmentalists might find it difficult to comprehend an ecological thriller. However, in this exhilarating account of the ocean's demise, Alanna Mitchell has produced just that. By diffusing the complexity of scientific reasoning alongside lucid tales of ocean abuse, Mitchell explains through her journey across the globe how the acidity of the ocean through to the adaptability of Zanzibar fisherman are all linked in to the great balancing act of the seas. If the idea of 'ocean change' or the importance of marine life were lost on you in any way, this book acutely puts in focus why 'we must keep it [the ocean] healthy if we are to save ourselves'. *Chris Carroll*

The Winter Harvest Handbook
Eliot Coleman
(Chelsea Green, £20)



Eliot Coleman is something of a cult figure among organic gardeners and growers, and this instalment won't disappoint. Detailing the techniques used on his farm to produce fresh salads and vegetables throughout the bitter Maine winter, Coleman takes us on a fascinating tour of horticultural ingenuity – polytunnels, fleece covers, precise sowing times and specific varieties. Although this is something of an instruction manual, anyone interested in how food can be produced year-round without heated greenhouses will find it a genuine page-turner. Coleman has done the world a great service in putting pen to paper. *Mark Anslow*

Future Scenarios
David Holmgren
(Green Books, £9.95)

Better known as the co-originator of the 'permaculture' concept, Holmgren has put his mind to how we can manage our inevitable 'energy descent' both gracefully and productively. Much food for thought. *Mark Anslow*

Starting out growing your own food isn't hard, it's just a matter of course, says first-time farmer **Matilda Lee**

WHERE THERE'S MUCK...

During a one-day course for beginner gardeners, I learned how to identify different types of soil, sifted leaf mould to prepare it for use as compost, got my hands properly dirty planting chard and broccoli seedlings in tiny tubs, saw how raised beds can be organised into a relatively small space and tasted a variety of salad leaves and herbs – including sweet woodruff, giant red mustard, sorrel, chervil, wild garlic leaves, purple wildflower pansy, chicory, ruby chard, salad burnet and more – with a view to choosing favourites to grow at home.

From organic gardening principles and garden design to planting and weeding techniques, the theoretical aspect of the course, organised by Growing Communities in Hackney, one of London's most vibrant community-supported agriculture networks, was thoroughly brought to life. Not only that, but I felt such a tremendous boost meeting my fellow growers that, three weeks on, I have spent more time in my back garden than in the previous two years. Other 'newbie' gardeners on the course included two people representing a community food-growing project on a London estate, a guy looking to improve the back yard of his new house and a woman curious about where the vegetables in her veg box came from.

Information can be gleaned from many sources – books and websites offering gardening advice abound – but if you are anything like me, looking to take a stab at gardening but with little more than growing a couple houseplants as your sum total experience, then I recommend a gardening course to help you take the leap. It's the perfect answer to the somewhat tricky question, 'Where do I start?'

The idea is that, just as with other practical skills such as sewing, breadmaking or cooking, you learn best in a hands-on environment, hearing and seeing direct from those with more experience.

Growing your own food is about helping to rebuild a sustainable food network and wresting control over what we eat from supermarkets and food conglomerates. Yes, it's time-consuming, but for those of us with busy lives it is a step outside the 'quick-fix' mentality that has become so ubiquitous and seductive. Growing your own food is slowly and meaningfully rewarding.

Growing Communities provides nearly 500 North Londoners with a weekly fruit and veg box. Head grower Ru Litherland says the network aims to organise more such courses on its own. The one I attended was part of a joint initiative of the Soil Association and the Daylesford Foundation, which promotes sustainable, organic farming.

The Organic Farm School, as the initiative is known, will include 300 courses over the next two years (see box, below left) and is just one way to tap into the growing movement for organic gardening and food cultivation that is blossoming in the UK, particularly in urban areas.

Ru has been with Growing Communities for six years and says that interest in growing-your-own has increased phenomenally over the past two to three years.

Growing courses

■ **THE SOIL ASSOCIATION**
www.soilassociation.org/organicfarmschool
Courses based around growing skills, kitchen skills, smallholding skills and a range of seasonal and specialist skills throughout the year, including foraging for wild food, hedge-laying, cider-making, beekeeping, cheese-making, preserving, butchery and game preparation, seasonal cookery demos, willow weaving and drystone walling.

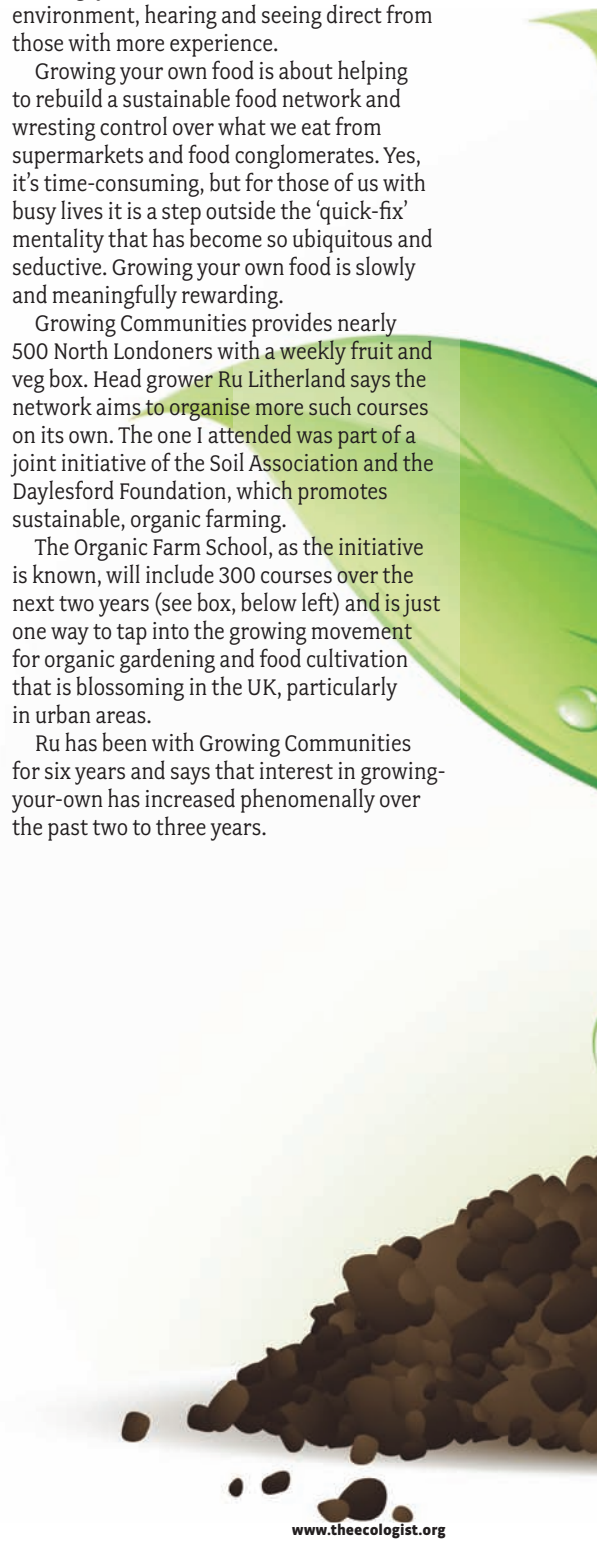
All new Soil Association members get 25 per cent off all classes (up to £12.50).

■ **FOOD UP FRONT**
www.foodupfront.org
Membership-based organisation that supports those wanting to grow food in their unused outdoor spaces. For a £15 annual membership fee you get a starter kit and advice and support from a local 'street rep'. South London.

■ **PERMACULTURE ASSOCIATION**
www.permaculture.org.uk
Click on 'courses and learning'.

■ **NATUREWISE**
www.naturewise.org.uk
Permaculture courses and forest gardens. Central London and in Wales.

■ **CAPITAL GROWTH**
www.capitalgrowth.org
This London Food Link-run project aims to create 2,012 new food-growing spaces by 2012. It provides practical and financial support to communities and offers a London-wide support network.



'Teaching food-growing is inspiring as it gives me a chance to step back and return to the perspective of someone who is coming to it fresh with lots of enthusiasm,' he says. That said, there is now more demand for food-growing courses than there are teachers, and Growing Communities is looking at ways to assist in training programmes to expand the pool of teachers available.

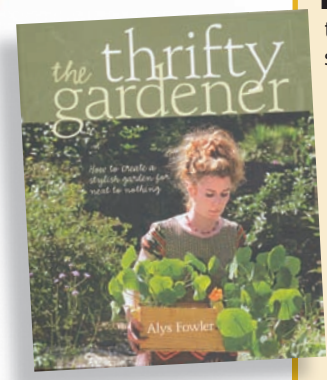
With the Organic Farm School, the Soil Association aims to reach more than 3,000 individuals, and offers, 'a chance to rediscover the precious knowledge of our grandparents'.

'As an urban child who went into farming, I know firsthand the importance of learning these skills direct from the practitioners themselves,' says Patrick Holden, director of the Soil Association. 'Having attended the first hen-keeping day at Daylesford I urge everyone to try one of these courses for themselves – these are essential skills for a more sustainable future.'

It is estimated that a quarter of the British population is planning on growing their own fruit and vegetables this year. With spinach, lettuce, tomatoes, parsley, basil, sorrel and French beans now growing steadily in my backyard, I can now proudly count myself among this new growing generation.

www.growingcommunities.org

Matilda Lee is the Ecologist's Consumer Affairs Editor



Some top tips for 'thrifty gardening'

■ **GARDENING** is something you do, not something you buy. You don't have to spend money to have a great garden. Slow gardening, like slow food, is taking time to savour. It's the process, not the sudden transformation, that matters.

■ **PRACTISE SCRAP CRAFT.** Scrap craft is when you reuse or recycle unwanted items into something useful. It starts with 'I wonder if I...' and the end result is all sorts of cool stuff for the garden. Floorboards turn into compost bins, a chest of drawers becomes your new container garden, someone's unwanted furniture your new patio table.

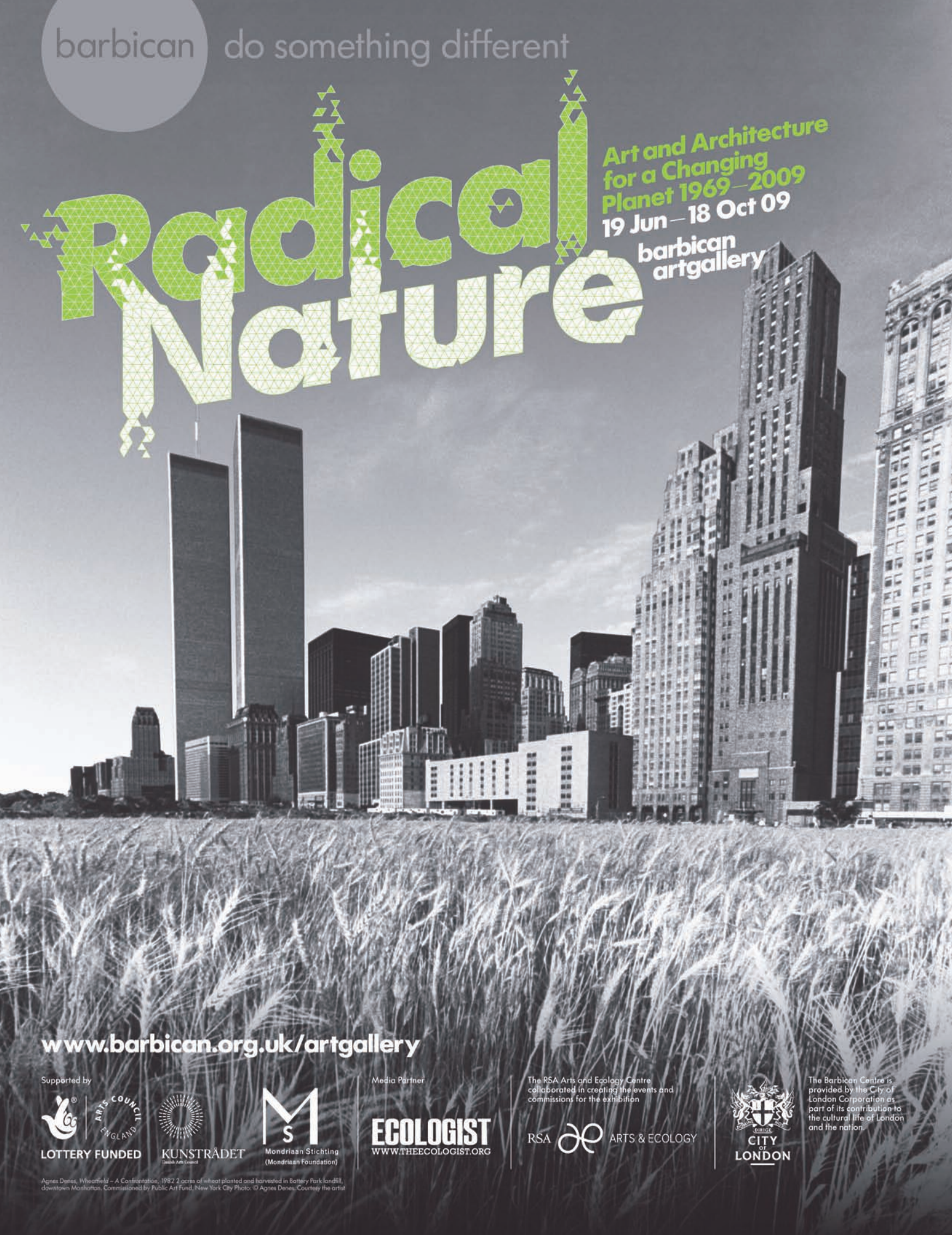
■ **NO-GARDEN GARDENING.** Containers laugh in the face of anyone who says they can't garden because they haven't got space. With a few containers, you can make a garden on a balcony, fire escape or rooftop, in a concrete courtyard or in those weird, unclaimed spaces at the backs of offices. If you're renting, containers give you the chance to indulge in gardening then take the whole thing with you when you move on.

■ **WINE BOXES** are great for growing things such as salad crops, radishes, spring onions, Oriental greens, tomatoes and herbs. The best place to get them is from high-end wine merchants. Another good source is old drawers. With both, you'll need to weatherproof (by using three coats of Danish oil) and create drainage holes in the bottom.

■ **LARGE FOOD TINS** make brilliant growing containers. Among my favourites are the big square ones containing bulk-cured olives, which could be sourced from a market stall that sells olives. Or try asking restaurants for ghee or oil tins. You'll have to cut the top off and for the best drainage drill holes around the sides near the bottom of the tin, rather than through the base.

■ **POTATOES** grow so easily in containers that I've almost given up growing them in the ground. I bought five very large pots (the size of dustbins, another alternative) from a pound store and grow a summer supply with virtually no effort. Spuds will grow equally as well in old compost or mulch bags. These can be disguised with hessian sacks.

Based on extracts from *The Thrifty Gardener* by Alys Fowler (Kyle Cathie Ltd, £16.99)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The RSA Arts and Ecology Centre collaborated in creating the events and commissions for the exhibition
RSA ARTS & ECOLOGY
DIRIGE
CITY OF LONDON
The Barbican Centre is provided by the City of London Corporation as part of its contribution to the cultural life of London and the nation.
Agnes Denes, Wheatfield – A Confrontation, 1982 2 acres of wheat planted and harvested in Battery Park landfill, downtown Manhattan. Commissioned by Public Art Fund, New York City Photo: © Agnes Denes. Courtesy the artist

Jay Griffiths
Author

What inspired you to write *Wild: An Elemental Journey*?
An instinctive loathing for all forms of enclosure: of time, land and perhaps most of all, the enclosure of the human spirit. Also, I wanted to listen to the voices, experiences and philosophies of indigenous peoples.

Where do you live and why?
In the dampest, gentlest, greenest valley in Wales. I came here because I had friends here and because I couldn't afford to live anywhere else, and while that is still the case it's also now true I do not want to leave. After a long time living in class-riddled England, the sense of classlessness in Wales is a massive liberation.

Can you describe a typical day?
The sun rises eastish and sets westish, and in between the songlines of all the world ring with life, with swampy, basking, effervescent, kind, wild life.

What is your favourite meal and made by whom?
A vegetarian lasagne cooked by me for a small number of close friends, with a couple of extra places laid for chance and strangers.

You've spent many years travelling the wildernesses of the world – what is the most important lesson your travels have taught you?
To love my boots. To endure. To listen. To sing, badly and out of tune, whenever I can, even if I can only half-hear the music.

In an increasingly fast-paced, stressful and built-up world, do you have any tips on how can we get – and stay – in touch with our wild, 'force of nature' selves?
Through language, through sensuality, through instinct, through all that is vivid, all that has spirit, everything through which life lives most ferociously and most sweetly. Lorca called it *el duende*, the spirit from the earth itself that charges art with power, and I believe that the indigenous human being within us all can feel that.

Where are you most happy? In your view, what is the key to happiness?
Reading John Clare, sitting on an unnamed stone by a stream almost too small for any map. If I knew a key to happiness I would call it the Zapatismo of the human heart, which stays tender to an intuition of plurality, as both an aesthetic and a rebellion. That said, I'm not sure that being happy is something I'm particularly good at.

What one book or film would you recommend all politicians should read?
[Proust's] *À la Recherche du Temps Perdu*, in the Russian translation by Lyubimov (unfinished), with instructions to complete the text for themselves. This would keep many of them out of mischief until they are out of office. For the minority properly equipped with a moral compass then Eduardo Galeano's *The Open Veins of Latin America* or *Our Word is Our Weapon* by Subcomandante Marcos.

What makes you angry?
Lies, bullying and the abuse of power. It's just a wee bit awkward how often they, like buses, come in threes.

What book or project have you got lined up next?
A truanting novel inspired by the life of Frida Kahlo and a book about childhood.

What environmental or social movements/campaigns do you most actively support?
In the widest sense, I try to oppose what I call the 'intellectual apartheid' by which the dominant culture degrades, denies and destroys the culture of indigenous peoples.

In Australia, there is a carving that is probably the oldest artistic representation, anywhere in the world, of the human face. That alone gives pause for thought. It is part of the world's oldest and largest rock art collection, but the site, on the Burrup peninsula, is threatened by a Liquefied Natural Gas (LNG) plant, and virtually no-one gives a toss because it is part of Aboriginal art, spirituality and epistemology. If Stonehenge were to be bulldozed or there was a plan to turn the Pyramids into an industrial complex, there would be an outcry in the press, but an equivalent crime takes place against a site of indigenous spiritual, historic and artistic importance and there is an eerie quiet.

I actively support the West Papuan people in seeking their independence and an end to the genocidal policies of Indonesia. Sadly, the British government seems to feel not wanting to be murdered is just silly fussiness on the part of the Papuans, who clearly need to realise that their extermination is necessary for the greater good of the international corporations sucking out the resources of their lands.

www.jaygriffiths.com

Jay Griffiths is the author of *Wild: An Elemental Journey*, *Pip Pip: A Sideways Look at Time* and *Anarchipelago*, a short story about the Newbury road protests

PHOTOGRAPH: ADRIAN ARBIB

CANCER AND HOW TO AVOID IT

We all carry cancer cells, so cancer lies dormant in everyone. A quarter of us will die of the disease; the other three-quarters will be protected by natural defences. So how can we stimulate these natural defences, both for the treatment and prevention of cancer? **Laura Sevier** meets Dr David Servan-Schreiber, author of the bestselling book *Anticancer: A new way of life*, to find out

How did you come to write the book?
Fifteen years ago I was diagnosed with a brain tumour. I thought I had beaten the cancer until eight years ago, when I had a relapse. After two successful operations and 13 bouts of chemotherapy, I asked my doctor what I could do to prevent another relapse. I was astounded to be told, 'Nothing – we'll just watch you closely'. I felt pretty helpless. As a scientist myself – I'm a clinical professor of psychiatry at the University of Pittsburgh School of Medicine in the US – I began to trawl through scientific reports. I discovered there is lots you can do. My book is an accumulation of many proven studies that pinpoint the foods and lifestyle changes that help combat cancer.

What causes cancer?
It's very simple: cancer is just the expression of an imbalance between all of the factors that feed cancer cells. We all have cancer cells. So you get cancer when there are more factors that promote cancer growth than factors that inhibit cancer growth. It's that simple. In the past 50 or 60 years we've been piling up the number of factors that promote cancer growth – such as cigarettes, sugar, trans fats and chemicals in our environment – and have been damaging the natural defences that we have to inhibit cancer growth. For instance, our grandparents used to walk to school. Do you know any kids now who walk more than five minutes to go to school? A few, but they're very rare. Physical activity boosts all of the defence mechanisms against cancer. We've weakened that.

Would you describe it as a tipping point?
That's right: it's a tipping-point theory of cancer, and everybody believes that – it's not just me. Any single thing, by itself, doesn't do it, but when you start accumulating risk factors you get cancer.

How do cancer cells behave?
Cancer cells do not behave like normal cells. They refuse to die after a certain number of divisions and they poison the tissues around them with chemical substances, creating

ILLUSTRATION: GETTY IMAGES

THE 'ANTICANCER' LIFESTYLE

INFLAMMATION AGGRAVATORS (WHICH CAN LEAD TO CANCER)	INFLAMMATION REDUCERS
■ Traditional western diet	■ Mediterranean, Indian and Asian cuisine
■ White bread and pasta	■ Wholewheat bread and pasta
■ Sugar	■ Natural sugar extracts (e.g. agave nectar)
■ Red meat, raised industrially	■ Organic meat from animals fed on grass or with flaxmeal (eaten at most three times a week)
■ Oils rich in omega-6 fatty acids (corn, sunflower, safflower, soy)	■ Olive oil, flaxseed oil
■ Dairy products from industrially reared livestock	■ Dairy products mainly from animals fed on grass
■ Eggs from industrial farming (hens fed corn and soy beans)	■ Laughter, lightheartedness, serenity, support from family and friends
■ Unmanaged stress, anger and depression; social isolation	■ A 50-minute walk three times a week, or a 30-minute walk six times a week
■ Less than 20 minutes of physical activity a day	■ Clean environment
■ Cigarette smoke, atmospheric pollution, domestic pollutants	

AVOID AS MUCH AS POSSIBLE	REPLACE WITH...
■ Deodorants and antiperspirants containing aluminium	■ Natural deodorants that do not contain aluminium
■ Cosmetics, skin and haircare products containing oestrogens, parabens or pthalates	■ Natural and organic products
■ Perfumes containing pthalates (nearly all of them do)	■ No perfume; a natural alternative
■ Heating foods or liquids in plastic containers made with PVCs, polystyrene or Styrofoam	■ Glass or ceramics
■ Scratched Teflon pans	■ Non-Teflon pans, stainless steel
■ Common cleaning products containing alkyphenols	■ Green or 'eco' products – or white vinegar (for counters and floors), baking soda or white soap

inflammation, which they need to sustain their growth.

The pharmaceutical industry is looking for drugs that will inhibit the chemicals secreted by cancer cells that cause inflammation, but there are a number of natural ways in which we are able to boost our immunity and reduce inflammation to keep those cancer cells in check. This is not meant to replace conventional medicine, but there are promoters and anti-promoters of cancer growth. It's a balance game. [See 'The anticancer lifestyle' box above.]

What does an anticancer plate of food look like?

The opposite of a regular western plate of food, which typically has a large slice of meat in the middle with a few vegetables on the side. The anticancer diet is principally composed of vegetables and legumes, accompanied by olive oil – or canola or flaxseed oil – or organic butter, garlic, herbs ands spices. Meat and eggs are optional; they don't represent the main ingredient on the plate. Our ratio of meat to vegetables must change dramatically. [See 'Anti-cancer foods' box overleaf.]

I was in a fancy French restaurant in Paris three or so months ago. I looked at the children's menu and it was scary. It was hamburger, French fries and ketchup with a vanilla ice cream for dessert. You cannot make a more pro-cancer menu than that.

Are we winning the 'war on cancer'?

It's clear the war on cancer has been a complete failure. Ninety-seven per cent of cancer research funds are invested in developing new treatments and early detection of cancer. Three per cent are invested in prevention. If you ask any practising oncologist they'll tell you they're completely overwhelmed. They have so many patients they don't know what to do. Oncologists are very well-meaning people – they want more money to do their job better; to have better drugs and detection – but it's all about treatment. We do nothing to stop the cause.

Cancer has been increasing in the West since 1940. Three major factors have

Anti-cancer foods

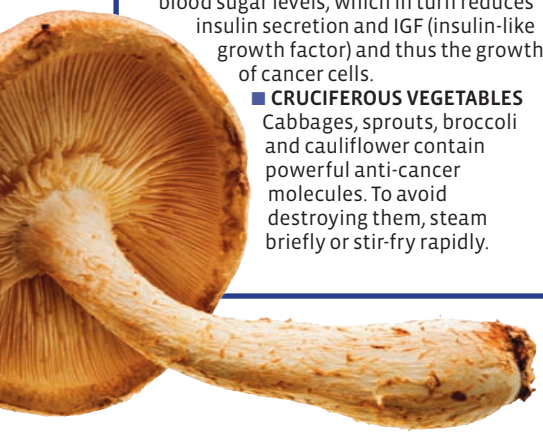
■ **GREEN TEA** Rich in polyphenols that reduce the growth of the new blood vessels needed for tumour growth, green tea is also a powerful antioxidant and detoxifier (it activates mechanisms in the liver that eliminate toxins from the body) and it facilitates the death of cancer cells by apoptosis (cell death). Steep for at least five to eight minutes – ideally 10 minutes.

■ **TURMERIC** The most powerful natural anti-inflammatory identified today. It helps stimulate apoptosis in cancer cells, enhances the effectiveness of chemotherapy and reduces tumour growth. To be assimilated by the body, mix it with black pepper and dissolve in oil.

■ **GINGER ROOT** A powerful anti-inflammatory and antioxidant, it acts against certain cancer cells. Grate into a stir fry or for an infusion, cut into slices and steep in boiling water for 10 to 15 minutes.

■ **VEGETABLES AND FRUITS RICH IN CARTENOIDS** Carrots, yams, squash, sweet potatoes, pumpkin, tomatoes, apricots, beetroot and all the brightly coloured fruits and vegetables contain vitamin A and lycopene, which have the proven capacity to inhibit the growth of several particularly aggressive cancers.

■ **GARLIC, ONIONS, LEEKS, SHALLOTS AND CHIVES** These all promote apoptosis in colon, breast, lung and prostate cancer, as well in leukaemia. They help to regulate blood sugar levels, which in turn reduces insulin secretion and IGF (insulin-like growth factor) and thus the growth of cancer cells.

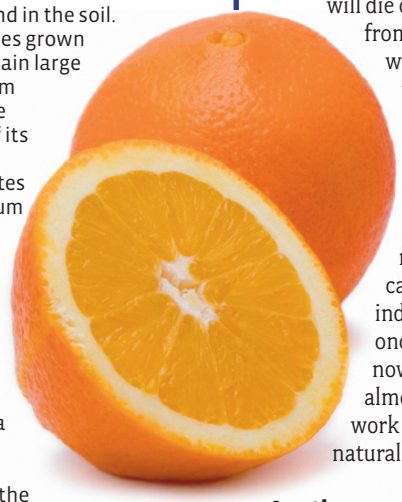


■ **CRUCIFEROUS VEGETABLES** Cabbages, sprouts, broccoli and cauliflower contain powerful anti-cancer molecules. To avoid destroying them, steam briefly or stir-fry rapidly.

■ **MUSHROOMS** Shiitake, maitake, enoki, crimini, portobello and oyster mushrooms stimulate the reproduction and activity of immune cells. They are often used in Japan as a complement to chemotherapy to support the immune system.

■ **HERBS AND SPICES** Rosemary, thyme, oregano, basil and mint are rich in essential oils of the terpene family, which reduce the spread of cancer cells by blocking the enzymes they need to invade neighbouring tissues.

■ **FOODS RICH IN SELENIUM** Selenium is an oligoelement found in the soil. Cereals and vegetables grown organically also contain large quantities of selenium (intensive agriculture depletes farmland of its selenium content). A mineral that stimulates immune cells, selenium is also found in fish, shellfish, giblets and offal.



■ **BERRIES** Strawberries, raspberries, blueberries, blackberries and cranberries contain a large number of polyphenols. These chemicals stimulate the mechanisms that lead to the elimination of carcinogenic substances from the body.

■ **CITRUS FRUITS** Oranges, tangerines, lemons and grapefruit contain anti-inflammatory flavonoids. They also stimulate the detoxification of carcinogens in the liver.

■ **DARK CHOCOLATE (MORE THAN 70 PER CENT COCOA)** Contains a number of antioxidants and many polyphenols (a square contains almost as many as a cup of green tea properly steeped). These molecules slow the growth of cancer cells.

drastically disrupted our environment over the same period: the addition of large quantities of highly refined sugar to our diet (cancer feeds on sugar, insulin-production triggers inflammation); changes in farming methods, and exposure to a large number of chemical products that didn't exist before the second world war. There is every reason to believe that these three phenomena play a major role in the spread of cancer.

If you stop what creates the cancer epidemic and make the changes necessary you'd get the benefits in 30 to 40 years. None of those politicians who were making those decisions (which would be costly, unpopular and pushed against by every single lobby) would be up for re-election then. And that's the main reason why we're going to be dealing with the cancer epidemic for a very long time.

As an attitude, do you think it's helpful to think of it as a 'war on cancer'?

No. I think the key is not about fighting, it's about learning to feed life. What I try to convey in the book is that it's all about bringing your consciousness to feed life in you. And if you feed life in you with what you eat (and don't eat), with how you treat your body, with experiencing life through meditation, pauses in your existence, through your relationships, then the body takes care of itself and it will help fight cancer. You don't have to have a fighting mentality. You have to have a caring mentality.

All of conventional medicine is organised around this idea of fighting the tumour. I'm not against that – I had a tumour and I was very happy there was a surgeon there to take it out, and I took chemotherapy to kill the cancer cells – it's just that it's only one aspect. It's incomplete and it's not enough.

Do you think the rate is set to increase?

At present one in three in the UK or US will die of cancer. The level of death from cancer has levelled because we have better treatments, but the number of cases of cancer has gone up. So we have more and more people crippled by cancer who don't die right away from the disease.

Cancer drugs are now the number one profit-making drug category in the pharmaceutical industry. If you're training to be an oncologist, most of the training is now based on drugs. They learn almost nothing about how you can work with the terrain – the body's natural defences that fight disease.

Are there many other doctors who are starting to think in the same way as you?

More and more. It's just so obvious. Everybody else knows that your food, exercise and mental outlook is going to make a difference in terms of your resistance to disease. You have to go through 10 years of training in medical school to have this wiped out of your brain!

How has the medical establishment reacted to your book?

Mostly it's been very favourable, partly because I was fortunate in that the World Research Fund for Cancer published a huge report in September 2007, with very similar conclusions to mine. It said that cancer is not genetic – which is what I say. There are some cases where it's a genetic cause of cancer, but they're rare; for breast cancer it's five per cent at most, so 95 per cent of them are not genetic. Why do we spend so much time worrying about the genes? I don't know.

In addition, in June 2008 the findings of a US pilot study was published in *Proceedings of the National Academy of Sciences* showing something we all knew in my field – that your lifestyle affects which genes are expressed or not expressed.

So for the most part, physicians are becoming more and more aware that this is important. All of their patients are asking,

'What should I eat? What should I do?'

They know they don't have the answers as it wasn't part of their medical training, so they're quite happy that somebody took the time to correct all the scientific information on what it is reasonable to do. I'm not against conventional medicine, so this is a book that they can comfortably give to their patients who want help to prevent cancer or to help themselves.

Would you say there is such a thing as a cancer personality?

This is always controversial issue. I think there is. Why? Because of the role stress plays in cancer. We know the mechanisms through which stress can promote growth of an existing tumour, but it's more the response to stress than the stress itself.

There is no question in my mind that responses of helplessness, powerlessness and abandonment are associated with higher levels of cortisol and higher levels of adrenalin, which impede the immune system and which feed inflammation in the body (key factors in the promotion of cancer). So helplessness feeds cancer – not stress.

Another important factor that boosts our natural defences is social support from family and friends. We know that this is the main buffer against the negative biological effects of stress.

When you were diagnosed with cancer, did that put you in a helpless position?

Yes, absolutely. And this is why I wrote this book: to help people move out of helplessness. It gives them hope and it gives them something to do to regain their power. There are things that they can do. I think it's essential to give people this kind of information.

Do people who try this diet and lifestyle report feeling healthier?

Of course – there is no question that this kind of diet and lifestyle is good for you overall. It helps with heart disease; it helps reduce arthritis; it helps prevent Alzheimer's, so there's no question about that. In my own case, I feel a lot healthier than when I had cancer – and I was 16 years younger when I was diagnosed with the disease.

Anticancer: A New Way of Life **by David Servan-Schreiber (Penguin, £14.99)**

Laura Sevier is the *Ecologist*'s Daily Life Editor

Environmental links

■ **INTENSIVE FARMING** When cows eat grass, their meat and dairy products are perfectly balanced in omega-3 fatty acids (which help to reduce inflammation and cancer-cell growth) and omega-6s. Since the 1950s, however, pastures have been replaced by battery farming: corn, soy and wheat have become the animals' principal diet. These food sources are rich in omega-6 fats and contain practically no omega-3s. Omega-6 fats and hormones given to stimulate milk-production can trigger the growth of fatty cells and inflammation.

The switch from grass to corn-soy combinations has also eliminated another anti-cancer benefit from dairy: conjugated linoleic acid (CLA), found primarily in cheese that comes from grass-fed animals, helps fight the growth of cancer cells.

■ **TOXINS IN THE ENVIRONMENT** In the past 30 years the World Health Organization's International Agency for Research on Cancer has tested 900 chemicals in the environment and found only one to be categorically non-carcinogenic; 95 have been identified as 'known carcinogens', 307 are 'possible' and 497 remain 'unclassified'. Many of these substances – such as benzene, which is found in petrol, certain plastics, glues, lubricants, dyes and detergents – continue to be widely used.

How to... raise a green baby on a budget

Limited funds and a concern for the environment don't have to be incompatible when it comes to raising a child. Anna Shepard has some helpful advice on keeping down costs while you're bringing up baby

Much as I would love to claim that my attempts to raise a green baby were born 100 per cent of a concern for climate change, I have to admit that they stemmed as much from the state of my bank balance. Like everyone else, I've been feeling the pinch. It struck me that eco-conscious parenting would not only be healthier for the planet and our child, but also would surely be cheaper.

For all that has been said about our gloomy economic climate getting in the way of environmental action – with a decline in organic sales cited, along with questions about whether our household recycling is still in demand – I believe the opposite. Current financial conditions make the perfect reason to embrace a planet-friendly lifestyle. At the heart of being green is using fewer resources and living more lightly on the planet. It is just such an approach that will save you money. If ever there was a time to join a car club, holiday in the UK, plant a row of lettuces and turn leftovers into dinner, it is now. The same goes for having a baby. Some may smirk at the concept of a green baby – given the extra set of footprints you are contributing to the world – but there is much you can do to ensure that you and your child tread lightly, while saving yourself a fortune along the way.

Stuff and nonsense

One reason why starting a family is often assumed to be about as eco-friendly as bringing home a patio heater is because you plunge into a world that requires vast quantities of stuff for remarkably short periods of time. From baby clothes to buggies and bouncers, many parents end up embarking on a marathon spending spree, only to find that their little darling grows out of everything a few months down the line. Two things to remember: first, you don't need as much as you think (whatever the baby catalogues will have you believe), and second, much of it can be found secondhand. This is when Freecycle comes into its own. I've met parents who have furnished their baby's room entirely from items picked up on the online recycling forum (to find your nearest group, visit www.freecycle.org).

Plus there are nearly new sales organised by the NCT (National Childbirth Trust) and websites such as Nappyvalley.co.uk and Gumtree.com advertising secondhand gear. It is also surprising what will wind its way to prospective parents once word gets out that they are entering baby world. Anyone who has had children knows how useful it is to receive a bag of baby clothes or toys, either on loan or to keep.

The other approach that has worked for me is remembering the art of improvising. One of my son's favourite toys is a rattle made from a

small Ribena bottle half-filled with dried chickpeas. With the lid tightly screwed on, it makes a satisfying noise when shaken and it's easy for a small baby to hold. Similarly, old t-shirts can be chopped up and turned into bibs; towels can be cut into terry towelling squares and you can even experiment with an item we named a 'puke poncho', made from a square of old towel with a hole cut in the middle for the baby's head. For anyone who ends up with a sickie baby (you have my sympathies) it's a must-have accessory.

Another unlikely eco saviour comes in the form of the internet. Going online – whether to bid for baby goods on eBay, to reassure yourself about something on parenting forum Mumsnet.com or to sit your baby in front of one of the Baby Einstein videos available on YouTube – saves you money, cuts down on shopping trips and travel costs, and enables parents to gather information without having to fork out for a load of childcare manuals.

It's easy to find yourself thinking that your child will have a better start in life if you've splashed out on the latest digital bedroom thermometer and enough baby toiletries to fill the bath, but if anything the opposite is true. Less is best, especially with products. A baby's skin is six time thinner than an adult's and contains lots of natural oils and moisture. Many cosmetics created for babies interfere with this and contain worrying ingredients such as parabens and phthalates. The less of them the better. Buying less also enables you to spend more on what you do choose. I prioritise suncream and nappy rash cream, preferring to spend above average on mineral-based and organic lotions such as those made by Weleda and Lavera.

There are times, however, when it seems being a green parent becomes the preserve of the wealthy. It's one thing buying the odd tube of lotion, but when it comes to baby food and clothes, the organic choice is out of many people's price league. Rather than cough up for jars of mush from the supermarket, it pays to make you own, whether or not you can afford to buy organic vegetables. You'll end up with less waste, too.

Battling the bills

Another battle I've had is keeping bills down. Not only do you find yourself at home more than usual with a small person to care for, thus inflating your energy consumption, but the sheer quantity of washing is enough to raise your electricity bill. It's not just baby clothes but milk-stained mummy clothes. Bibs help, as does an eco approach to laundry based on lower temperatures and avoiding the tumble dryer, but sometimes you have to accept that you are simply using energy that you would otherwise have consumed at your work place or elsewhere. Unfortunately, this means it is you paying for it.

The fact is, being a green parent isn't all plain sailing. I'll be the first to admit failures, including one involving a major tenet of green parenting. After several bouts of nappy rash, I gave up using washable nappies on my son and resorted to the disposable option. To ease my guilt, I buy Moltex Eco nappies, made from sustainable, eco-friendly materials. I'm consistently shocked at the impact this has had on my landfill waste. I'm also short of time to tend my vegetable patch and I've horribly neglected my wormery – but I don't believe in being too hard on myself. It's tough enough coping with the sleepless nights and the added responsibility of being a parent without beating yourself up if a few eco habits are compromised. My hope is that things will settle down. Give it a few years and I should have more time, and will have perfected my green parenting skills. Or that's what I tell myself. The best part is that I'll have a little helper to assist me in the garden or with the compost heap. The thought of which makes it all worth it.

Anna Shepard is an award-winning freelance journalist

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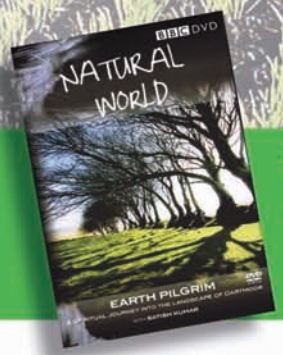

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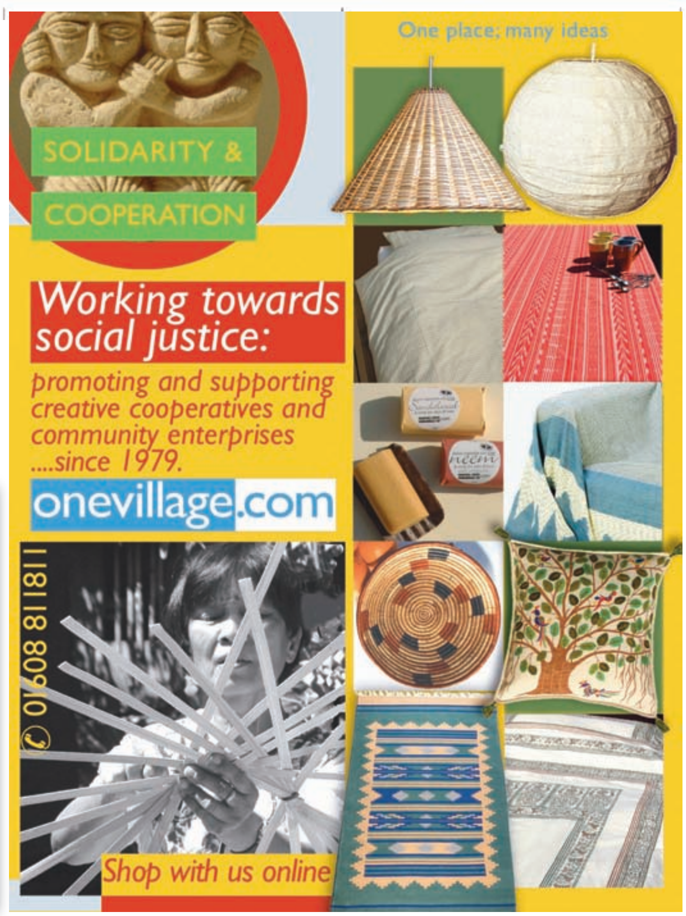

Home & Business Services

Looking to green your company by changing suppliers or to use more ethical services in everyday life? From alternative office supplies, and ethical finance to transportation to meetings, this range of companies will help provide you with solutions and show you how...

Parenting

The amount of baby gear we buy – such as nappies, wipes, bottles, car seats, pushchairs, clothes, shoes, toys and other nursery items – is staggering. Given the ongoing costs of raising a child, we as consumers would do well to read and understand the labels and buy fewer but better products

Health & Beauty

The best way to ensure healthy skin is to maintain a healthy diet, get enough sleep and keep stress levels low. If you do buy products for your face or body, try to make sure they are based on natural ingredients. These companies carry products that have not been tested on animals; they contain no parabens, petrochemicals or synthetic ingredients

Clothing

The virtual boutiques and retailers featured on these pages stock a range of well-made, stylish and ethical clothes. Precise sizing charts make it easy to find the right size for you – and if something doesn't fit, or you don't like it, simply return it. Being fashionable and being ethical are no longer at odds…

Finance

Ethical finance is about taking control so your finances are not tied up in deals you wouldn't like, such as trade with oppressive regimes or coal plants, oil extraction and unsustainable logging. Ethical banks finance companies and projects that benefit people and environment so your money works for – not against – the world

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LETTERS

Paradigm shifting

Pollution benefits individual companies and governments, especially when the pollutants are air- or waterborne and can be transferred to competitive economies. Mankind is a predatory species and we treat fish, trees and oil as prey, always seeking maximum exploitation and upping our efforts to compensate for 'evasive' tactics such as depletion or protective legislation.

We require a paradigm similar to what happened when we went from a hunting-gathering existence to that of agriculture. Eliminating pollution benefits is about not rewarding predation. It forces us to become economic agriculturalists rather than hunters.

Robert Burk
by email

Your maths or mine?

As a part-time silversmith I have for many years been aware of the horrors of the extraction of precious metals, especially the much-publicised gold mining and the equally problematical but less well publicised silver mining. It was therefore with considerable interest that I read Matilda Lee's *Dilemma* ('Can silver ever be ethical?' April), and found it quite enlightening.

I have to query/dispute her statement that 'nine million miners have lost their lives in those mines over the past 450 years', however. That would be 20,000 per year, 55 per day. I'm sorry, I just don't buy that!

Phil Williams
by email

Ecologist *replies: Mining industries are historically poor at keeping transparent records of how many die (especially if they were poor, indigenous peoples) either as a direct or indirect results of working in mines. According to the 2005 film* The Devil's Miner, *about the Potosí mines, one of the world's largest sites for silver and other minerals, 'it is estimated that Cerro Rico and the other Bolivian mines have resulted in eight million deaths in the last 500 years'. This is also the view of historians and geologists. This may seem high but compare this to current rates of death in Chinese mines alone, for instance: according to a Chinese government report, a total of 2,845 accidents were reported in 2006, resulting in 4,746 deaths, or an average of 13 deaths per day.*

LETTER OF THE MONTH

Be offensive

What an interesting and useful article on allergies appeared in your April issue ('Cooking for allergy-sufferers'). I was surprised to find Matilda Lee so concerned about offending people, though. Since when were the *Ecologist*'s editors so worried about giving offence?

Please give offence to the giant pharmaceutical companies that are first polluting our planet and our children, and then spending millions marketing their chemical 'cures' for the problems they create, by recommending that your readers visit acupuncturists, reflexologists and homeopaths in their efforts to free their children from allergies.

An allergy doesn't have to be for life, and it is only a question of the child having been thrown out of balance, usually from ingesting chemicals – and these therapies work to restore the child's balance so that eventually they can eat everything that they want to.

I watched my six-year-old son recover from violent sneezing and respiratory problems induced by crop-spraying within minutes of being given a homeopathic remedy – although I wouldn't say results are always that speedy!

Zayda Kebede
Member of the Alliance of Registered Homeopaths
by email

Working with the wild

We all once lived in wilderness and learned how to 'manage' the bounty of nature, how to make tools, shelter, weapons. In our long history on this planet, it is only a short time ago that we knew how to survive in this way, and so the genetic information is still there – and the desire. The success of the likes of [TV survival expert] Ray Mears, who offers us the opportunity to reconnect to the earth, demonstrates this deep need.

Some in Scotland have kept their connection and make a living working with wild harvests: basketry, bulbs, fruit drinks, mushrooms, preserves, honey, herbs and woodcraft (see www.forestharvest.org.uk).

You may be interested to know that the Forestry Commission Scotland and Reforesting Scotland have been working towards developing a responsible (or sustainable) approach to the 'threats and opportunities' of non-timber forest products (NTFP) and other wild produce.

In Scotland there is a new policy on NTFP that tries to clarify the legalities of foraging, the differences between picking for personal use and for profit, and the various ways to balance the need for protection of biodiversity against a growing interest in 'free food'.

[Name and address supplied]
by email

Growth is the problem

I read with interest your recent *Editorial* ('If not now, when?' March).

We certainly need to conserve more and consume less, but that is difficult to achieve in the neo-liberal, consumer-orientated world we live in today. The Government's answer to the 'slowdown' in car trade, for example, was to offer in April's budget incentives to scrap your old car and buy a new one with £2,000 provided by the Government. This scheme not only encourages consumerism, but also does nothing to encourage people in the UK to use public transport. Just another example of economic concerns taking precedence over environmental ones in our capitalist society.

You say you stand for sensible growth, sustainable growth, renewable growth. We in the Green Party, however, believe that growth is the problem, not the solution. Gross Domestic Product (GDP) measures nothing

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? DAILY DILEMMAS: If your home is eco-friendly on the inside, does it matter what it looks like on the outside?
Go to www.theecologist.org to have your say. In a subsequent issue we will publish the most practical and engaging selections in the letters pages.

that can be considered progress in the world today. We believe it should be replaced by a wellbeing factor that includes other social and environmental factors, such as how much CO_2 we emit and how much renewable energy we embrace.

In short, we believe that the relentless pursuit of economic growth is the central contributory factor in causing the environmental problems we are facing today. When one pursues continuous growth on a planet that has finite resources, when one levels rainforests the size of Wales every single year, forests that are responsible for putting millions of tonnes of rain in our clouds every single day, thus self-regulating biodiversity, it becomes easy to understand how our economic system is tampering with our life-support system, and we need urgent remedial action to resolve it.

Rupert Read
Green Party candidate for Eastern Region MEP
by email

Shock and core

The nuclear industry appears to be using the same tactics as George Bush's 'shock and awe'.

Three possible sites have been put forward for nuclear newbuild in Cumbria. One is Sellafield, which is described by the industry as 'least preferred' because of the decommissioning work. The other two sites of Kirksanton and Braystones are greenfield and include areas of European wildlife importance.

So what happens? People are so shocked and awed by the prospect of new nuclear build on these greenfield sites that they say 'Sellafield is the best place for newbuild as it is already contaminated'.

We should not be deflected from the real issue by these nasty tactics. No site in Cumbria is 'suitable' for new nuclear build – not while the high-level liquid nuclear wastes already existing at Sellafield are in a critically dangerous state, so much so that the Norwegian Radiation Protection Authority has just published a report on a hypothetical accident at Sellafield. The report concludes that if only one per cent of the liquid radioactive waste stored at the plant is released to air, the radioactive fallout in western Norway could be five times higher than in the areas of Norway that were worst affected by the Chernobyl accident of 1986. In other words, if radiation damage happens in Norway, 500 miles away, then here in Cumbria we would be affected much more severely.

The Norwegian report summary states: 'It has proved difficult to find relevant information in the public domain describing possible accident scenarios reviewed by

ECOLOGIST POLL
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Q: Should the UK government press ahead with plans to build new homes on floodplains?

75% Do not believe that full employment is the hallmark of a successful society

British authorities'. Could the British authorities' lack of interest in the wellbeing of the people of Cumbria have something to do with the fact that Norway has no nuclear power stations and the UK does?

No site in Cumbria is suitable for new nuclear build. Any accident would have significant impacts on agriculture, the environment and Lakeland society for decades to come. Newbuild is insane while Cumbrians are still subjected to the ever-present prospect of evacuation from (or more likely, enforced incarceration in) their homes.

The prospect of a nuclear accident in Cumbria would increase if the nuclear industry's 'shock and awe' tactics work. Money and effort should be spent on reducing risk rather than bribing Cumbrians to acquiesce to a Nuclear Coast.

Marianne Birkby, Radiation Free Lakeland
by email

You do the physics

Sheila from North Yorkshire (*Letters*, April) might like to use the money she will save on her cancelled *Ecologist* subscription to browse through a few *Earth Science* journals. There she might find that the average annual anthropogenic emissions of carbon dioxide exceed those from volcanic sources by between 50 and 150 times. In 2007, the US Geological Survey reported that gas studies at volcanoes worldwide had helped vulcanologists tally the annual CO_2 output from this source at some 200 million tonnes, while the US Department of Energy gave a figure for anthropogenic emissions in 2003 of nearly 27 billion tonnes, a factor of 135 times greater (http://hvo.wr.usgs.gov/volcanowatch/2007/07_02_15.html). The climate blog Realclimate.org gives a more conservative estimate of 50 times greater CO_2 emissions from anthropogenic than from volcanic sources, but also points out that isotopic studies on carbon dioxide in the atmosphere clearly indicate that the extra gas is from human activities (http://www.realclimate.org/index.php/archives/2006/05/current-volcanic-activity-and-climate). Sheila's degrees should leave her in no doubt about the effect all this carbon dioxide is having on the planet's climate. After all, that's simple physics and chemistry, isn't it?

Phil Marston, Switzerland
by email

Leach to their own

After reading your *Daily Life* article ('Spotlight on...' April), I looked for other brands of reusable water bottle that are free of Bisphenol-A and phthalates.

In the article you advertised a single brand, Sigg, without giving any alternatives or explaining what materials Sigg bottles are made of. So I made an enquiry, and found that Sigg bottles may well contain Bisphenol-A (BPA).

The company never says that its bottles don't contain BPA, it says they don't leach BPA. Those are two different things.

A faithful reader
by email

Ecologist *replies: Sigg bottles are not made with a plastic liner but are instead lined with a proprietary non-toxic, water-based resin that is extremely stable. The company does not guarantee that its bottles are not made with BPA, however. What it does guarantee is that there is no leaching of BPA – something that cannot be guaranteed with other bottles, particularly those not intended for reuse but which get refilled time and time again. We understand your concern but feel confident that the Sigg bottles featured in April's* Daily Life *are extremely safe, and the results of the company's own and independent testing support this confidence. There is no reason for most of us to carry a water bottle around at all. If you are one of those who does then the Sigg bottle is probably the safest you can use.*

www.theecologist.org/ETV
Now playing Fishy Business: the high cost of cheap farmed salmon

Lunar **module**

Like the rescue of Apollo 13, resolving our own crises requires a systematic approach and a true understanding of what the 'problem' is, says **Neale Upstone**

Possible responses to 'the triple crunch' of economic crisis, peak oil and climate change have been promoted as 'a new Apollo programme' – a programme of 'green growth'; a green 'New Deal'.

If we are to draw parallels between missions to the moon and our economy, however, then perhaps we ought to move beyond rhetoric such as this. Instead, we should copy the more systematic approach of those in the Apollo programme all those years ago.

When the oft-misquoted words 'Houston, we've had a problem' were uttered by Commander James Lovell from Apollo 13, it signalled the start of a major crisis.

The response at Mission Control in Houston, Texas, was urgent, but also methodical. Numerous engineers asked serious questions about the causes, and thoroughly investigated the longer-term effects of any proposed solutions before carrying them out. During the mission this included modelling things such as the impact decisions would have on fuel and oxygen depletion. Afterwards it involved a long investigation to find out how to avoid such a problem ever happening again.

Let's consider a current crisis response, *A Green New Deal*, the report published by the New Economics Foundation and inspired by Franklin D Roosevelt's New Deal of 1933. Would this approach have brought the Apollo astronauts home?

It is true that our problems sound similar to those of the 1930s depression: we do again have high consumer debt, ill-regulated markets, cutbacks in foreign trade and growing wealth inequality. This is already creating a comparable downward spiral of reduced spending and production.

> **The response was urgent but also methodical. Numerous engineers asked serious questions about the causes**

However, to think that today's problems are the same but with climate change added in is a big mistake. We must look more deeply and systematically at the problems, just as the Apollo 13 engineers did.

In truth, the problems of the 1930s listed above were just superficial. Nobody looked beyond them. Our carbon emissions were already a problem. So too was deforestation, which had already been a problem for much longer. In fact, the only notable new problem we have today is our dependence on declining oil reserves.

Neale Upstone is an active campaigner and a member of the SFR Group (www.systemicfiscalreform.org)

Unfortunately, the 1933 New Deal only addressed the immediate problems, because it focused only on the financial system and upon employment, much influenced by the economist John Maynard Keynes.

What do we do about the rest? What about the scarcity of resources on which our present-day standard of living is built? What about the long-term problems of climate change and declining biological systems?

We can forgive Keynes for being ignorant of global warming. Less forgivable, however, is his failure to address the unsustainable use of resources such as oil and forests, and that his seemingly sole focus around poverty was an effort to create full employment and end economic depressions. He failed to provide an answer to centuries of wage-slavery, and he left sustainability to technological advancement.

I would say that Keynesian economics is both an unsustainable and an inequitable approach. It relies on the 'trickle-down effect' to alleviate poverty, which requires perpetual growth in economic activity, and must operate unconstrained by the resource limits of our finite planet. The 1930s Keynesian New Deal doesn't just require a 'green' refresh – we need an alternative.

I think one exists. Had the authors of *A Green New Deal* looked at earlier work published by the New Economics Foundation, they would have found the reforms needed in the 1990s writings of James Robertson.

Robertson built on the writings of Henry George, who, back in the 1870s, did address scarce resources, technological progress and, crucially, poverty.

In a bestselling book, unsurprisingly titled *Progress and Poverty*, George had explained the causes of the poverty trap and economic crashes, including the fall of empires and civilisations.

His solutions dealt not only with economic crashes and poverty, but also gives us the tools to deal with our energy and climate 'crunches' too. This is what James Robertson spotted, and he evolved George's approach to include our modern challenges.

Since his work in the 1990s, Robertson's proposals have been adopted by a new group, which formed to evolve and champion this approach, calling it 'Systemic Fiscal Reform' or SFR for short.

The reforms propose how government funding, tax and welfare should work for the benefit of all, both within our lifetimes and in the impact we have on future generations.

Ultimately, they would make the tax and benefit system unrecognisable compared to today's complex, loophole-ridden forest of legislation.

The key reforms are:

- No employment or business taxes – these are replaced with a land-value tax (famously blocked by the landed gentry of the House of Lords back in 1909).
- No VAT – replaced with resource taxes such as a carbon tax and taxes on deforestation.
- No benefits – replaced with Citizen's Income: a sizeable universal welfare payment paid to every adult as their share in the value created in a prosperous economy.

The most important benefit of these reforms is that they make it possible to address poverty without having 'growth' – whatever its colour – as the answer; and by addressing poverty, we are presented with the opportunity for sustainability without misery.

We can do much better than a green update of FDR's plan. Instead, let's follow the Houston example and ensure we understand what will happen before we attempt yet again to 'reboot' the economy.

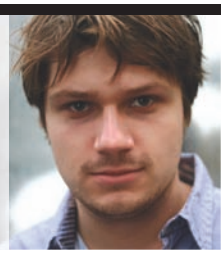
If we do, I think we can bring our astronauts home.

email: comments@theecologist.org

Let's make it a three-party system on 4 June and get some serious and effective Greens in the European Parliament

Ballot boxing

Joss Garman is an environmental campaigner and journalist



It probably isn't too much of an exaggeration to suggest that most people are hard pushed to name a politician they really admire. In Britain, however, one name will come up time and again. The leader of the Green Party, Caroline Lucas, is consistently appearing on lists of politicians people recognise, like and consider ethical. For good reason: Caroline can often seem like a lone voice marching the grey corridors of power on our behalf, wrangling with the intricacies of energy policy or trying to clamp down on the aviation industry's free-for-all.

Caroline is in fact just one of 43 Green members of the European Parliament who can take credit for pushing through some of the best environmental protections anywhere in the world. Take the recent Renewable Energy Directive – perhaps Europe's most important green law – which commits the whole of Europe to generating at least 20 per cent of its energy (heat, transport and electricity) from renewable sources by 2020. It was drafted by Luxembourg Green MEP Claude Turmes, who together with his colleagues took on huge coal and nuclear special interests and ensured they failed in their attempts to water it down every step of the way. Equally, every European check on the aviation industry has Caroline's prints all over it.

In 1989, 15 per cent of the vote in Britain went to the Green Party. Yet despite breaking the grip of the monolithic parties and overtaking the Liberal Democrats as the third-largest party at that election, not a single Green MEP was handed power because of the unfair and disproportional electoral system. It's ironic to consider that even without a proportional system, without a clear and recognisable leadership – instead six people spoke for the party and some 30 people ran the party by committee – the Greens still became the story of those elections. Jonathon Porritt described the emergence of a serious and effective green movement at the time as 'the most radical and important political and cultural force since the birth of socialism'. Yet now, when more than ever we need Green voices in Brussels, instead we find it swamped with UKIP racists and climate sceptics. With proportional representation and a more professional Green Party, there's just no excuse for letting that happen any more.

It's nothing less than a tragedy that in the eastern region, where seven European seats are up for grabs, two have been held by UKIP since 2004. This time, the smart and committed campaigner Rupert Read needs just one in 10 votes to take one of those seats for the Greens. Equally in the south-east region, seven or eight per cent of the vote would see Caroline re-elected, and every extra Green vote would put momentum behind the party's Westminster ambitions.

> **Now, when more than ever we need Green voices in Brussels, we find it swamped with UKIP racists and climate sceptics**

With huge swathes of society completely unrepresented in Westminster, it's clear mainstream politics in Britain is so broken and distorted by the current electoral system as to create a bizarre tyranny whereby electoral power is held in a handful of *Daily Mail* constituencies that dictate the terms of the debate. That's unlikely to change until the electoral system changes. But on 4 June you have the opportunity to vote for more Carolines and Claudes in Brussels, people who can reinsert our movement's principles of sustainability and fairness directly into the political conversation.

GOOD BUY WORLD

PETER RIGG

MOLLY SCOTT CATO: ECO-NOMICS

If it is not to be choked by debt and taxes, Ireland must return to the self-sufficient, localised vision of one of its founding fathers

Struggling for Éire

'What is the difference between Iceland and Ireland?' asks a Belfast-based green economist friend. Answer: one letter and about six months. The Irish economy is one of the most beleaguered in the EU, its banks having to be nationalised and its inward-investment strategy holed below the waterline.

Molly Scott Cato is a reader in green economics at the Cardiff School of Management

Economic policymakers have relied on a low tax regime to encourage investment but this has also weakened the state, undermined social provision and deepened inequality. The unravelling of this model began when 'competitors' in central Europe cut their taxes and undercut Ireland on wage-rates, in a classic example of the race to the bottom. The environmental consequences of wide-scale property development were also disastrous.

The country that made good from the EU has found its membership of the euro to be a double-edged sword. The single currency may offer Ireland some protection now, but it has caused the asset bubble and consequent bust by limiting room for economic manoeuvre and forcing Ireland to live within the confines of interest rates fit for the transition economies. The result was a spectacular inflation in asset values – especially property – and a rush of capital and people into the country.

> **The country that made good from the EU has found its membership of the euro to be a double-edged sword**

Pro-euro opportunists on this side of the water have tried to use the financial crisis as an argument for the UK to join the single currency; in fact it is the opposite: membership in a unified currency area for diverse economies can only ever lead to imbalance because of the one-size interest rates being incapable of fitting all. Green economists opposed the idea of the single currency, calling instead for the euro to become a common currency – part of a move towards a world of currency diversity.

In his 1992 book *The Growth Illusion*, Richard Douthwaite, a green economist now living in Westport, County Mayo, described the abandonment of the dream of economic independence that inspired Ireland's first president, Éamon de Valera. The lessons learned as England's first overseas colony were forgotten in the rush to leap on to the neocolonial bandwagon of the financialised global economy. The Celtic tiger is now under the boot of the corporate big-game hunter; the Irish government struggles to maintain solvency and credibility within Europe.

Contemporary green politicians share much of de Valera's vision of self-sufficiency and strengthened local economies, a vision that seems increasingly prescient as international trade collapses and we face declining oil supplies. The green vision is an open-spirited and cosmopolitan one, however, welcoming a diversity of cultures and lifestyles; green economists favour relocalisation without the cultural inwardness and conservatism that characterised the Ireland of de Valera.

As a consequence of its liberation from the political constraints of the UK, Ireland can demonstrate the advantages of a proportional representation electoral system that allows Greens into government, even if only in coalition. Although there is resistance to any variation in the 'international competitiveness' mantra that has dominated policymaking in recent years, there are some hints of a Green New Deal: €100 million to be invested in renewable energy; 4,000 jobs to be created in home insulation, and policies to support the growing of organic food including a much derided – although entirely sensible – policy of creating 'edible playgrounds'.

In spite of these few 'green shoots', the Irish economy is in a sorry state. It has lost its independence and commodified its culture in return for the fickle fool's gold of foreign capital and tourist earnings. To answer the question we began with, the real difference between Iceland and Ireland is in terms of resources. In real economic terms Ireland is wealthy: it has a creative and skilful population, land, energy and water. The citizens of Ireland – like people across the globe – are only awaiting politicians with the vision to replace their vulnerable, globalised economy with a self-reliant, localised one.

email: comments@theecologist.org

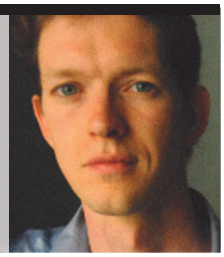
History **in a hole**

Global warming is not simply a present danger, but one that threatens also to wipe away our past. **Andrew Curry** examines the historic sites at risk from the elements

Rising sea levels are eating away at coastal sites; increased rainfall is eroding mud-brick ruins; creeping desert sands are blasting the traces of ancient civilisations, and the melting of ice is causing millennia-old organic remains to rot.

For countless communities, archaeology can be a source of local identity, pride and income. 'It may be intangible, but when a community loses its connection to history it loses something pretty important,' says University of Northern Colorado anthropologist Michael Kimball.

Archaeologists can't stop global warming, but they can make dealing with it a priority. That may mean documenting sites before they disappear; in some places, simple steps such as putting roofs over melting or rain-threatened areas are ways to preserve them. Action, however, must be taken soon. What follows is a look at some of the threats facing archaeological sites around the world.



Andrew Curry is a contributing editor to *Archaeology* magazine

> **Archaeologists can't stop global warming, but they can make dealing with it a priority**

Thawing Scythian tombs

Three thousand years ago, Scythian nomads ruled the Eurasian steppes from the edges of the Black Sea in the west to China in the east. In the Scythian burial mounds in the Altai mountains on the edge of the vast Siberian permafrost region, archaeologists have found amazingly well-preserved mummies in the tombs, often with their clothing, burial goods, horses and even stomach contents intact. 'Instead of archaeology, the material culture is so well preserved it's almost a kind of ethnography,' says Hermann Parzinger, who discovered the tomb of a mummified Scythian warrior in Mongolia in 2006.

Scientists say the Altai mountains aren't as cold as they used to be, however. The glaciers that covered the slopes of the Altai are receding and even disappearing, and for the first time since their occupants were buried 3,000 years ago, the Scythian tombs are in danger of thawing out and rotting away.

'These tombs are all in an area where the permafrost is just at an equilibrium,' says Jean Bourgeois, an archaeologist at Ghent University who works on sites in Russia and Kazakhstan. 'Just a degree or two can be enough to [destroy] frozen contents.'

Archaeologists are scrambling to figure out how to keep the grave mounds cool. Proposals range from reflecting sunlight away from the kurgans by painting them white to stabilising the underground temperature by installing 'thermo-pumps'. After seeing the region's climate change with his own eyes over the past decade, however, Bourgeois has come to realise that even in a best-case scenario, archaeologists cannot preserve all of them. 'They will have to choose,' he says.

Channel Islands erosion

The Channel Islands off the coast of California are a critical link in the study of how humans settled the Americas. Many researchers now believe that the first people came to America by boat, island-hopping from Siberia all the way down to the California coast.

Some of the best evidence for this comes from the Channel Islands. Evidence from shell middens, rock shelters and other settlement sites supports the idea that early Americans were good sailors who reached the islands more than 13,000 years ago, hunting pygmy mammoths, elephant seals and sea lions. Human bones found on Santa Rosa Island in 1959 have been radiocarbon-dated to 13,000 years ago, making them the oldest human bones found in the Americas.

Rising seas now threaten to wipe out clues to how early humans made their way into the Americas, just as researchers are beginning to look into the possibility of coastal migration. At Daisy Cave on San Miguel Island, University of Oregon archaeologist Jon Erlandson has spent a decade excavating a 65ft-wide midden that the island's prehistoric residents built up over thousands of years. Excavators have found the remains of tools, beads and even baskets.

Their work is becoming a race against time, however. Erlandson says the midden has shrunk by approximately 3ft in the past decade. 'If we've lost a metre in 10 years, how much will we lose in 50 or 100?' he asks.

continued on page 88

Scythian mummies preserved by the cold of the Altai mountain region in Siberia are now at risk as glaciers melt

The advance of the Sahara desert threatens historic sites in Sudan

continued from page 87

The desertification of Sudan

Local nomads call the ruins *Musawwarat es-Sufra*, or 'yellow pictures'. More than 2,000 years ago, the kings of the Meroites – a desert kingdom closely linked to ancient Egypt – built a temple complex 20 miles east of the Nile valley, in what is today Sudan. 'It was probably the most important pilgrimage site of the Meroitic kingdom,' says Claudia Naeser, an archaeologist at Berlin's Humboldt University, who is excavating its reservoirs and temples.

Musawwarat's centerpiece was the 50ft-long Temple of the Lion God, carved inside and out with reliefs dedicated to the Meroitic god of fertility, Apedemak. The lion god's temple was once in the middle of a grassland, but warming temperatures and overuse have killed off the area's vegetation, and the Sahara's sands are creeping ever closer.

Musawwarat is far from alone. The scale of the problem is overwhelming, and solutions – from hardening stone with special chemicals to erecting protective walls or planting trees as windbreaks – either prohibitively expensive or impossible because of a lack of water. There may soon be no more 'yellow pictures' to see.

Retreating Swiss glaciers

In the summer of 2004, University of Bern archaeologist Albert Hafner led an expedition high into the Swiss Alps to investigate hiker Ursula Leuenberger's discovery of a 4,000-year-old leather quiver the previous summer. At the site, near the Schnidejoch glacier, they found a 5ft-thick ice patch, 260ft long and 100ft wide. In just one sunny week, the edges of the ice patch shrank 20ft. Over the course of two summers, archaeologists found in it everything from prehistoric leather pants and shoes to nails from Roman sandals.

The finds revealed that people have climbed high in the Alps for millennia, despite the harsh conditions. 'This was just the quickest way from one valley to another,' says Hafner.

His work also showed that 1,000-year gaps in the ages of the artefacts corresponded with cold periods when glacial ice would have blocked the pass. The fact that fragile organic materials have been preserved near Schnidejoch for more than 5,000 years means that the ice cover in that area hasn't been this small since the Stone Age.

For archaeologists, the melting ice is both a crisis and an opportunity: the artefacts at Schnidejoch never would have been found without climate change, but as alpine ice fields thaw and vanish, countless more artefacts may rot away and disappear forever.

> **The lion god's temple was once in the middle of grassland, but the Sahara's sands are creeping closer**

Rainstorms in Peru

In Peru, the difference between a normal and a bad El Niño year can be tremendous. The country's deserts typically get slightly more than an inch of rain per year. In 1998, the last severe El Niño season, the region was doused with 120 inches, which caused serious flooding. Water takes a heavy toll on exposed archaeological sites, many of which are located along rivers or on easily eroded slopes.

Take Chan Chan, an elaborately planned city eight miles square that dates back 1,000 years. Made of unfired mud brick, Chan Chan's pyramids and palaces were put on UNESCO's list of World Heritage Sites in Danger in 1986 because they were threatened by erosion. Over the past two decades, the site has deteriorated steadily.

Greenland's melting sea ice

In a normal summer, Greenland's northern and eastern coasts should be ringed by an ice belt 30 to 40 miles wide. The drifting ice acts like a shock absorber, dampening the strength of the North Atlantic, but in the past five years, the sea ice has all but disappeared. Without its floating frozen shield, Greenland's coast is being pummelled by storm surges originating hundreds of miles away.

The effect on the island's heritage has been catastrophic. Hardest hit have been sites associated with the Thule culture, people closely related to the Inuit of northern Canada who migrated to Greenland some 2,000 years ago. Thule houses – made of stone and turf with whale-bone rafters – are disappearing quickly, along with buried tools and artefacts.

'A metre per season will be tumbled down to the beach and washed away,' says Danish archaeologist Bjarne Grønnow. 'It is not a slow process.'

Older sites along the coast are also in danger. Archaeologists fear the frozen turf that covers Qeqertasussuk, a 4,500-year-old settlement where evidence for the earliest settlement of Greenland was found, may be melting. Grønnow is heading there this summer, and he is not optimistic.

'I've been working in Greenland for 30 years now,' he says. 'I can see with my own eyes how it has changed.'

This piece appears in its entirety in the March/April issue of *Archaeologist*, and is available online at www.archaeology.org/0903/etc/climate_change.html

email: comments@theecologist.org

Hungry microbial organisms that eat coal and excrete clean-burning methane gas – fool's gold or philosopher's stone? Take a guess…

Microbe mining

Attention climate activists – here comes the next 'clean coal' scam: hungry, methane-belching microbes are being unleashed to clean up the image of the world's dirtiest industry.

Jim Thomas is a research programme manager and writer with ETC Group (www.etcgroup.org)

In April, genome mogul J Craig Venter wowed a room full of investors in San Diego, California, with a black-and-white image of coal covered in some kind of moss. Only it wasn't moss. According to Venter, those fuzzy edges harboured microbial organisms that eat coal and turn it into methane gas. Coal, of course, is one of the world's dirtiest climate-changing fuels, and still embarrassingly plentiful. Methane, found in natural gas, has the reputation of being relatively 'clean-burning'. Turning the ugly duckling of coal into the white swan of methane is an energy alchemist's wet dream. 'We and BP think we can scale this up substantially,' boasted Venter in San Diego. 'We're not too far away from making an announcement to scale this up.'

Yes, that's global energy giant BP, which holds an undisclosed stake in Venter's private company, Synthetic Genomics Inc. Neither BP nor Venter is shy when it comes to grand visions and inflated claims. If you believe his publicist (who also happens to be his wife), Venter has so far singlehandedly decoded the human genome, revolutionised the field of genomics, (almost) built the world's first artificial life form, more than doubled the number of species known to humankind and intends to put the petroleum industry out of business within a decade. Expect fawning headlines when Venter and BP announce they have also achieved the holy grail of 'clean coal' with their mossy-looking microbes.

They won't be the only ones building the hype. There are now a handful of startups also on the scent of magical methane-making microbes. While oil and gas companies have been tapping existing methane deposits in coal seams for some time now (known as coal-bed methane) it has only recently become apparent that some of these natural methane pockets result from the activity of a class of bugs known as methanogens, which naturally metabolise hydrocarbons such as coal, oil and shale. The theory goes that if you can isolate and breed the very best methanogens and then inject them into coal seams and abandoned mines, you should get a stream of profitable gas back in return. It's a sort of probiotic therapy– using 'good bacteria' to inoculate coal against bad PR.

And it's not just coal that will get the methane makeover. Calgary-based Profero Energy is about to start pumping methanogens and a few key nutrients into Canada's infamous Athabasca oil sands, hoping also to transform heavy, polluting bitumen into an abundant source of 'clean' natural gas. Whether in the tar sands or coal country, the ultimate target for deploying this new approach is likely to be in reviving old workings to eke out extra revenue, rather than replacing existing and planned coal and oil extraction. Doing so will bring new environmental disruption associated with methane recovery, such as contamination of groundwater and the risk of methane escape through natural fissures (raw methane is a much more serious greenhouse gas than CO_2). While the current generation of microbes under consideration are naturally sourced, at least one company, Luca Technologies of Colorado, is also looking at genetically engineering its microbes to further convert coal into hydrogen. Nor is microbial mining likely to bring much in the way of local economic benefits. It used to be that coal miners were communities of real people with jobs and pay cheques; in this new model they are colonies of archaebacteria that ask no salary or overtime.

> **Turning the ugly duckling of coal into the white swan of methane is an energy alchemist's wet dream**

The realities of mining-by-microbe are likely a long way off, but the experimental nature of the technique won't be so evident when the headlines come around. Just as policymakers already treat unrealised carbon capture and storage schemes as if they were an existing technology in order to justify building coal-fired power stations, so the coal industry will tout its unproven methane microbes as proof that the dirty black stuff is now, once again, definitively clean and green. Now that's magic.

Commons cause

Henry VIII's land-grab robbed ordinary people of their commons – now a new campaign offers us the chance to take back what we're owed

It's all about land. Over the past 500 years the revolutionary mission of the people has been to grab the land back again. If we have access to land then we have a space to grow food, a space to play in, a space to camp in. Land gives us a connection to nature, to soil, to the earth. It can heal us. It is freedom.

In the medieval land system, nearly everyone had access to land of some sort, whether it was common land or owned land or rented land. A measure of self-sufficiency was thus available to the meanest peasant.

The world changed in 1535 when Henry VIII sacked the monasteries, the old church was 'reformed' and the new Protestant sect started to take over. This process was accompanied by a series of Acts of Enclosure, whereby previously common land was enclosed for the exclusive use of landowners. This is why so many so-called 'commons' today have a fence around them. Really, they should be genuine commons – that is to say, the locals should have the right to gather firewood from them and graze their animals on them.

In the 1930s, we had the idea of 'Distributism' being promoted by Catholic intellectuals such as GK Chesterton and Hilaire Belloc. This was an excellent social philosophy that sought to share land more equally, and also encouraged a co-operative rather than a competitive system of trade and banking. Chesterton's catchphrase was 'three acres and a cow'.

In the UK today, while some of the ideas of Distributism made their way into anti-trust laws, land is less widely shared than ever. According to the UK Land Directory, 70 per cent of the UK's 60 million acres is owned by one per cent of the population – 6,000 individuals and companies. We need to grab the land back from these guys. But how?

One answer of course is allotments. The whole point of the allotment is that your family is provided with a little patch of ground that should be sufficient to grow your own vegetables. And they are always things of beauty. Like a snowflake, every one is different, and every one reflects the personality of its owner. As I gaze out of train windows in England, Belgium and Holland, I see beautiful allotments and patches of land. I see shambolic homemade sheds, neat rows of beanpoles and raked earth, freshly sown. I see little patches of freedom, created for themselves by the people.

Allotments are in short supply though. That is why I have conceived of a campaign called Land For All. We all need to explore new ways of getting access to a piece of land – for fun, freedom, fuel and growing things.

In this scheme, we would not be looking for land to live on. This idea is to help those living in cities who would like to be able to escape to their own allotment or playground or campsite for breaks, holidays, parties and feast days. Instead of flying abroad, you would spend the week on your plot, tending the garden and doing exactly what you want. You will not be allowed to build on these plots, but you will be allowed to camp on them or put a caravan on them. This way, those of us bound to cities and jobs will be able to access our own free world, where we can plant a useful and beautiful garden, have barbecues, take the kids for weekend retreats or go alone for some peace.

I called Simon Fairlie, who is one of the people behind the Tinker's Bubble community in Somerset, and who now sells scythes and runs *The Land* magazine, one of my favourite reads of all time, to ask his advice.

'The best thing would be to get together with a bunch of others and buy a few acres,' he said. 'This way you can get the land cheaper than when buying a smaller plot.'

> **Seventy per cent of the UK's 60 million acres is owned by one per cent of the population – 6,000 individuals and companies. We need to grab the land back from these guys**

Land bought this way can cost £3,000 or so an acre, whereas it can be as much as £20,000 or more per acre for small plots.

'There is also renting,' Simon advised. 'It is worth approaching philanthropic aristocrats or even councils. Many councils have bits of land covered in greenhouses, where they used to grow all the municipal plants for roundabouts and so on. Now these plants are bought in from the Netherlands, so you may be lucky and be able to find some cheap land to rent which already has greenhouses on it.'

You can find more information on Simon Fairlie's *The Land* magazine at www.tlio.org.uk. And for information about the new campaign, go to www.landforall.org, where we will hope to provide links and information for those interested in buying non-residential land in groups.

ILLUSTRATION: DAVID HUMPHRIES

Tom Hodgkinson is the editor of *The Idler* and author of *How to be Free* (Hamish Hamilton, £14.99)

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