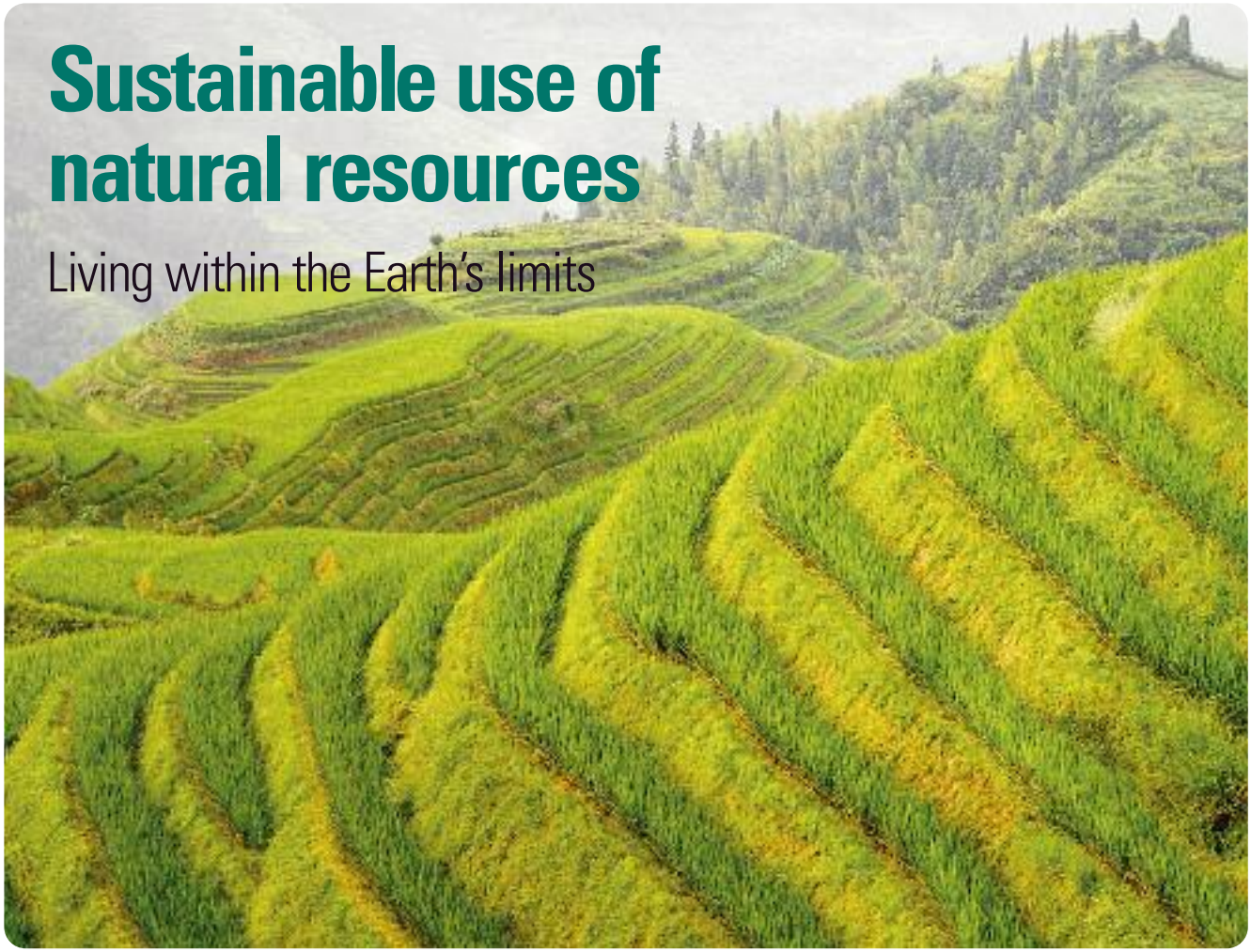
Sustainable use of natural resources

Living within the Earth's limits



Steve Allen Travel Photography / Alamy

Major review of aggregate resource management in England

Aggregate resources in England are unevenly distributed: highest levels of demand are in London and the south east, but resources are most abundant in the north and west.

In 2007, the British Geological Survey led a team of consultants with expertise in land-use planning, economic modelling and extraction engineering to investigate the environmental, social and economic impacts of the system used to manage aggregate supply in England. The team will also examine the likely effects of a range of regulatory and supply alternatives.

This research will influence sustainable management practices of major construction projects such as the 2012 Olympic Park, Crossrail and Thames Gateway. It will also influence the UK's approach to sourcing raw materials for climate-change adaptation and mitigation, for example coastal flood defences.

Chris Gomersall/Nature Picture Library

Material with massive thermal expansion discovered

Researchers on NERC's *e*Science programme have discovered a material with an unprecedented thermal expansion. The team, led by Andrew Goodwin from the University of Cambridge, looked at how the crystal silver hexacyanocobaltate behaved across a range of temperatures. They found that when heated, the crystals expanded massively in two directions, and shrank by an equally large amount in the other.

The new compound could be used to stabilise sensitive devices facing extreme temperatures, for example optical space telescopes, which regularly face severe temperature changes.

■ Colossal positive and negative thermal expansion in the framework material Ag3[Co(CN)6]. *Science*, 2008.

Geologists help 2012 Olympics

Contractors for the 2012 Olympics will use a detailed 3D geological model of the Olympic Park Development Zone, produced by the British Geological Survey, to guide the building project. The model can help locate ground conditions that may be difficult to build on by assessing the thickness, geometry and distribution of individual geological units. It can also identify potential threats to groundwater quality caused by construction.

Andrew Parsons/PA Wire

Aerial view of construction work on the main stadium for the 2012 London Olympics.

Adaptation of barley to climate

The genetic mutation that enables cultivated barley to grow successfully in the cold, wet climate of northern Europe originated in wild barley in Iran 9000–6000 years ago, say researchers. The mutated gene controls flowering time.

'Flowering later in the year is an important adaptation to the northern European climate as it enables a longer period of growth before setting seed,' explained Huw Jones from the National Institute of Agricultural Botany (NIAB).

With the University of Manchester, the NIAB team has shown that the flowering time mutation is common in northern Europe but rare in the south.

Terry Brown from Manchester said, 'We think this development was important for prehistoric agriculture.'

■ Population-based re-sequencing reveals that the flowering time adaptation of cultivated barley originated east of the Fertile Crescent. *Molecular Biology and Evolution*, in press.

Spring and neap upwelling

For the first time, researchers at the Proudman Oceanographic Laboratory and the universities of Bangor and Southampton have measured the rise of nutrients from the depths of the ocean at the edge of the continental shelf during spring and neap tides.

This nutrient supply to the surface water at the shelf edge fuels very localised growth of phytoplankton, small marine plants at the base of the ocean's food chain. This draws large fish populations to these areas.

The implication is that researchers can link the physics of turbulence and mixing at the shelf edge with phytoplankton growth. This could provide useful information to commercial fishermen and regulators.

■ Spring-neap modulation of internal tide mixing and vertical nitrate fluxes at a shelf edge in summer. *Limnology & Oceanography*, 2007.

Clear to brown: upland waters return to natural state

Falling levels of acid rain, not climate change, are causing upland waters to turn brown, say researchers from University College London (UCL), the Centre for Ecology & Hydrology (CEH), the Environmental Protection Agency in the United States, and international colleagues.

The work was part of a major international assessment of dissolved organic carbon concentrations in 522 remote lakes and streams across Northern Europe and North America. Dissolved organic carbon has increased over the last two decades – an early indication that climate change may be affecting upland ecosystems such as peatlands, some research has suggested.

But the new study reveals that policies put in place in the 1970s to reduce acid rain, which have led to reduced acidity of soils, may be more important. The reduction in acidity means that organic matter from plant and animal remains becomes more soluble and so more of it washes into rivers.

Chris Evans from CEH said, 'If correct, this explanation requires a complete reassessment of rising dissolved organic carbon levels because it suggests that surface waters across formerly polluted areas of Europe and North America are returning to a more natural condition.'

Future upland management and water treatment infrastructure may need to change to take account of this.

■ Dissolved organic carbon trends resulting from changes in atmospheric deposition chemistry. *Nature*, 2007.