ECOLOGIST
SETTING THE ENVIRONMENTAL AGENDA SINCE 1970
www.theecologist.org
Number 07 | January 2010

CONTENTS

Copenhagen blame game

And so, after the crushing disappointment of the Copenhagen climate talks, comes the mud-slinging.

UK environment secretary Ed Miliband's opinion piece for the Guardian newspaper the day after the conference closed fingered China, Sudan and Bolivia for knobbling any chance of a strongly worded commitment from world leaders.

This was followed by an 'eyewitness' article on the Guardian website from environmentalist Mark Lynas, who attended the talks as an advisor to the Maldives' delegation.

Lynas damned China for not only refusing to allow any country to mention binding greenhouse gas targets in the final agreement, but also for playing aggressive diplomatic games such as sending second-rate bureaucrats to negotiate opposite Obama, Brown and Merkel.

Lynas also took a swipe at NGOs that he saw as allowing China to get away with such tactics through a lack of political pressure:
'Campaign groups never blame developing countries for failure; this is an iron rule that is never broken,' he wrote.

A backlash then followed from readers of Lynas' article, pointing out that there was no reason for China to agree to anything when Obama had put such measly cuts on the table – emissions reductions of just four per cent on the baseline year of 1990.

And of course, said others, in terms of historical responsibility and per capita emissions, it should be clear when the 'blame' for climate change most lies.

Other readers posted comments on Lynas' article talking about trade embargos and tariffs – the most powerful diplomatic weapons available in today's globalised world.

But the idea is wracked with difficulties. The west is in thrall to China's cheap goods, and has been for decades. A cursory glance at the labels inside our clothes, the small print on the bottom of our children's toys and the text on the back of our television sets should pretty quickly indicate the enormous problems with slapping on punitive economic sanctions, should China continue to refuse to sign a climate agreement.

Copenhagen was never going to deliver what everyone wanted: not the EU's 40 per cent by 2020 cut; nor the island nations' 1.5°C temperature rise limit; nor the environmentalists' dream of a 350 parts per million greenhouse gas atmospheric concentration target.

But few could have expected that it would serve up such an awkward situation. Some, including the Financial Times' environment correspondent Fiona Harvey, are predicting that 2010 will come and go without a Chinese signature on a legally binding treaty.

It's clear that we'll be waiting some time for the international agreement to come; let's in the meantime put down our handfuls of mud and concentrate on making some meaningful progress at home.

Mark Anslow, Editor

Have greens got it wrong about tar sands?

For environmentalists, tar sands are a 'climate crime'; for peak oil experts they can never do the job of conventional crude. But both of these critiques ignore the real danger of tar sands, says **David Strahan**

Tar sands are widely seen as climate-enemy No 1.

With their 400 tonne dumper trucks and toxic tailing ponds, the open-cast bitumen mines of Alberta are the very symbol of climate catastrophe. So you can hardly blame protestors for their choice of whipping boy.

But some of the criticism is misguided. In a typical attack, a First Nations campaigner visiting the climate camp in London last summer declared: 'Tar Sands produce three times as much CO_2 per barrel as conventional oil. There's enough under the ground to push us over the edge into runaway climate change'.

One of those statements is moot, the other misleading, and ironically, by taking this approach, environmentalists risk boosting the prospects of the oil they most love to hate.

There's no doubt that fuel made from tar sands produces more CO_2 than those made from conventional crudes – but not three times more, about 20 per cent more on average according to the International Energy Agency. The confusion is between upstream and lifecycle emissions.

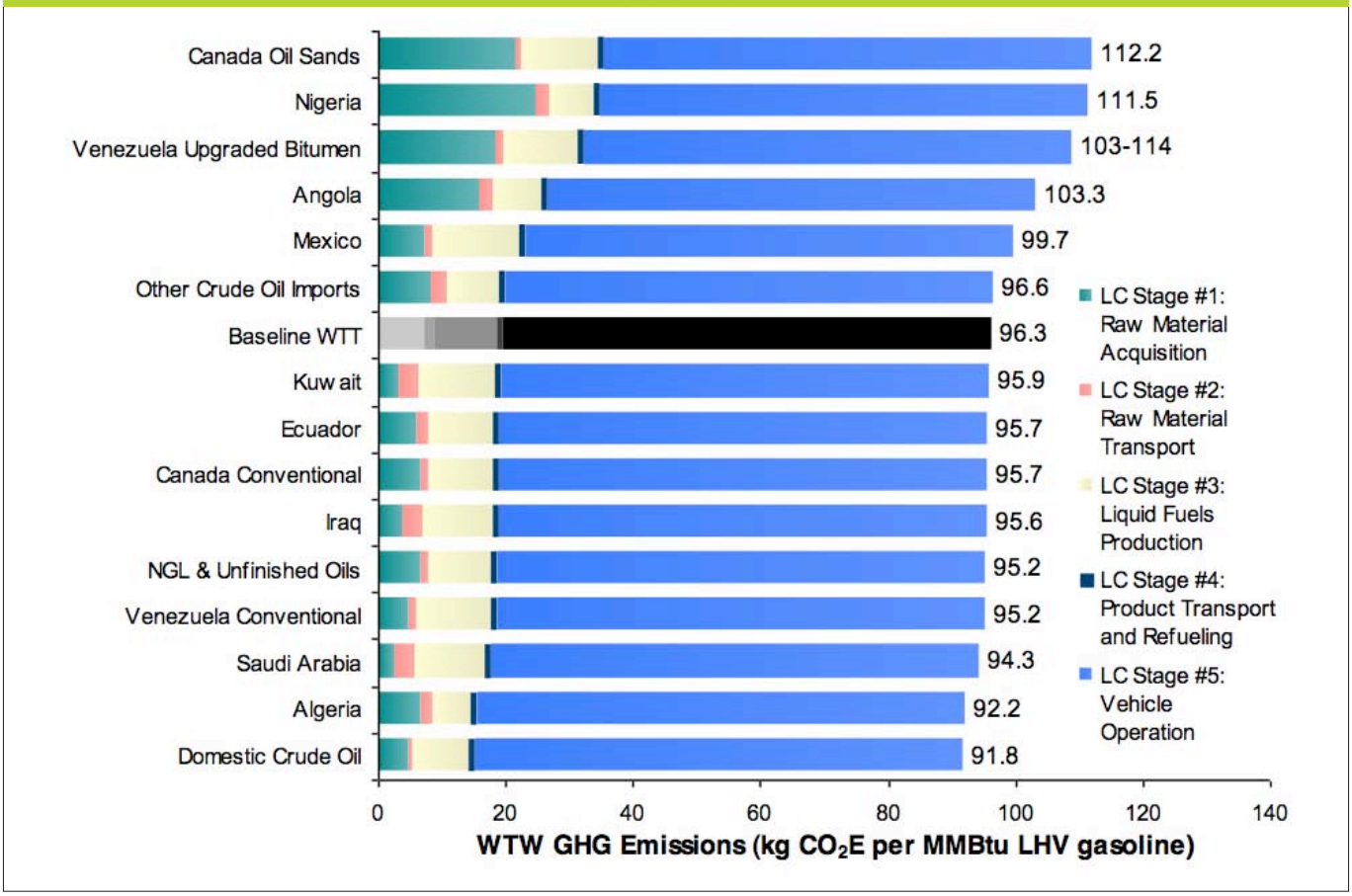
Turning solid, sticky bitumen into something resembling crude oil involves quite a performance. Shallower deposits are mined using massive mechanical shovels and trucks, while deeper deposits are extracted by injecting steam underground to melt the bitumen, then pumped out using conventional wells. Then the bitumen has to be separated from the sand using hot water, diluted to flow down a pipeline, and leavened with hydrogen stripped from natural gas to produce a synthetic crude. Only then is it fit to enter a refinery as normal.

All of that takes far more energy than production of conventional crude. In 2005, production emissions for the average barrel produced in the US amounted to 25kg $CO_{2(e)}$, while those for the average barrel consumed – including imports – were about 40kg, according to a US government report.

By contrast, average emissions from production and upgrading of tar sands are about 80kg per barrel for mining and around 115kg for steam-assisted production, according to a study from consultants IHS CERA. So, depending on which benchmark and production process you choose, the tar sands' upstream emissions look two to five times higher.

But for both conventional crude and tar sands, far more carbon is contained in the end products – petrol, diesel and jet fuel. About 450kg $CO_{2(e)}$ per barrel is emitted through the exhaust pipe, whatever the feedstock. Roughly another 50-70kg is released during

HOW MUCH DIFFERENCE DOES FEEDSTOCK SOURCE MAKE TO THE EMISSIONS FROM PETROL?



A graph from a US Department of Energy report, demonstrating that, regardless of where the oil comes from, the lion's share of emissions occurs during the 'use' phase of the fuel, when it is burnt in an engine

refining, and much smaller amounts by transportation to and from the refinery.

This has two implications. First, the difference between emissions from conventional crude and tar sands on a lifecycle basis – the only one the atmosphere cares about - shrinks dramatically. The data in the US government study show lifecycle emissions from tar sands fuels are 16.5 per cent higher than the average barrel consumed in the US. Second, it means roughly 70 per cent of the tar sands' lifecycle emissions are emitted downstream. So by attacking the higher – inevitably upstream – tar sands emissions, environmentalists ignore the main event, and offer the industry a convenient get-out.

What? We're capturing...

The industry has reacted to the criticism by proposing carbon capture and storage (CCS). Shell, for instance, plans to capture 1.2 million tonnes of CO_2 per year at its bitumen upgrading plant at Scotford from around 2015. And who could complain about that? If burying the extra CO_2 produced upstream can bring the lifecycle emissions down to conventional levels, everybody should be happy – including climate campaigners.

But of course there's a catch – in fact there are two. First, CCS could never capture all the upstream emissions. Engineering limits mean the technology is only likely to ever reach 90 per cent efficiency, meaning a tenth of the CO_2 would still escape. Worse, CCS is only likely to be cost effective at facilities like Scotford that produce a large and concentrated stream of CO_2, and is unlikely to be justified on all the tar sands' far flung production sites. Second, CCS can never capture the downstream emissions – the lion's share.

This is important in light of recent work from a number of climate scientists that projects sustainable levels of atmospheric CO_2 not in terms of annual emissions, but in terms of the total that can be emitted over the next few centuries.

Jim Hansen, director of the NASA Goddard Institute, and Pushker Kharecha of Columbia University, have shown how avoiding 'dangerous' climate change depends critically on the decisions we make about coal and non-conventional oil, as conventional oil production approaches its peak.

Their modeling demonstrates that even if we burn all the world's conventional oil and gas – which must be overwhelmingly likely – we could still hold atmospheric CO_2 to 400-450 parts per million and temperature rise to less than 1°C above the present, provided we progressively eliminate coal emissions by 2030 and avoid emissions from non-conventional oil altogether. For coal this could plausibly be achieved by installing CCS at power stations, where it would capture most of the emissions. But for the tar sands that wouldn't work, so the only option is not to exploit them at all. By this logic climate campaigners should be arguing not to clean up the tar sands, but to shut them down – a much bigger ask.

'Anybody who cares about the planet should worry less about production

'By this logic, climate campaigners should be arguing not to clean up the tar sands, but to shut them down – a much bigger ask'

emissions and more about the size of the producible resource,' says Dr Kharecha. 'Non-conventionals could more than double the world's usable oil, but we cannot let that happen.'

Despite the fact that CCS can only capture a fraction of the tar sands' upstream emissions, the Alberta government is funding projects such as Shell's at Scotford as part of a $2 billion CCS support package. Professor David Keith, of the Department of Chemical and Petroleum Engineering at the University of Calgary, who is scathing about the idea of CCS in the tar sands, suspects a political agenda at work: 'My guess is the Alberta government sees paying for CCS and other low emission technologies as crucial for the survival of the tar sands, and even a license to expand'.

Presumably this was not what climate campaigners had in mind by attacking the relative carbon intensity of tar sands production.

Can the atmosphere take it?

It may be that the climate threat from tar sands has been over-stated. Peak oilers have long argued that despite the size of the resource, the tar sands could never be exploited quickly enough to compensate for declining production of conventional oil. Others, such as Jackie Forest, an author of the IHS CERA report, believe it would be 'really pushing it' to ramp up tar sands production to 6.3 million barrels a day by 2035 – which is barely a tenth of what's needed to replace the predicted decline from conventional wells.

If that is what happens, rising emissions from slow-growing tar sands production would be outweighed by falling emissions from fast-depleting conventional oil, even without CCS.

But now it seems the tar sands may not only fail to fill the gap, but actually make it wider. A recent paper by Myles Allen, head of Climate Dynamics at the Department of Physics at Oxford University, suggests the need for a radical new climate policy approach, one that would render exploitation of non-conventional oils foolish not only in terms of emissions, but also the long term fuel supply.

Current policy focuses exclusively on reducing the atmospheric concentration of CO_2 by progressive cuts in annual emissions. The EU, for example has a target to cut annual emissions by 20 per cent by 2020, or 30 per cent if other countries also impose stringent targets. But Allen's work shows that this fixation with the annual rate of emissions may be misplaced. His modeling shows that the relationships between yearly emissions, atmospheric concentration of CO_2, and the temperature response of the climate, are highly uncertain. The connection between cumulative emissions and temperature, on the other hand, is much clearer. Scientists cannot say with any confidence what the temperature response will be to a given level of emissions in a given year; they can be much more definite about the temperature rise that will result from the total amount of carbon dumped into the atmosphere by humanity.

'Despite the fact that CCS captures only a fraction of the tar sands' upstream emissions, the Alberta government is funding $2bn of trial projects'

'We know that what we've emitted so far has lead to roughly 1C warming,' says Allen, who has served on successive Assessments of the IPCC, 'so if we emit the same again, we can expect the temperature to rise roughly 2°C. It makes no difference to the climate what year emissions peak, what matters is that we limit the total amount of carbon that enters the atmosphere.'

This insight has led Allen to propose a hard ceiling for cumulative emissions of 1 trillion tonnes of carbon (1 TtC, equal to 3.67 Tt CO_2), to go alongside annual targets, as a much surer way of limiting warming to 2C. The trillionth tonne must be our last, he says. The new cap would encourage policies to cut emissions sooner rather than later, because later cuts would have to be steeper and inevitably more expensive to achieve. This would concentrate minds, and reduce politicians' room to fudge if short term targets, such as those for 2020, are missed. 'The response would not be to give up in despair, but to say OK, now it's going to be even more expensive to hit the long term goal of avoiding dangerous climate change, how are we going to do it?' Allen says.

Over half way to the limit

A trillion tonnes may sound a lot, but we have already emitted over 500 billion tonnes (Gt), says Allen, leaving around 400Gt before we have to stop emitting altogether. And that's only counting CO_2, not the other greenhouse gases, so the effective limit may be very much lower. Meanwhile, estimates of the size of remaining conventional oil and gas resources suggest they contain 250-500GtC – more than enough to exhaust our total ration.

So what would it mean if world leaders adopted the Allen approach? That might sound fanciful, given the huge difficulties experienced at Copenhagen, but as the climate news gets ever worse, it must become more likely. In that case exploiting the tar sands would not expand the total oil available to us, but reduce it.

That's because, under the Allen approach, each barrel of tar sands fuel consumes more of our total carbon budget than a conventional barrel. So the more we expand the tar sands, the fewer barrels will be available to humanity before we have to stop consuming oil altogether. If tar sands fuels emit 20 per cent more than conventional, for every five barrels of tar sands we consume, we could have consumed six conventional barrels.

For coal-to-liquids fuels, such as those produced in South Africa, the ratio is even worse: for every barrel of CTL, we deny ourselves two conventional barrels.

We can't have the extra conventional barrels right away, of course; the only reason the tar sands are being developed is because the rate of conventional oil production is already unable to match demand. And, as conventional production peaks and goes into decline, fewer barrels will be available each year. If we forego the non-conventional barrels, we can have more conventional ones, but only as quickly – or slowly – as conventional depletion will allow.

And that presents a problem: to allow ourselves the most barrels and energy overall within our trillion-tonne carbon budget, we have to reduce consumption now to benefit later. It's entirely against human nature and market economics, but it's exactly what we should be doing, says Allen. 'We need to step back and think about fossil fuel resources as a whole, and the century as a whole, and ask whether policies are sensible in that light.'

David Strahan is a journalist specialising in energy issues, and author of The Last Oil Shock (John Murray, £12.99).

'Each barrel of tar sands consumes more of our total carbon budget than a conventional barrel. So the more we expand the tar sands, the fewer barrels will be available to us before we have to stop consuming'

Inverie, the 'capital' of the Knoydart peninsula

Photo: Jim Manthorpe

Learning from remote sustainable communities

Living off the beaten track need not require lashings of fossil fuels to provide a comfortable lifestyle. **James Morrison** tells the remarkable story of the inhabitants of Scotland's Knoydart Peninsula

It's Britain's remotest mainland point, and Scotland's last great wilderness. Accessible only by a 20-mile cliff-top hike or a chugging boat-ride from the faded ferry port of Mallaig, the Knoydart Peninsula is a place of wheeling golden eagles, free-roaming red deer, dense woodland, and brooding munros.

But for its inhabitants, who number barely 100, it is also the location of a slowly unfolding experiment in sustainable living.

A decade ago, Knoydart (English translation: 'rough bounds') became the subject of a celebrated community buy-out when its 17,200-acre central estate was sold for £750,000 to a charity set up by residents determined to end 900 years of near-feudal ownership. Since then, the Knoydart Foundation has transformed the area into a model of responsible land management, animal husbandry, and ethical tourism.

Independence

Over the past eight years, every property in Inverie – the dispersed settlement, snaking around a bay, which passes for the peninsula's capital – has been linked to a hydroelectric system fed by Loch Bhraomisaig on the slopes of Beinn Buidhe. The community has also been exporting its most plentiful resources, timber and venison, to trading partners as far afield as Ireland. Now, in its 10th anniversary year, it's embarking on the next phase of its march towards self-sufficiency – intensifying cultivation of home-grown staples, and diversifying into eco-building and electric vehicles.

'We make use of whatever we can locally,' says Angela Williams, the foundation's development officer, surveying the single-track high street winding to the small wooden jetty which passes for Inverie's ferry terminal.

As things stand, she admits it would be wrong to paint Knoydart as a carbon-neutral utopia: 'We have a market garden we're developing as a community resource. Otherwise, most food is imported from elsewhere.'

So why do so many visitors to the area – attracted by positive write-ups on websites like responsibletravel.com and greentraveller.co.uk – evangelise about its eco-friendly credentials? The answer lies in the efforts its stolidly progressive residents are making to

harness its natural advantages.

The foundation's proudest achievement is its hydroelectric system, which generates 280 kilowatts of electricity and supplies 70 homes and businesses around Inverie Bay – a lifeline for a community the National Grid has never threatened to reach. Now managed by a separate company, Knoydart Renewables, the project has a tangled history stretching back well before the 1999 buyout.

Transfer of power

Until the 1970s, locals largely relied on diesel (a single generator in Inverie is still used as back-up today). But by the end of the decade, the estate's then owner, Major Macdonald, decided to invest in hydropower – his principal intention being to provide a reliable supply to his 19th century loch-side mansion.

In the 1980s and 90s, this stuttering system fell into disrepair under a succession of less diligent landlords. By the time the foundation took over, an overhaul was needed. Angela, 46, recalls how basic conditions were when she moved from Lancashire to take up her post in 2001: 'Cash registers weren't working, nobody had computers.'

In the end, it took a £500,000 cash injection – largely financed by the European Regional Development Fund and the Scottish Government initiative Highlands and Islands Enterprise – to make the power supply fit for purpose. Only three years after the buyout, with the dam raised and refurbished, additional transformers installed and the existing turbine-house rebuilt, was it possible to connect an initial 45 properties to the makeshift grid. 'We're lucky to have such an ideal head of water,' says Angela. 'We've only had one instance where the dam level ran low – during a very dry spring in 2008. But year on year we've improved our knowledge of how it works.'

Import-Export

The network of connected homes and businesses is still being extended incrementally as more scattered properties come within reach of its 5km power-line. But even now most residents of Knoydart's other main settlement, Doune, rely on diesel, while a handful of refuseniks closer to home prefer fossil fuels.

Which is where Gwen Barrel, the foundation's 'Powerdown' officer, comes in. Powerdown is a consortium of 26 highland community groups which recently secured a £1.5 million grant from the Scottish Government's Climate Challenge Fund to mount a sustained effort to reduce their combined carbon footprint through local innovation. Knoydart's focus – besides odd diversions, including an upcoming road-test for electric quad-bikes –is on renewables.

Like Angela and most other 'Knoydartians', Gwen is an incomer. Ten years ago, she migrated from Durham on an impulse, and today is fiercely patriotic ('I am!' she snaps, when asked if she'd describe herself as 'local').

Gwen's current aim is to persuade households not yet linked to the hydro system to convert to energy-efficient combination schemes or wood-boilers – a task she knows will mean overcoming entrenched attitudes based on 'age and tradition'. The thought of homes being heated by imported coal and kerosene rankles with her: one resource Knoydart cannot be said to lack is timber.

Wood-a-plenty

The peninsula's verdant 500-hectare covering of conifers is managed by the Knoydart Forest Trust. Each year it produces 150 tonnes of firewood and 30 tonnes of building timber for local consumption. The trust is pushing the latter ever more proactively – it ran log-building courses last summer, culminating in the completion of a Swiss-style cabin at Inverie's Long Beach Campsite.

More importantly, in terms of long-term sustainability, timber represents the peninsula's most obviously tradable raw material. Last year, Knoydart began exporting wood to the nearby Isle of Eigg – itself the subject of a 1990s community buyout – while fires now crackle with its kindling as far away as Ireland.

Any risk of deforestation is mitigated by the trust's rolling tree-planting programme, which maintains a mix of indigenous species. 'Every five years we have a large harvest,' explains community forest manager Grant Holroyd. 'The first was in 2007 – we sold 8,000 tonnes of Sitka Spruce to a sawmill in southern Ireland. All the wood went straight from the forest by ship to the mill, so there was no road haulage.'

A similar model of sustainability is adopted in relation to other aspects of land management. Though Gwen stresses Knoydartians are 'not farming deer', an annual stag cull takes place each autumn, in the interests of biodiversity.

While the resulting venison yield has become the peninsula's other signature export, Gwen hopes more will increasingly be consumed locally. The once-a-year harvest

Treeplanting on Knoydart. The peninsula's forests are sustainable managed and harvested.

Photo: Jim Manthorpe

One of the few roads on Knoydart, none of which connect to the mainland

Photo: Jim Manthorpe

presents certain practical problems, though, she explains: 'It's possible for us to eventually become self-sufficient. Most of us buy the bulk of our meat locally, and people are growing their own fruit and veg and keeping chickens. But we have a problem with the big Victorian larder we've inherited, which isn't big enough to store large amounts of meat.'

To galvanise the community, Gwen's planning to demonstrate the need for long-term planning by organising a 2011 Burns Night supper using locally sourced haggis, neeps and tatties: 'It's a nice symbolic project that shows how far ahead you have to think to make a single meal for everyone,' she says.

The message has already reached some quarters. A short trot down the road, there's ample home-grown fare on the menu at the Knoydart Pottery and Tea Room and the Old Forge Inn, where hearty mains include venison burgers and seafood dishes whose ingredients have travelled no further than nearby Mallaig.

A model for the future?

But just how self-supporting would Knoydart be without tourism as a fall-back? With 200 beds at the foundation's 'bunkhouse', a spacious campsite offering panoramic views of Loch Nevis, and 10 self-catering properties, no-one is pretending the area doesn't benefit from visitor income. 'The economy is buoyed by tourism,' concedes Angela, adding that 'serious munro-baggers' and stag parties ensure holiday lets remain occupied throughout winter – especially at New Year.

Yet, shorn of a proper ferry link (day-trippers are shipped to and from Inverie by a privately owned boat whose main purpose is to serve locals commuting to Mallaig, and children attending that town's secondary school), and with no road link to the rest of Scotland, the peninsula is as far off the beaten track as it's possible to get in Britain.

'Just how self-supporting would Knoydart be without tourism as a fall-back? With 200 beds at the Foundation's 'bunkhouse', no-one is pretending the area doesn't benefit from visitor income'

This out-of-the-way appeal may explain why so many people who initially arrive as tourists end up staying to help with Knoydart's numerous green projects – or moving in for good. Of its 100-odd permanent residents (the last census recorded 98), only one family, the Morrisons, are even Scottish. Angela says the legacy of the highland clearances, combined with the estate's ever-changing ownership prior to 1999 – entire past populations were uprooted wholesale, as vassals followed their lairds elsewhere – means the only 'natives' are children born here.

As for second-homers, they are refreshingly few – and none can be described as absentee landlords. Hardly surprising that Knoydartians' attitude towards newbies is so relaxed (its latest growth business, Knoydart Construction, is currently building four houses for 'outsiders'). Angela says: 'Our view is that we are all incomers, so everyone's welcome.'

So just how easy would it be to replicate Knoydart's example elsewhere? On nearby Rum, locals will soon find out. February 2010 sees the first phase of a staggered handover of the island by its long-time owner, Scottish Natural Heritage, to the Isle of Rum Community Trust, following a referendum of its 30-strong population which returned a vote of 22 to two in favour of the transfer. Islanders – until now employees of SNH almost to a man (and woman) – have already established three crofts, and in future see allotments, intensified fishing, Knoydart-inspired deer culls and hydroelectric power as integral to their endeavours to build a viable community.

As with Knoydart, though, tourism and migration will also be vital parts of the package. A former Knoydartian, Charlie King, 67, is now chairperson of the 'task group' set up to steer Rum's quest for autonomy. He's convinced Knoydart's is an example worth emulating:

'It's so much more vibrant there than 10 years ago. The buyout is the best thing that's ever happened to Knoydart.'

James Morrison is a freelance journalist and writer

Who needs Africa's land more: us or wildlife?

An explosive mix of animals, people and economics means that land in Africa is becoming more valuable – and more contested – than ever. By **Thembi Mutch**

You'd think that an increase in the African elephant population to over 150,000 individuals since the ivory ban in 1989 would be good news. And it's true that the worldwide crackdown on ivory trading has been remarkable success.

But there is a side of the story that goes significantly under-reported.

Although they look beautiful on our television screens and through tourist lenses, elephants do huge damage to local crops. Earlier this year six elephants were killed in West Kilimanjaro, as thousands of local people – many Maasai – stood by and cheered. The incident was hushed up: elephants hacked to death are bad for business. But the evidence suggests that the situation may become even more serious.

In Tanazania, since the gradual elimination of poaching (of bush meat - small antelope, rather than elephant ivory) and the granting of new hunting licences, elephants and other wildlife are starting to return to areas once abandoned. In the interim, however, their former migration routes have been settled and farmed by national investors and villagers, struggling to keep up with the food demand of a growing population.

Both wildlife and people need access to land. In both cases, the numbers are increasing, fast.

Land use, indigenous rights, management and conservation are highly contentious political issues in Tanzania. Both wildlife and people need access to land. In both cases, the numbers are increasing, fast. The question, then, is whether more land can be found and used in ways that support local populations, wildlife, and tourists, and yet don't exploit the environment.

Hunter or hunted?

Hunting, ironically, is considered a good choice in terms of raising money by the government wildlife division and some ecologists.

Tanzania now only lags behind South Africa as a big game hunting destination. Hunting can earn good money – one African bull elephant can cost $15,000 to hunt (for a foreigner) and, managed correctly, hunting encourages local people to preserve their sources of revenue – the wildlife.

Fred Nelson of the Tanzania Natural Resource Foundation says: 'The key policy issue to sustain wildlife is to spread the benefits so that they are felt by the landholders, at a local level. The story of conservation is the struggle between government, hunting agencies and villagers trying to control the most valuable asset, the wildlife'.

Examples such as Ikona in Western

Tanzania and Eastern Tarangire are cited as instances where communties benefited by dealing directly with tour companies and charging for access, or selling hunting rights. At a smaller level new hotels potentially bring markets for local farmers to sell their produce to them, and crafts to tourists.

Evictions

But hunting – or more particularly establishing the reserves that support it – is not an easy solution. In creating the famous Mikomazi game reserve in Ngorogoro in 1988, 5,000 Maasai pastoralists were evicted. They lost everything: there are still many hapless Masai selling bangles and trinkets in Arusha and even thousands of miles away in Zanzibar.

In Loliondo, four hundred Maasai families are currently being forced to abandon their homes according to local NGO UJamma. For six months of the year they are denied any rights to their own land, whilst the several thousand acres are used exclusively by hunters from the United Arab Emirates (UAE).

'Land itself is valuable, and Africa's land is increasingly in demand. Much of East Africa's prime land is already owned by overseas investors'

The case is being debated in parliament at the moment, and the surrounding secrecy, potential corruption, and death of at least one journalist is an embarrassing blot on Tanzania's reputation.

Richard Ndaskoi, a Maasai with over fifteen years of experience working with NGO and community groups in Tanzania, explains that the issue is like a set of balancing cards, all interlinked, and easy to topple.

'The policy is to reimburse people when they are moved off land by private investors or government wanting the land for game reserves or parks,' he says. 'Actually what happens is the infrastructure is so cumbersome, the sums awarded so small, and the distances so great that they don't get paid. Masai became third class citizens on their own land. Remember some of these people depend on cattle for everything; it is wealth, food, bride price and an indicator of status, even though many Masai would actually prefer white collar jobs and education!'

Foreign ownership

Of course, land itself is valuable, and Africa's land is increasingly in demand. Much of East Africa's prime land is already owned by overseas investors. Paul Tudor Jones, a US billionaire, owns the only private (and extremely valuable) hunting concessions in the Serengeti, Tanzania.

Meanwhile, Bill Gates, Paul Allen (his business partner) Richard Branson, Saudi Arabia and the Sultan of Dubai recently put in bids to buy up tracts of Africa, including land in Tanzania, Sudan, Zimbabwe and the Congo. The ailing state-owned conglomerate Dubai World has several large hotel contracts in Tanzania, Zanzibar and Rwanda.

In many African countries the mechanisms to monitor land appropriation, such as a companies register, don't exist. So although there is an auditor general in Tanzania – and an anti-corruption unit – bypassing them both is straightforward: they monitor only government or donor money, not private investment.

Government departments seem happy to play along: 'There is an increasing trend for government departments to raise levies and fees, and to collect that money in such a way that it doesn't go through the auditor general, doesn't come under scrutiny from the anti-corruption unit, and is very difficult to account for,' says Jean De Villiers, Executive Director of the Whale Shark Conservation Society in Mafia Marine Park, Tanzania. 'It's basically parallel taxation.'

The problem with selling land in this way is that it often rides roughshod over local people. Title deeds were not common until recently. Land can be leased to hotels and game parks, but unless it has conservation status, there are often no stipulations about what it is used for, or indeed incentives for potential investors to find out what the national policy directives are for land use.

Tourist paradise?

One option that should work for both people and wildlife is tourism. In Zanzibar alone 87 new licences for hotels were granted in 2009, according to government statistics. Yet no statistics exist on how land is proportioned, or how much is available for agriculture: on a small island under 90 km long and 40km wide, with a million inhabitants and a dwindling water table, it seems odd that these are not easily accessible facts. Similarly, as international hotels spring up apace in the capital Dar Es Salaam, few draw attention to the fact that the majority of the seven million inhabitants have no working sewage or clean water.

Some defend the national parks system fiercely: 'There are now fifteen national parks in Tanzania, Kilimanjaro produces the largest amount of revenue which supports other parks,' says Jo Anderson, an environment consultant based in Arusha and regular Mountain guide on Killimanjaro. 'The fact is the system IS working!'.

But others say that the money gained from the parks doesn't find its way back to where it is needed, especially when government departments refuse to 'cross-fund' each other. The detractors say that money is not, despite the propaganda, being used for building infrastructure in poor communities.

Local knowledge

Meanwhile, as people haggle over land prices and use, animals are continuing to tread centuries-old routes. Right now, the migration routes of the wildebeest, elephants and zebras run across corridors of land at the base of Kilimanjaro. The rainfall decline due to deforestation, the melting of snow on Kilimanjaro and increased tourism means the animals' migration routes have changed. Elephants now walk (or rather crash through) valuable land that has been cultivated for years by villagers, causing understandable annoyance. This year, according to Director of Tanzania Wildlife Research institute (TAWIRI), Simon Mduma, at least 200 families around the Serengeti have lost all their crops from elephant damage.

Many believe that the answer lies in genuine community consultation, which can take years, and a great deal of knowledge and skill. Several NGOs are now actively involving communities in prime wildlife areas to encourage them to respect wildlife and learn systems of law, tenure and advocacy. Says Fred Nelson, 'The Maasai are resilient and have established and effective systems of consultation and consensus, systems of handing down knowledge, these need to be properly used: they are good conservationists, conservation has benefited from them; they have not benefited from conservation'.

Tanzania is in the middle of an uneasy balancing act between animals, people, investors with an eye on the long game, and the less scrupulous ones out for a quick buck. The best intentions of governments often fall by the wayside as they lack research facilities, infrastructure, vehicles and people power to implement their plans.

Too much intervention from government and business however, and communities begin to regard wildlife as government property, even though these governments don't have the cash – and arguably the moral authority – to do any more than play cops and robbers around wildlife.

Ultimately, any strategy to bring harmony back to relationship between man and beast in Africa must be sensitive to practical realities. As Simon Mduma, Head of TAWIRI wryly observes: 'Biodiversity and conservation is good for the intellectuals; it's hard to believe it when you are losing, when your relatives are being killed, or you can't eat.'

Thembi Mutch is a freelance journalist based in Tanzania

Will carbon capture and storage work?

Carbon capture sounds like a fantastical idea: dig up fossil fuels, burn them, then return the captured CO_2 underground. But the hurdles that stand in its way are formidable. By **Mark Jansen**

Things are hotting up for the carbon capture and storage industry.

Across the world, there are some 200 test projects are underway to see whether carbon capture and storage is viable, both technically and financially. Most are still at the planning stage and only eight are up and running. None is operating at anything like the scale needed to make a serious dent in our CO_2 emissions, yet they are cited by supporters as proof that the basic concept does work.

At the Sleipner gas field in the North Sea, Norwegian company Statoil is removing excess CO_2 from the gas and storing it underground. A similar project is up and running at In Salah in Algeria, where Statoil has joined up with BP and Algerian firm Sonatrach. Captured CO_2 is also being piped 330km from a coal power station in Beulah, North Dakota, to the Weyburn oil field in Saskatchewan, Canada, where it is pumped underground to help extract oil, a process known as enhanced oil recovery.

An upbeat industry

These examples were widely quoted at a conference on carbon capture and storage held by the Institution of Mechanical Engineers in London this autumn. The mood was ebullient: speaker after speaker called for urgent investment to build bigger demonstration plants before a global roll-out sometime in the 2020s. Tony Grayling, head of carbon capture and sustainable development at the Environment Agency, predicted that 'carbon capture and storage will play an important, if not essential, role in meeting our de-carbonisation targets.'

Grayling pointed out that no-one has yet built a full-scale demonstration project, with most existing tests applied to power outputs of just 30 or 40 megawatts. But in November the UK Government confirmed plans to provide funds for up to four carbon capture and storage demonstration projects of 300 megawatts or more.

These will be funded at least partly by a levy on electricity bills, enshrined in the energy bill which has yet to be passed in Parliament. The Government has proposed that the Environment Agency will assess whether carbon capture is technically and financially viable by around 2020. 'This is an enormously ambitious timetable,' said Grayling. 'We are sceptical about whether there will be enough demonstration projects by then to make a proper assessment.'

Environmentalists split

Carbon capture has divided the UK green movement, with Friends of the Earth an enthusiastic supporter, while Greenpeace and the Green Party are lukewarm or downright hostile. In May 2008 Greenpeace branded carbon capture 'a scam'. Its report, 'False Hope', argued that carbon capture cannot be

made ready in time to avert dangerous climate change, that storage may be unsafe and that the extra energy required to capture, transport and bury CO_2, would accelerate the exploitation of natural resources. 'False Hope' also argued that the cost of carbon capture would inflate electricity bills by anything from 21 per cent to 91 per cent.

Where could all the carbon go?

Greenpeace appears to have softened its attitude since then. 'We are not ideologically opposed to it, but it shouldn't be seen as a silver bullet,' says Jim Footner, senior energy campaigner at Greenpeace UK. Footner is concerned that the prospect of carbon capture may be used to justify more coal plants, so emissions would carry on rising even if the bulk were captured. He also fears it may divert money and political will away from renewable energy and energy efficiency, which Greenpeace sees as more pressing priorities.

Similarly, Green Party leader Caroline Lucas says that while the party is 'not completely against the idea' of carbon capture and storage, it 'should certainly not divert attention and resources from energy efficiency and renewable power'. Investment in these areas would create many times more jobs than carbon capture and storage, Lucas adds.

Enormous quantities

In his latest book, 'Our choice: a plan to solve the climate crisis', climate change campaigner Al Gore argues that because of the huge energy cost of capturing and storing CO_2, coal-fired power stations would have to burn 25-40 per cent more coal to produce the same amount of electricity, leading to significant environmental damage.

Gore also believes the sheer volume of CO_2 capture that would be needed to make a difference 'strains credulity'. If all the CO_2 emitted by US coal power stations were captured and converted into liquid form, the volume would be equivalent to 30 million barrels per day, which is three times the daily volume of US oil imports. Gore adds that finding suitable geological sites will be a mammoth undertaking. Former oil and gas fields will only hold a fraction of the world's CO_2 output and the longer-term assumption is that most of it would be stored in saline aquifers 1 to 4km underground. Complex and time-consuming research is needed to identify which sites would be suitable.

However, Gore concludes that the transportation and burial of CO_2 is likely to be safe, citing separate studies by the Massachusetts Institute of Technology and the IPCC. While noting that carbon capture and storage 'is probably impractical for many years to come', he believes that large-scale demonstration projects should be built 'to determine how realistic this idea might be'.

'If all the CO_2 emitted by US coal power stations were made liquid, it would fill 30 million oil barrels a day'

Taming King Coal

But despite the technological unknowns, the argument for at least experimenting with carbon capture is compelling. The Intergovernmental Panel on Climate Change has said carbon capture and storage could account for between 15 per cent and 55 per cent of the global economic effort to cut CO_2 emissions by the end of this century. On top of this, coal fulfils 25 per cent of the world's total energy demand, while renewables provide just 0.4 per cent, according to 'The Future of Coal', a 2007 report by the Massachusetts Institute of Technology. It argues that 'coal use will increase because it is cheap and abundant'. The Institute notes that China is currently building two coal power stations a week, and the International Energy Agency predicts that the global demand for energy will rise 45 per cent by 2030 as developing nations industrialise.

Lord Nicholas Stern, author of the 'Stern Review on the Economics of Climate Change', argues in his book A Blueprint for a Safer Planet, that 'China, India, Poland and others are likely to rely strongly on coal, perhaps 70-80 per cent or more, for the next few decades, largely because it is cheap, power stations can be built rapidly, and it is available internally and is thus secure.'

Stern calls for an immediate investment in 30, large-scale carbon capture demonstration projects around the world over the next ten years, to test different geologies and types of coal: 'We must learn quickly whether it will succeed or fail,' he says. 'Even though it may only be a transitory technology between 2020 and 2050 as other technologies are developed, that is a crucial period.'

No choice

Jon Gibbins, professor of power plant engineering and carbon capture at the University of Edinburgh, believes the UK has no choice but to use carbon capture if we are to achieve an 80 per cent reduction in carbon emissions by 2050. 'We can't change the way our energy system works fast enough to do it without carbon capture and storage,' he says. He is convinced the technology can be made to work: 'There is no question of that, the issue is money and time.' Although carbon capture is likely to be expensive, Gibbins argues that it is unlikely to be any more expensive than electricity from offshore wind.

Figures given by electricity generator EON to a parliamentary select committee in 2008 suggest that electricity generated using coal with carbon capture would cost £68 per megawatt hour, compared to £42 without, while electricity from onshore wind farms would cost £75 per megawatt hour and, from offshore wind, £107 per megawatt hour. Perhaps, as Gibbins argues, the best way to resolve the cost issue is to build some commercial-scale demonstrations: 'How do you know until you've done it?' he asks.

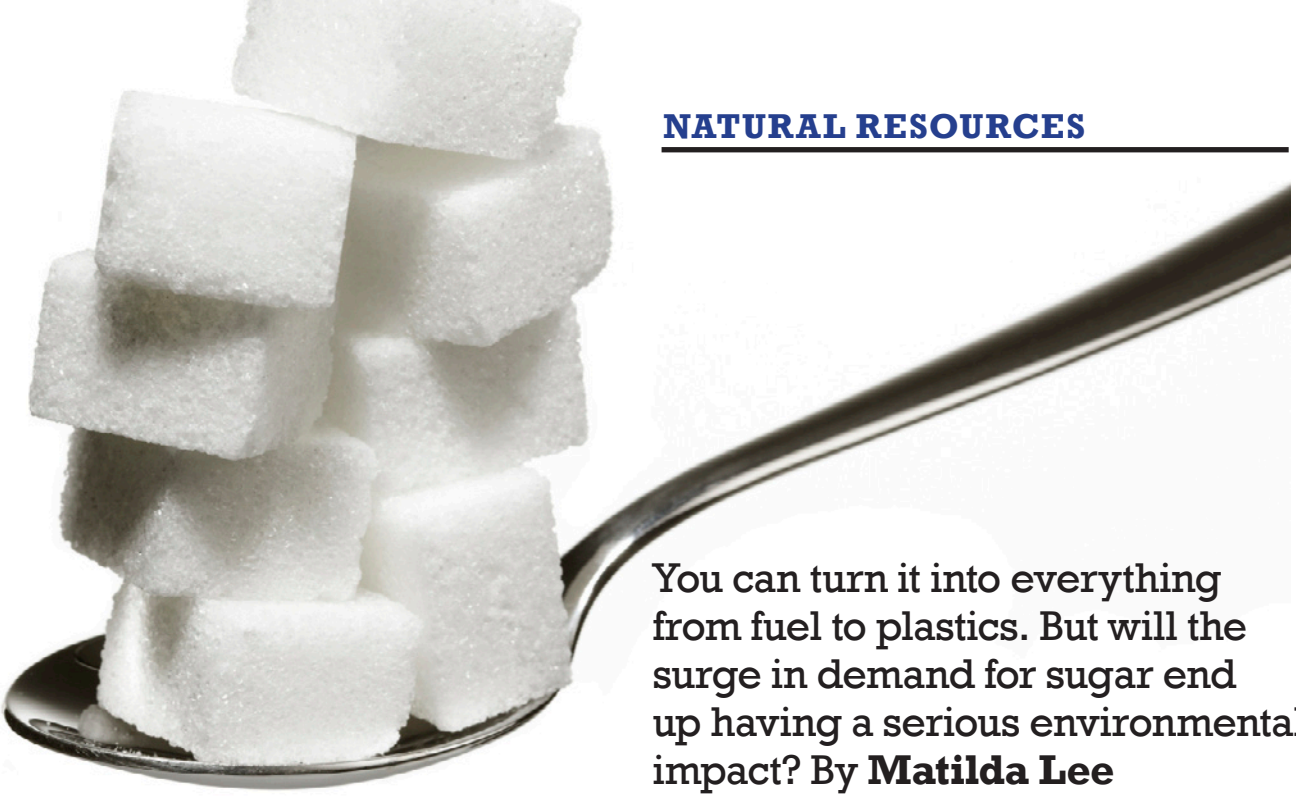
Neil Crumpton, senior energy specialist at Friends of the Earth in the UK, believes that the case for carbon capture 'gets stronger every day'. Like Stern, Crumpton sees carbon capture as a 'transitional' technology to be used while countries make the switch from fossil fuels to renewables. Pilots such as Sleipner and Weyburn have proved that it can work, he believes, while the additional energy required will fall dramatically as the technology improves, from 25-40 per cent to as little as 15 per cent: 'I've spoken to enough engineers and credible sources to believe that 15 per cent or less is very possible,' he says. This claim is supported by Jonathan Forsyth, technology and engineering manager at BP's Alternative Energy division, who told the engineers' conference this autumn that there would be 'significant progress' over the next decade, with energy losses falling 'from 20-40 per cent to 10-20 per cent'.

Despite being an infant technology, carbon capture is already attracting strong public protest. Efforts by power companies Vattenfall and RWE to bury CO_2 in Germany, and by Shell to bury CO_2 at Barendrecht near Rotterdam, have been met with fierce opposition and threats of legal challenges. Like Gore, Crumpton argues that CO_2 transportation and storage is perfectly safe explosive gas and petroleum products far more dangerous than CO_2 have been held safely underground for millions of years and subsequently transported through pipelines - but public fears will have to be addressed. 'There will have to be lots of public meetings and information given out,' he says.

However crazy and problematic carbon capture may seem, most leading thinkers on climate change seem to agree it is worth pursuing. Whether the public will back it remains an open question.

Mark Jansen is a freelance journalist

'Despite being an infant technology, carbon capture is already attracting strong public protest'



You can turn it into everything from fuel to plastics. But will the surge in demand for sugar end up having a serious environmental impact? By **Matilda Lee**

Will sugar be the oil of the 21st century?

What with Coca-Cola's Diet, Lite, and Zero drinks, the sugar content of the world's popular fizzy drink seems to be disappearing. Until you look at the bottle itself.

In May 2009, Coca-Cola unveiled the 'PlantBottle', the 'bottle of the future' according to Coca-Cola's CEO Muhtar Kent, made partially from sugarcane and a sugarcane by-product. Some 2 billion of these new plant-based polyethylene (PET) bottles will be on shelves by the end of 2010.

Sugar, it seems, is not just the stuff that rots your teeth. Long used as an alternative fuel, sugarcane, of late, has emerged as a material in 'bioplastics', an industry estimated to take up to a third of the total plastics market by 2020.

Jim Thomas, a research manager at ETC (action group on Erosion, Technology and Concentration), likens the situation today to the end of the 19th century, when synthetic chemists were working out how to crack the hydrocarbon molecule.

'What you've got now is synthetic biologists doing the same thing with sugar – saying, "how can we biologically transform sugar into thousands of different things"', he says.

In the long term, what Thomas refers to as the 'sugar economy' will encompass a range of biological feedstocks – plants, grasses, corn stalks, algae and agricultural 'waste' products – whose cellulose fibers are broken down into sugars, becoming the building blocks for fuels, plastics and chemicals.

Yet much of this technology is in its infancy, so for now, the focus is on sugarcane, which can be made into polyethylene (the most widely used of all plastics) by extracting the sugar (sucrose) and fermenting it to produce ethanol, which is dehydrogenated to ethylene, and then polymerised.

Carbon counts

Coca-Cola, like many other multinationals, sources its sugarcane from Brazil, the world's largest sugarcane producer and exporter, producing an estimated 31.3 million tons of sugar and 25.7 billion litres (6.8 billion gallons) of ethanol in 2008.

Low production costs, a result of a 30-plus-year-old ethanol industry which now fuels a portion of nearly all of the country's cars, have made Brazil one of the most vocal promoters of energy crops. In the past few years it has seen a massive influx of foreign investment to expand the infrastructure for biofuels and bioplastics.

Coca-Cola has tentatively claimed its new bottles are carbon friendly: 'Preliminary research indicates that from the growing of the plant materials through to the production of the resin, the carbon footprint for the PlantBottle packaging is smaller than for bottles made with traditional PET'.

Other corporations have more ambitious claims about bioplastics.

Dow Chemicals, the world's largest polyethylene producer and Crystalsev, one of Brazil's largest ethanol companies have formed a joint venture in Brazil to produce polyethylene from sugarcane. Its new plant is expected to start production in 2011, have a capacity of 350,000 tons a year and produce 'enough renewable energy to power the plant and provide domestic energy to a city of 500,000 inhabitants', according to Bruno Pereira, Manager of Sustainability in Plastics for Dow in Latin America.

Pereira says that the production of sugar-based polyethylene will 'cut greenhouse gas emissions by 211 per cent compared with conventional PET production'. Fossil based PETs global warming potential (GWP) is 1.8 pounds of $CO_{2(e)}$ per pound of PET, whereas cane-based PET's GWP is -2.0 pounds of $CO_{2(e)}$ per pound of PET (ie. carbon negative, as it 'locks up' atmospheric CO_2 absorbed through photosynthesis).

Dow is also working to develop and approve an appropriate methodology to make its project in Brazil eligible for UN carbon credits. 'Considering all environmental and social studies conducted so far, the company is fully confident with regard to the project's

eligibility,' Pereira said.

Brazil's largest petrochemical firm Braskem plans on producing 200,000 tons of sugar-based ethylene/polyethylene a year and has already secured contracts to provide products to Johnson & Johnson, cosmetics company Shiseido and the Toyota Group.

Braskem claim that its green plastic 'removes more carbon from the atmosphere than it emits throughout its lifecycle, from the planting of sugarcane to post-consumption recycling.'

Doubts about land use

While there are high hopes for sugarcane to usher in a post-petroleum economy, the worry is that, like biofuels, the technology may become a victim of its own success. Already, Brazilian campaigners claim production is increasing deforestation, damaging vital ecosystems and exacerbating land conflicts.

To sustain both the biofuels and the emerging bioplastics market, estimates point to a necessary expansion of sugarcane plantations to cover some 12.2 million hectares by 2015, or at least doubling from the current 8.89 million hectares in the next by 2020. A study from the University of Sao Paulo estimates that billions of dollars will be spent in the next five years on the construction of 73 new ethanol companies in the center-South region.

The question is where this expected increase should come. Currently, sugarcane is concentrated in the state of Sao Paulo, which accounts for about 50 per cent of the country's sugarcane harvest and 60 per cent of total ethanol production.

Maria Luisa Mendonca, director of Brazil's Network for Social Justice and Human Rights says: 'We know that sugarcane plantations are expanding very quickly, "pushing" forward agricultural borders and, at the same time, preparing the way for the expansion of cattle-raising and soy production.'

Brazilian campaigners claim that seven million hectares of the Amazon have been cleared over the past five years by soybean farmers, as they have had to move to make way for increased sugarcane production.

And according to a report by Friends of the Earth, sugarcane production is spreading to regions where it has previously never been grown, threatening environmentally-sensitive areas such as the Pantanal Wetland in Mato Grosso do Sul and the Cerrado in Maranhao.

Unsustainable growth

Recent studies that have taken into account emissions from land-use change have demolished the idea that ethanol – derived from either maize or sugarcane – automatically has net greenhouse gas savings.

If carbon-rich tropical forests are razed, even indirectly, because of sugarcane expansion, 'benefits quickly diminish' - regardless of how effective sugarcane is for producing ethanol – according to a report published in *Science*.

'Recent studies that have taken into account emissions from land use change have demolished the idea that ethanol always reduces greenhouse gas emissions'

But while destruction of the Amazon has generated much international visibility, the fate of the Cerrado, a biome known as the 'father of water' as it fills up the principal water basins of the country, has been largely ignored. More than half of this species-rich region has already been cleared, and, at the current rate, it will be totally destroyed by 2030.

The Cerrado is already being used to cultivate sugarcane, and is a major battle-ground for campaigners. The government has identified it as a potential area for expanded sugarcane production, primarily because its flat terrain allows for mechanised harvesting. A study has found that the production of sugarcane ethanol from converted areas of the Cerrado requires at least 17 years of ethanol production to recuperate the carbon lost into the atmosphere.

But in a wider sense, away from the tallying of carbon emissions, environmentalists point to the detrimental 'monoculture model' required to maintain large sugarcane plantations, wherever they be.

Friends of the Earth Brazil argues that aside from being a water hungry crop, sugarcane plantations' environmental impacts include the application of chemical fertilisers, intensive use of herbicides and pesticides, the pollution and decrease of available water sources, soil contamination, soil compaction by heavy machinery, destruction of native vegetation areas, contamination of rivers and springs, atmospheric pollution due to clearing cane plantation areas through burning, and the destruction of biodiversity.

Given this, Mendonca argues that the real cost of sugarcane production hasn't been accounted for.

'A true environmental impact study should include the whole agricultural sector and the whole process of ethanol production,' she says.

Government responds

Responding to concerns about deforestation from sugarcane growth, President Luiz Inácio Lula da Silva has said more than once that sugarcane will not be produced in the Amazon

In September this year, the President proposed an Agro-Ecological Zoning (ZEE) bill which limits where sugarcane can be grown. The bill, if passed, would prohibit the construction or expansion of sugarcane farms and production plants in any area of native vegetation, in the Amazon, or in Pantanal (Brazilian Wetlands).

It aims to restrict sugarcane production to regions that do not require full irrigation and areas that allow mechanised harvesting, helping to end the practice of clearing land by fire. It favours, instead, expansion into underused or 'degraded pasture land'. It has set aside 64 million total hectares for sugarcane planting, equivalent to 7.5 per cent of the national land area.

Lucia Ortiz, coordinator for Friends of the Earth Brazil, doesn't believe that the ZEE goes far enough. 'It doesn't refer to areas or projects that are already in force, and there are already areas in the Amazon region being cultivated. More than that our concern is that it permits a huge expansion of monoculture of sugarcane –these areas are very much concentrated where there is infrastructure available and environmental concerns have taken a backseat to lobbying from the sugarcane industry'.

Better Sugarcane

Elsewhere, the Better Sugarcane Initiative , a market-led standard for sugarcane, is being developed to 'mitigate the consequences of production and expansion of sugarcane,' according to BSI general manager David Willers.

The BSI standard, which is still being revised, measures labour and social issues, climate change, pollution and high conservation land use standards in a metric. Willers says BSI certification and labelling should begin by September 2010.

It is a member-based organisation, with big corporates such as Coca-Cola, BP, Tate & Lyle and Cargill already involved. Willers says the goal is for members to claim that their products have contributed to sustainable sugar and avoid 'certification fatigue' by being the one label used in the sugar industry.

BSI certification could have a positive effect, eradicating some of the worst practices such as wage-slavery, terrible working conditions, pollution from sugarcane production and moving towards some standard of biodiversity protection.

Yet when asked about sugarcane production indirectly contributing to deforestation, Willers said that although there are protections against sugarcane growth in high conservation areas, the BSI will not measure indirect land-use change.

While the BSI may mean 'sustainable sugar' becomes a mainstream standard, it won't necessarily guarantee that the future of sugarcane production -and the myriad products that spring from the resulting sugar compounds -will be sustainable.

Matilda Lee is the Ecologist's Consumer Affairs Editor

Environmental Funders Network

Where did all the green funding go?

There's still money to be had for good environmental projects, but it's a fraction of what's being spent in other areas, says **Harriet Williams**

Every one of us has a role to play in tackling climate change: governments have to enact policies to reduce carbon emissions; consumers have to show willingness to change behaviour; and business has to gear growth towards a low-carbon economy.

But one important player is missing from this cast list – philanthropy, broadly defined as the investment of private wealth to bring about public good. 'Good philanthropy', writes Alex Steffan, author of acclaimed sustainability blog WorldChanging, 'funds innovation that would otherwise never emerge, and supports action where none would otherwise be taken'.

The art of good giving is to bring about positive change, filling in gaps that government and corporate funders can't or don't want to reach, and catalysing solutions that would not pop up spontaneously.

As such, philanthropy seems tailor-made for breaking the stalemate that characterises today's environmental crisis, in which every other actor stalls on the grounds of political unpopularity, personal inconvenience or cost, perpetually waiting for someone else to move first.

Digging deep

It's true that a number of philanthropists have already seen good reason for investing in action to avert climate change, including foundations associated with companies like Sainsburys, Skype, Admiral Insurance and Tetra Pak.

'It's a no-brainer, what can I say?,' Peter Kindersley, co-founder of the publisher Dorling Kindersley, says of his support for Friends of the Earth.

The UK has a large, well-endowed philanthropic scene, with charitable giving by trusts and foundations worth over £2 billion a year. Foundations have helped bring about important policy shifts, investing in campaigns that led to the UK Climate Change Bill, European regulation on cleaner cars, and stalled plans for a new coal-fired power plant at Kingsnorth.

But a new report for the Environmental Funders Network, a grouping of green-minded philanthropies, suggests such examples are the exception, rather than the norm.

The carbon gap

In 2007, only 3 per cent of trust giving went towards environmental causes, and only one tenth of this – £5.9 million – directly targeted carbon emissions. ExxonMobil burnt through nearly double this amount lobbying on US climate policy in the first half of this year.

Even the 97 environmental grantmakers identified in the report only direct 10 per cent of their spending towards climate change mitigation.

More encouraging is the finding that UK trusts which do make environmental grants are upping the ante considerably, and increased their green giving at nearly ten times the rate of inflation between 2005 and 2007. Interestingly, the US – long cast as a climate laggard – has stolen a march on the UK here. On a per capita basis, US foundation giving to the environment runs at nearly four times that of UK trusts, and US foundations nearly quintupled funding for climate change between 2004 and 2008.

Nonetheless, these amounts are vanishingly small compared to levels of public concern over climate change. As we know, climate is much more than an environmental issue. Human health and development are issues of huge interest to the foundation sector, and rightly so. Yet philanthropic investment in both stands to be jeopardised by rising global temperatures, which will spread disease, create environmental refugees and foster conflict.

Why the green blind spot?

How can we explain the disconnect between trust priorities and environmental realities? The report suggests reasons why grantmakers find it hard to engage.

For one, there is a preference for tangible outcomes – philanthropy has moved on from a time when success was measured in name plaques over museum doors, but there is still a liking for things that can be visited or counted.

Examples would include the purchase of mosquito nets to prevent malaria, or the restoration of habitat for endangered species. Both very worthwhile activities, but both of which could be set adrift if climate change spreads disease to new areas or renders whole ecosystems defunct. Attributing cause and effect is also at odds with the messy processes of social change. Action on climate change takes place many steps removed from the people or places that philanthropists ultimately wish to protect.

Efforts to redesign policy, business practice or public behaviour along lower carbon lines proceed in unpredictable fits and bursts. If these efforts succeed, it is hard to apportion the credit. For instance, was it public mobilisation, academic research, or fortuitous political timing that finally won the Climate Change Bill? The answer is all of the above.

Risk culture

Good philanthropy is about innovation, creativity and taking risks – reasons why it is a valued income stream among environmental groups, although not usually the largest.

Ironically, the interests ranged against tackling climate change can appear more comfortable with these risks than the forces of light. The rise of right-wing think tanks in the US is an often used example of how conservative foundations have successfully shaped political debate. The American Enterprise Institute and its ilk are certainly not pretty, but they are not shy about seeking change.

This returns us to the response of philanthropy to today's twin environmental crises of climate change and over-consumption of resources. The foundation sector should aspire to lead, not fund the same roll-call of activities that open the government or corporate purse. Leadership requires an increase in green grant-making and bold strategies for giving it away.

Not an easy role to step into. But it is in developing a vision of a sustainable future, and rallying the social change that helps it come about, that modern philanthropy could take centre stage.

Harriet Williams works for the Environmental Funders Network