

ECOLOGIST

SETTING THE ENVIRONMENTAL AGENDA SINCE 1970

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Taking energy into our hands Ed Mayo



Late last year we, Co-operatives UK and The Co-operative Group, published a new report which reveals the growing number of people who are choosing to start renewable energy co-operatives in their communities, against all the odds.

What is exciting about the report is that it is the first and most comprehensive guide to what amounts to a new movement of communities who are taking action for greener energy into their own hands.

In a time of doom – when all talk is of cuts, unemployment and rising prices – this report highlights a different story. Despite, or maybe even because, of the wider economic woes, people across the UK are creating a co-operative movement for green energy.

There are now 43 communities who are in the process of or already producing renewable energy through co-operative structures. They are set up and run by everyday people – local residents mostly – who are investing their time and money and together installing solar panels, large wind turbines or hydro-electric power for their local communities.

The report highlights a series of examples. Like Ouse Valley Energy Service Company, which is owned by 250 people who have installed solar panels on a local brewery. Or River Bain Hydro, which installed a hydro electric power generator in its local river with investment of £200,000 from around 200 people.

The report also shows that together across the UK local residents have invested over £16 million in these co-operatives. These range from over £4 million which has been invested by over 2,700 people in Westmill Wind Farm in Oxfordshire, right through to around £38,000 which has been invested by around 34 local residents to install solar panels on a local primary school in Nayland, Suffolk.

Overall, Co-operative renewable energy in the UK is a testimony to the fact that green economy co-operatives are the fastest growing part of the UK co-operative sector, having grown by an astonishing 24 per cent since 2008.

What amazes me about this growing movement is that it is emerging against all the odds. This government's rhetoric about supporting community owned renewable energy has not yet been backed up by an integrated plan to make it a reality. As many of the people in renewables co-operatives in the report say, there's a lot stacked against communities on this – changing legislation and red tape, not to mention hard economic times.

For a start, government legislation keeps shifting, and there's no better example of this than the government's recent slashing of the solar Feed in Tariff. Whilst we recognise that the solar tariff was generous, the early and dramatic nature of the cut means several energy co-operatives have been put on hold.

Like many, Co-operatives UK and The Co-operative Group are campaigning on this in the hope that government will introduce the planned premium community tariff that encourages communities to create green energy together. But the fact that it was cut at such short notice has been a serious set back for many co-operatives.

Planning hurdles and bureaucracy are also a major problem for small community renewable schemes. With complex planning regulations and a wide range of organisations to deal with – the Environment Agency, Distribution Network Operators, local authorities, funders and so on – it is hard for small community renewable schemes, often set up and run by local volunteers, to get things set up.

River Bain Hydro, for example, has successfully set up a hydro electric scheme in North Yorkshire, despite spending a large proportion of its limited time negotiating with power companies because of a lack of co-ordination. As they explain: "Between the power house and the grid, a distance of a hundred yards, we ended up with five different organisations involved in delivery."

With a financial crisis, cuts and difficult environment, perhaps we shouldn't be surprised that people across the UK are coming together to create green energy themselves. The co-operative sector, which has always been there to support people trying to make a difference, is doing all it can to help – whether through schemes to support community shares or through The Co-operative Bank's commitment to invest £1 billion in renewable energy by 2013, and its broader support for new co-operative enterprises.

As we all know now, we have built an economy based on a financial house of cards of banks, bonds and bail-outs. When you strip away the hype and hope, the only feasible alternative strategy is one that is based on bootstrap development of local enterprises such as these, making use of the three unlimited sources of wealth we have – people, ingenuity and renewable energy.

*Ed Mayo is Secretary General of Co-operatives UK, the trade association for co-operative enterprises.
To read the report visit www.uk.coop/renewable*

COVER PHOTO: Our exclusive photographic story from Peter Caton exposes the human cost of endosulfan

Supermarket food waste to power renewable energy instead of tackling food poverty

Food aid charities argue supermarket food waste could help prevent hunger in vulnerable people. Yet supermarkets' anaerobic digestion plans may eclipse food redistribution says **Matilda Lee**



Campaigners say feeding those suffering from food poverty should be a priority

For little more than the price of a big cup of coffee at Starbucks you can get a warm and hearty three-course lunch made from scratch at the Station House Community Café in Haringey, London. The café is a 'big society' outfit: run by volunteers, with a social mission and a linchpin in a community that, like many others, has suffered the closing of local shops. All the food that goes into making £4 veggie lunch at the café are donated by the nearby Sainsbury's supermarket. This is perfectly good fruit and vegetables that the supermarket can no longer sell and would otherwise go to waste.

Danny Turi, Station House's newly hired manager, explains how it works: 'On Thursdays I go by the Sainsbury's in Haringey and pick up the food they have donated. At 3:30 pm, 4 volunteers show up, we lay it out on a table and in 15 minutes we devise a menu of two starters, one main and three desserts. What I love most about cooking is that it's local, vegetarian and seasonal. Everything is perfectly edible - just nearing or on its sell-by date'.

Both the Station House Café and the Pie in the Sky Cafe in Bromley-by-Bow, which serves, 'the healthiest meal in the square mile' of an area saturated

with chip shops and off licenses, were started by Kelvin Chung (pictured below), via his food non-profit Food Cycle.

The aim of these cafes is to put to good use at least a little of the 361,800 tonnes of fresh food waste produced by supermarkets each year, according to WRAP. Up until quite recently, most of this waste was sent to landfill, but food distribution charities are desperate for the donations to enable them to serve thousands of people for nothing or next to nothing.

Activists say that supermarkets' food waste could provide those suffering from 'food poverty' access to fresh, healthy meals and are pushing for supermarkets to integrate the distribution of food waste to charities into their food waste plans. For example, last year, the food industry redirected 3,600 tonnes of surplus food to FareShare enabling the charity to provide 8.6 million meals for vulnerable people.

Yet, these efforts are in danger of being sidelined as supermarkets look for the most 'efficient' ways to get rid of unwanted food, leading to policies that prioritise anaerobic digestion for renewable energy, rather than food redistribution.

Anaerobic digestion vs. feeding the needy

Tristram Stuart, campaigner and author of *Waste: uncovering the global food scandal* says most supermarkets' food waste reduction policies see waste sent for anaerobic digestion when other methods, such as redistributing food to those in need, should be prioritised.

'Supermarkets have in the last few years adopted a wide range of waste reducing policies and have adopted more proactive waste management policies. Most have targets for sending waste to anaerobic digestion, that is the most popular. However, the main purpose of our campaign is to show that there are even better things to do with food than produce renewable energy - mainly, feed people.

Last month, Stuart's charity Feeding the 5000 saw over 5,000 people gather in Trafalgar Square (pictured below) to get a hot, freshly cooked meal for free. The event was meant to showcase

just how much perfectly good fruit and vegetables go to waste, much of it simply because it doesn't meet supermarkets' strict cosmetic standards.

'We picked up about a ton and a half of red cabbages from Lincolnshire that were going to be ploughed back into the field. We could have taken more. The problem is logistics, who pays for that transport?' Stuart says.

'Mainly because of cosmetic standards, some 20 to 40 per cent of produce at farms never reaches supermarket shelves. It is usually fed to livestock or ploughed back in the field,' he adds.

Streamlining food waste policies

'There is like-for-like 14 times greater redistribution of food from supermarkets in the US compared to the UK. Social welfare is a greater thing and there is a lot more philanthropy. Sure, it is used by governments to release and deflect pressure for proper welfare measures. But it is what we ought to be doing here.

It is very, very effective and organisations such as FareShare do not simply dole out food, these are organisations that supply much more than that.'

He says that there are legislative and fiscal incentives used in the US that could be adopted in the UK.

Stuart gives the example of the US Bill Emerson Good Samaritan Act, which encourages the donation of food products to nonprofits for distribution to needy individuals.

'This basically protects retailers legally against people who may get sick. This is a knee jerk excuse companies use for not engaging more with charities and it is by and large a bogus excuse.'

'There's been back-of-store food redistributed for decades to homeless shelters and the like. But they exist in an ad hoc way, it is down to individual store managers as to whether they say yes,' he adds.

Marks and Spencer's, for example,

say it donates any remaining food to local charities on a 'store by store basis' or to FareShare. Any food that is left is recycled - currently 89 per cent is sent to anaerobic digestion units, the remainder is composted, according to an M&S spokeswoman.

Sainsbury's donate the majority of its food waste to charities or anaerobic digestion however aims to send all its food waste to anaerobic digestion by 2012.

Kelvin Cheung, of Food Cycle, says that a supermarket's store by store policy has meant that his charity is at the mercy of individual store managers, and receiving leftover food waste depends on whether the store manager is sympathetic to their cause.

Tristram Stuart believes supermarkets should have a default policy to donate unwanted food to charities. 'They shouldn't have it as a store by store policy. They should seek out local homeless charities. Supermarkets have

a responsibility to ensure that food is consumed. If you fail, you are contributing to malnourishment and global warming - all the things food production is involved in.'

Dr. Richard Swannell, Director of Design & Waste Prevention at government-funded non-profit WRAP says the

best way that supermarkets can reduce food waste is to prevent it in the first place. 'That's where you get the biggest environmental benefits. We are trying to encourage it through the voluntary Courtauld Commitment. If you can't sell it, then distribute it charities such as FareShare. After that, if it's possible, it should be substituted for animal feed, if it's not safe and suitable for consumption, then it should be sent for anaerobic digestion, finally composting.'

“Mainly because of cosmetic standards, some 20 to 40 per cent of produce at farms never reaches supermarket shelves. It is usually fed to livestock or ploughed back in the field.”

'Soundscape ecology': the new science helping identify ecosystems at risk

As industrial development and human encroachment intensifies globally, academics believe the study of natural soundscapes could teach us much about how ecosystems function - and how they are under threat.

David Hawkins reports



Increasing industrial expansion is threatening 'sonic diversity'

Acoustics tie us to nature. Natural, ambient sounds give us a picture over time and define place. Sound also carries information about the time of day or seasonal time; every landscape has a rhythm to it. Cicadas here in the Midwest are very loud in the late summer – in fact they’re called Dog Days cicadas. As humans we’ve become accustomed to what these natural sounds are but as ecologists we haven’t studied their meaning in a very holistic way...’ Dr Bryan C. Pijanowski and his colleagues at Purdue University, Indiana seek to change that by pioneering the emerging science of soundscape ecology.

To get an overview of a soundscape it’s necessary to study the biophony (sounds that come from animals), geophony (geophysical signals that are the result of the movement of wind and water and earth) and anthrophony (sounds produced by human activity). As Dr Pijanowski explains: ‘The idea is to study the patterns of all of these, how they occur and emerge in different landscapes around the world. From this we can learn about ecosystems and how they function, and how these ecosystems might be threatened by the measure of anthrophony, because anthrophony provides us with a reflection of the amount of human activity that occurs in a landscape.’

By its nature soundscape ecology is interdisciplinary and collaborative.

‘It’s based on a lot of work that’s been done by bioacoustics experts – who have been studying birdsong and vocalisation and communication in animals for decades. We’re also building upon the work of acoustic ecologists who have turned their ears to natural sounds and who are

often musicians. They have provided us with a rich vocabulary to begin to think about these natural soundscapes. Then there are cognitive psychologists who know how vertebrates process acoustic information and how certain kinds

of sounds can give us an emotional response.’

The team at Purdue are trying to bring all this together: ‘We’re saying for the first time that that soundscape is fully a reflection of the landscape.’ Implicit in this is that soundscapes should be treated as equally important and preserved with as much zeal as the landscapes we can see. Previously no-one had thought about developing a system of classification for soundscapes but this new field aims to do just that while also thinking about how we might start working to protect them.

‘We’re interested in identifying soundscapes that might be threatened and that if lost would mean losing part of the acoustic heritage of the earth. There are some that are phenomenal and unique and are only found in one location.’ Human activity and the anthrophonic sounds arising from it are one of the main drivers of change in soundscapes, while climate change is another. Can the study of sounds be used to discover if something is wrong in an ecosystem?

Understanding climate change
‘Because geophony is a reflection of climate we think we’ll be able to use it as a means to understand climate change. A lot of the organisms that vocalise are temperature-dependent like insects and amphibians. So climate change could alter the natural soundscapes in ways that might

be important to ecosystems – affecting things such as predator-prey relationships.’

A good deal of research has been done at La Selva biological station in Costa Rica. In that environment, streams are very noisy after rainfall and this explosion of geophony

occupies a lot of the acoustic space. ‘For organisms that are trying to vocalise and find mates, if the climate was to change and it stayed rainy for longer or shorter periods it could seriously affect their chances of reproducing, because

the geophony is so dominant in that landscape and when the rains stop everyone is vocalising.’

Climate change can alter geophony and there could be a compression of vocalisation opportunities in time. Sonic diversity can also be a sign of a healthy ecosystem. A study published by Pijanowski and colleagues in March 2011 in the journal *Bioscience* suggested that in undisturbed forest the acoustic niches are very complex, with a lot of biological signals present. But as you move into more human-dominated landscapes far fewer biophony patterns are found. The dawn chorus and dusk chorus dwindle or don’t exist at all in many human-dominated landscapes.

‘There have been several papers published in high-profile journals like *Nature* and *Science* in the last few years where we’re beginning to see these interactions between anthrophony and biophony’, says Pijanowski. ‘There are a lot of different kinds of biological responses to noise in landscapes. For example, birds can begin to sing louder, or raise the pitch of their singing, to make their voices heard across the noisy landscape. Or in some cases they may shift to singing at night, when it’s quieter.’

Landscape ecology

‘Some organisms are more adaptable and so can alter their behaviour to deal with a noisy environment, but others like insects stridulating that are fixed in their frequency patterns and so if they’re drowned out they’re just drowned out for good. Nesting success can be affected as well. We’ve just published a series of papers in *Landscape Ecology* that looked at soundscape ecology in a variety of perspectives and some of these showed that bird behaviour really suffers in noisy environments.’

An important distinction is that anthrophony tends to be just noise with no meaning, whereas natural soundscapes are communicative networks buzzing with information. The Purdue University soundscape ecology research project is trying to use information theory to extract these complex biophonic signals from the background hum of anthrophony.

‘One of the things we’ve been doing

“We’re interested in identifying soundscapes that might be threatened and that if lost would mean losing part of the acoustic heritage of the earth.”

here in Indiana is setting up acoustic sensors in all different kinds of habitats. We've been recording continuously, day and night, for about four years. We now have a tremendous amount of data and we're beginning to analyse how different habitats vary in their acoustic signals.'

Soundscapes exist everywhere and the need to safeguard our natural acoustic heritage is surely something which should be emphasised more. But urban environments are places where we can exercise positive design to create the soundscape or change it for the better. Dr John

Levack Drever, a composer and acoustic ecologist at Goldsmiths, University of London, explains that a lot of contemporary thinking in this area goes back to the great listener Murray Schafer.

'Schafer says that the reason cities are getting louder is that we don't know how to listen, and nobody is properly trained to design sounds. In order to design environmental sound to better ends we first need to learn to resensitize our listening and to then design from that perspective.'

Noise mapping

The particularities of place are central to this, the meaning and memories of sound, and all the sonic associations we carry with us. 'Schafer shifted emphasis away from just the noise aspect, which had been the main focus when thinking about soundscapes up until that point, to considering more positive soundscape design.'

Dr Drever complains that acousticians aren't expected to make qualitative judgements about sound, but rather just measure 'sound pressure levels' (volume). These data are fed into Defra's Noise Mapping department that seeks to work out where 'noise hotspots' are and formulate action plans to tackle them. 'But the whole thing of course is a huge generalisation and a huge oversimplification; it doesn't involve people and their perceptions or a

dialogue about how we want our cities and environments to sound.'

'There has to be a closer dialogue between a community of creative listeners like musicians and sound artists (who are working with environmental sound and its qualitative aspects) and the engineers and architects who craft our soundscapes. We also need to evaluate the sounds

that might already be here before a major rebuild takes place. I am also wary of how soundscape design can be used as a marketing tool, and the sterile corporate soundscape that we might be moving towards.'

There is also serious concern about sounds that are beyond the hearing range of the average adult. Dr Drever adds: 'We might not be completely aware of how frequencies we can't hear (for example those below 20 Hz) might be affecting us, especially when they're at very high levels. At the other end of the spectrum, frequencies of 16 kHz and higher are used to keep "undesirable" teenagers away from certain places.'

Even if you're broadcasting frequencies that the average adult can't hear, you're still filling the space with frequencies, potentially at quite high volumes. The main worry is always that somebody is going to have permanent hearing damage. But these volumes and sounds can affect you in other ways... And what about species that use that range of frequencies?'

Both Pijanowski and Drever advocate and practice soundwalking in order to reconnect with the soundscapes in which we dwell. Dr Drever reveals that he has 'always been amazed at the level of listening that's happened. People really have quite profound experiences when all they're doing is listening.'

In future will we perhaps see the emergence of an ecotourism of the ear?

In the meantime there is an enormous amount of concerted listening, recording and analysing to be done in order to conserve soundscapes that are crucial to our natural and cultural heritage. Dr Pijanowski: 'It's my hope that our research could impact on policy that regulates noise and helps protect the natural soundscape. We're in danger of severing our acoustic link with nature. We often seem to no longer hear it or see it – and does that mean we no longer value it, as a species?'

“The reason cities are getting louder is that we don't know how to listen, and nobody is properly trained to design sounds.”



The impact of a loss of 'soundscapes' is only just beginning to be understood

A web of environmental, economic and social forces have shaped UK landscapes for years. Environmental awareness has slowed encroachment on natural areas, but serious threats persist. Is it time for a fresh approach?

By **Sam Campbell**

How eco-logging and livestock grazing can protect UK's natural landscape



Eco-logging is being pioneered as a landscape management tool - but logging still faces PR hurdles. Photo: Dave Mercer / Natural England

Emma Lusby, Senior Press Officer at Natural England, told the Ecologist that some conservationists prefer not to make a distinction between environments termed “wilderness” and those called “natural”. ‘We’d not really use these terms to differentiate between areas, when talking about habitats and the wider environment,’ she said. ‘All our landscapes are managed to some degree – to produce food, as parks and gardens, for development and drainage for example.’

She noted that the only truly ‘natural’ environments in the UK are the rare remnants of Caledonian pine forest. Even these often need some degree of management in the form of ensuring non-intervention.

Fiona Whitfield, Conservation Officer at the Lancashire Wildlife Trust (LWT), drew similar conclusions. ‘There are no wildernesses left in England,’ she told the Ecologist. ‘Management is required to “maintain” many English landscapes.’

‘LWT and other conservation organisations tend to manage habitats as part of wider landscapes – all habitats require management otherwise succession to woodland would occur. This would be fine if there was enough room for a habitat to succeed and another be replaced due to natural processes such as fire, wind blow and so on, but humans have now taken up so much room for housing, infrastructure and agriculture that natural processes cannot take place.’

Nature reserves are now managed to maintain and protect special, rare habitats like heath, dunes grassland, woodland, ponds and wetland, mosslands, and thus ensure the survival of the rare species that depend on them.

Such environments were often once profitable producers, grazed by cows or sheep, for example, with the ecological benefits a secondary benefit, often not considered at all. England’s changing economy means that such management is increasingly the responsibility of conservation organisations. Conscious of the inherent contradiction of using high carbon management that can worsen other environmental issues, organisations have taken inspiration from traditional methods, termed “naturalistic” by conservationists.

‘Often using cattle, horses, or sheep is less invasive, than machinery, probably cheaper, quieter, more sustainable, and is also better for the soil as they don’t compact the ground like diggers’ explained Lusby. ‘Animals can also reach the parts that machinery cannot go and their style of gentle grazing and moving around benefits the plants.’

This low impact approach has become Natural England’s ethos, she added. ‘We’ll always use or advise on using the most appropriate regime to protect, restore and/or enhance a particular habitat, and within the given circumstances. This comes from trials elsewhere, the best available knowledge and evidence; there’s lots of sharing of info.’

Grazed needs

The LWT has also recognised the benefits, using a mix of animals for grazing depending on the type of habitat. ‘LWT has recently bought its own flock of Hebridean sheep and is now breeding from them, has a herd of Longhorn Cattle on loan and has employed a full time Conservation Grazing Apprentice,’ Whitfield said. ‘LWTs commitment is to sustainably manage its reserves and it is working on ways to manage its own flock on its own reserves and beyond in perpetuity.’

Sian Parry has been working on the LWT grazing project since April this year, when she was taken on via a Grazing Advice Partnership (GAP) trainee-ship scheme. Parry explained that different animals are used for different habitats, for example sheep on dune heathland, but Longhorn Cattle on wetland sites. ‘As well as habitat, the objectives for the site have to be considered so we don’t necessarily do year round grazing on sites,’ she explained, adding that careful consideration is needed before reserves are grazed. ‘The LWT are always considering whether it is appropriate to put animals into an area.’

Grazing is becoming a fairly popular approach within conservation, Parry said. ‘It is a more natural method of

scrub control – the browsing habits of the livestock can create tussocks which then become suitable for all different wildlife and generally helps to increase the diversity of area.’

The benefits of are clear from a hay meadow on Freshfield Dune Heath, owned and managed by the LWT. Since 2005 the number of plant species has increased from 39 in 2005 to 76 in 2011. Vascular plant numbers have increased from 76 in 2005, to 281 in 2011. ‘This benefits the environment by allowing plants a place to thrive with the knock-on effect of increased numbers of invertebrates – over the whole site in 2005, 500 invertebrate species were recorded increasing to 890 in 2011. This then has a knock on effect for birds, mammals and reptiles,’ said Whitfield.

She cited as an example increasing sheep sorrel (*Rumex acetosella*) leading to an increased population of small copper butterflies (*Lycaena phlaeas*).

Depending on finance and infrastructure, there is huge potential for using grazing in all sorts of environments, Whitfield argued, from common land in the south of England to the Welsh mountains, where a mix of goats and sheep graze inaccessible areas. The alternatives to grazing are removing invasive species by hand

– not feasible given conservation’s manpower constraints – or to use machinery.

Nevertheless, Whitfield stressed that grazing must not be seen as a silver bullet, suitable for all sites. ‘Every management

technique has its pros and cons, and most habitats benefit from a mixture,’ she said. ‘The benefit of using animals as a management tool is that they do the job slowly over time, living with and being a part of the landscape. They give a different structure to a habitat and do not cause a devastating effect, which many mechanical means do. Animals do have their limitations and do not necessarily do the exact job needed by overgrazing, by undergrazing, by not eating a target species or by eating a desired species.’

“She noted that the only truly ‘natural’ environments in the UK are the rare remnants of Caledonian pine forest.”

However, the machine-associated expenses of fuel and depreciation are not applicable with animals, she pointed out. 'A benefit to using animals is they can help offset some of their own costs either through breeding and selling live animals or meat.'

And benefits are not confined to the economic and ecological: 'Animals change the dynamic of a landscape just by being there – being a point of interest for human visitors,' Whitfield said.

Eco-logging

These less tangible considerations were key in the decision to use animal power to redeem perhaps the most vilified form of management – logging. Logging has for decades been the prime enemy of conservationists across the world. Images of timber extraction have become synonymous with environmental degradation and destruction. But some species, at least in the UK, require environments shaped by tree cutting.

The 492-ha Ainsdale Sand Dunes National Nature Reserve, a large sand dune system which stretches approximately 20km from just north of Liverpool up to Southport, is one such area.

Dave Mercer, Natural England's Senior Reserve Manager for the Ainsdale Sand Dunes and the Ribble Estuary NNRs, explained that the area, which has Special Area of Conservation (SAC) status, is home to the most northerly colony of sand lizards (*Lacerta agilis*) in the UK, to 40 per cent of the UK's natterjack toads (*Epidalea calamita*), and has specialities like dune tiger beetles (*Cicindela maritima*).

While the open dunes are managed with sheep and cattle grazing, approximately 170 ha is Corsican pine (*Pinus nigra*) woodland now colonised by endangered red squirrels (*Sciurus vulgaris*) and managed for them. But approximately 2.5 ha of the woodland is broadleaf and naturally occurring alder woodland in one of the dune slacks. Mercer said that trees have to be felled to ensure the continuance of the alder coppice habitat, rare in a coastal area. Alder coppice is associated with bramble flowers, which in turn attract the dark green fritillary butterfly

(*Argynnis aglaja*) and the vernal mining bee (*Colletes cunicularis* ssp. *Celticus*), a UK Biodiversity Action Plan (BAP) Priority Species.

Despite the necessity of tree cutting in the area, Mercer said that such management can be a public relations problem. 'When there's a large urban population near a woodland area, there's not always a clear understanding why trees are being cut down,' he said. Objectives such as thinning to lessen the incidence of needle blight and to promote the regeneration needed for transient habitats for ground flora and invertebrates are easily understood by conservationists but are not immediately obvious to the general public. 'Nobody likes to see a big automated extractor while walking in the woods,' Mercer added.

The solution was obvious, at least to Mercer, who has long taken an interest in sustainable forestry. 'I had seen horses working in the Lake District and in Keilder Forest, and had been to demonstrations over the years. I realised that horse-logging could be an ideal solution to our PR issues.'

Painter, a Cyldestdale cross pony, now hauls logs out of the woods, the continuation of an ancient symbiosis of man and beast. But the project is far from primitive. Mark Turnbull, one of the horse logging contractors registered at the British Horse Loggers, the industry's national body, explained that his tools range from a simple log chain dragged behind the horse, to a custom 8-wheeled, Swedish-built timber buggy with flotation tyres.

'The chain has been around thousands and thousands of years and that's how they pull out logs with elephants. But there's a limit to what you can drag out in a day and you do cause a bit of surface damage,' he said. When using the buggy, on the other hand, 'you can hardly see where it's been', Turnbull added, although its usage is limited by the terrain. Both are used on the site, he said, chains pulling the timber to more

accessible areas, where it is loaded onto the buggy.

Horse logging is about far more than just public relations, however. The coppice site is surrounded by sand dunes so the topography is very steep. Access for large machinery is thus very difficult. At 15.2 hands high, Painter is sure-footed, able to extract timber effectively and safely through standing trees without causing any damage to trees, without compacting the soil and damaging roots, or otherwise disturbing the flora and fauna.

Conservationist groups are currently the main demand for horse logging, but these methods are gaining traction as a viable and sustainable industry for the 21st century. 'We're getting more and more recognised,' said Turnbull. 'It's never gone away but now more landowners and estates are using our services.' He added that a better work ethic has meant that perceptions of horse loggers as inefficient are

changing. 'If we're going to do a job, we don't mess about – we get stuck in and do a good day's work. It seems to be working – we are enjoying a resurgence.'

Horse logging can appear to be expensive,

superficially: Highly skilled and complex work, it demands a premium. But take into account the greater finesse, lower impact, and lessened reliance upon expensive infrastructure such as roads, and the cost equation evens out. As fossil fuels grow more expensive, horses will be ever more cost effective.

The rising price of timber is another factor, Turnbull said, the price of the extracted wood significantly offsetting management costs. Even lower value coppice produce can be in demand in a specialist market, for example birch shavings used in pot-pourri.

Turnbull is upbeat about the future of horse logging. 'We've got Prince Charles on board now and he's playing a very active role as patron,' he said, adding that his own 19-year-old son has decided to join the business. 'The future's rosy.'

“When there’s a large urban population near a woodland area, there’s not always a clear understanding why trees are being cut down.”

Cetaceans under siege as man-made perils blight the oceans

Whales, dolphins and porpoises have no respite from oil and chemicals, fishing nets, shipping, noise pollution and a host of other dangers brought about by man's unrelenting destruction of the sea, says **Anthony Wall**



Cetaceans face an increasing array of threats from man's continued plunder of the oceans

Noise. A curse – the curse, some would say- of modern life. Noise, day and night. In cities, where more than half of us now live, decibel levels are soaring. Intrusive noise robs us of vital sleep and, say researchers, contributes to all manner of ailments and afflictions. The World Health Organisation pinpoints; stress, insomnia, tinnitus and hearing loss, high blood pressure, aggression, inability to concentrate, tendency to heart attacks.

It has even been suggested that our unquiet lifestyle is driving us mad. Human beings are just not equipped, physically or psychologically, to cope with this rising racket. It's self-inflicted torture. But what of the other creatures who share our planet and whose habitat we habitually invade and despoil? They too can be driven to distraction by the pervasive man-made din.

Nowhere is this truer than in the seas around us. Once, the loudest sound to permeate these waters was the lowing of the mighty blue whale. But today... Drilling, blasting and seismic surveys for offshore oil and gas; powerful sonic booms from Naval vessels; the constant thrum of maritime traffic. All these bring distress, sometimes death, to whales (and their dolphin and porpoise brethren). With super-sensitive hearing, 20 times keener than man's, they are trapped in a newly hostile environment. Traversing the dark deep, whales must rely not on sight but on sound.

Marine biologist Chris Clarke explains: 'Whales use a variety of sound signals to navigate, communicate, find food and mates. They're long-lived mammals. The bowhead, for example, can reach an age of 200. So, during its lifetime, a whale will have gone from a natural realm of relative quiet to one in which it may be deafened and forced to shout.'

And mechanical noise pollution doubles every decade. The source of

this acoustic bombardment is both military and civilian.

A prowling frigate sends out high-intensity sonar pulses as it hunts for enemy submarines. Elsewhere, oil prospectors are probing the seabed with thunderous giant airguns. Whales flinch and flee.

Nor does the torment end there. Cargo and passenger ships –passing in an ever-lengthening procession- induce further panic. Their propellers resonate on the same frequency as the whales' echolocation system.

The bends

'It must be like living next to a jam-packed motorway,' says Chris Clarke, 'only worse because your hearing is so acute.'

When whales surface too quickly, startled and disoriented, they are known to suffer 'the bends'. This agonising, potentially fatal condition results from nitrogen bubbles in the blood. Deep-sea divers dread it. But they, at least, can take remedial measures. Unlike the luckless whales.

From around the globe come harrowing pictures of mass strandings as the great beasts (scores at once and with the occasional pod of dolphins for company) beach themselves in a seeming suicide bid. Deliberate or not, it usually succeeds. Sometimes, if rarely, the high-and-dry casualties have been re-

floated on a rising tide. In most cases, though, concerned spectators can do little but watch helplessly – and hope. Now and then, a vet will put a far-gone whale out of its misery.

What lies behind these 'mysterious' strandings? Again,

man is implicated. The US Navy admits that sonar disturbance has led to whales beaching – in the Bahamas, for example- and takes full responsibility.

Not every stranding can be blamed on human activities. But scientists at Woods Hole Oceanographic Institution, conducting post-mortems, find clear evidence of a link between the two. CT scans often reveal bleeding around the

whales' inner ear as well as serious damage to other organs. No one here doubts the cause: anthropogenic (man-made) noise.

Sea mammal specialist Jill Bell adds: 'Whales also face a more insidious threat, what I call aural smog, a kind of persistent background hum. Their language – clicks, creaks, groans, whistles, chirrups – it's becoming less and less audible.'

(Even the ocean-spanning arias of that legendary singer the humpback no longer carry as far as they did.)

Beneficial impact

'I believe the well-being of the entire whale family is at risk,' she concludes, 'and maybe its long-term future.' How can we help these amazing animals, an 80-strong clan, early icons of the environmental movement (though still not safe from barbaric harpoons)? Like us, whales are warm-blooded, air-breathing, feed their young on milk, speak to each other, and are renowned for their play, music and intelligence. Unlike us, they have a wholly beneficial effect on the marine ecosystem.

But people, in growing numbers, care passionately about the whale's fate. A conservation-conscious public, following the lead of bodies such as WWF, Greenpeace and Friends of the Earth, continue to tell government and industry: 'Clean up your act'. A start has been made. Rules (not universally observed) already exist to try to shield whales from human hubbub and disruption. We monitor their migration routes, and –whenever practicable- stay away from breeding and calving grounds. Some shipping lanes have been shifted to avoid areas where whales regularly congregate. Speed limits may be imposed on large vessels in coastal waters. The aim is to lessen the likelihood of colliding with whales.

Alas, 'ship strikers' are far from uncommon. In 2010, luxury liner Sapphire Princess plough into a humpback while cruising off Alaska. No one on board noticed. Only when Sapphire had to increase power to maintain her rate of knots did the captain become suspicious. He halted the ship – to discover a dead whale lodged in the bulbous bow. The humpback was eventually towed away

**“Marine biologist
Chris Clarke explains:
“Whales use a variety
of sound signals to
navigate, communicate,
find food and mates.”**

by a tug. This was the ship's second strike within a year. After an almost identical collision,

Sapphire Princess arrived at Vancouver in Canada bearing a whale corpse before her.

One species is especially accident prone, reports the WWF. Northern right whales seem strangely unaware of the

peril posed by, say, a looming tanker, and will not attempt to move aside. Fatalities are thus inevitable. Indeed, ship strikes may account for up to 90 per cent of 'non-natural' deaths among these sitting targets.

Cetaceans (whales, dolphins, porpoises) have no respite from an ongoing siege. They're choked and poisoned by circulating oil and chemicals, drowned in entangling nets, while mothers and calves are abruptly parted by full-throttle powerboats with slashing propellers... man's impact is inescapable.

Discarded litter strews, and sinks into,

the sea. Unsuspecting whales ingest it. When biologists in Seattle dissected the

“When biologists in Seattle dissected the carcass of a young grey whale, they were astounded at what they saw. Its stomach contained 50 tonnes of debris.”

carcass of a young grey whale, they were astounded at what they saw. Its stomach contained 50 tonnes of debris. Among the items catalogued: dozens of plastic bags, surgical gloves, a golf ball, small towels and a pair of sweatpants.

Marine pollution takes many forms. Of these, polluting noise is a worse and more widespread problem that we recognised. As Woods Hole scientists point out, virtually all ocean ocean-dwelling animals depend to some degree on their hearing. If that is impaired, the consequences could prove dire, perhaps life-threatening – for fish, say, and also for multitudes of hungry people.

But back to the whales. While our population zooms, billion by billion, their struggles to recover from the past onslaught of international whaling. Slow-breeding creatures (a cow may give birth to a single calf every two or

three years), whales have never found it easy to meet potential partners in the huge expanse of water where they roam. Now, due to encroaching human clamour, the task is doubly difficult.

They're been here 50 million years, an eternity compared with that rowdy arch-invader *Homo sapiens*. After everything we've done to them, whales deserve a break. Let's give them some peace.

WHALE SUPERLATIVES

The 180-tonne, 100-foot blue whale is the largest creature that ever lived. Starting as a barely visible egg, it increases in weight 30 billion times during its first two years.

The sperm whale, immortalised in *Moby Dick*, can dive two miles deep and stay under for as many hours. Its prey includes the fearsome, fast-moving giant squid which still eludes man.

A humpback hurls its 40-tonne body more than 50 feet into the air as courtship display. One of nature's truly astonishing spectacles – and the most powerful single action any animal performs.

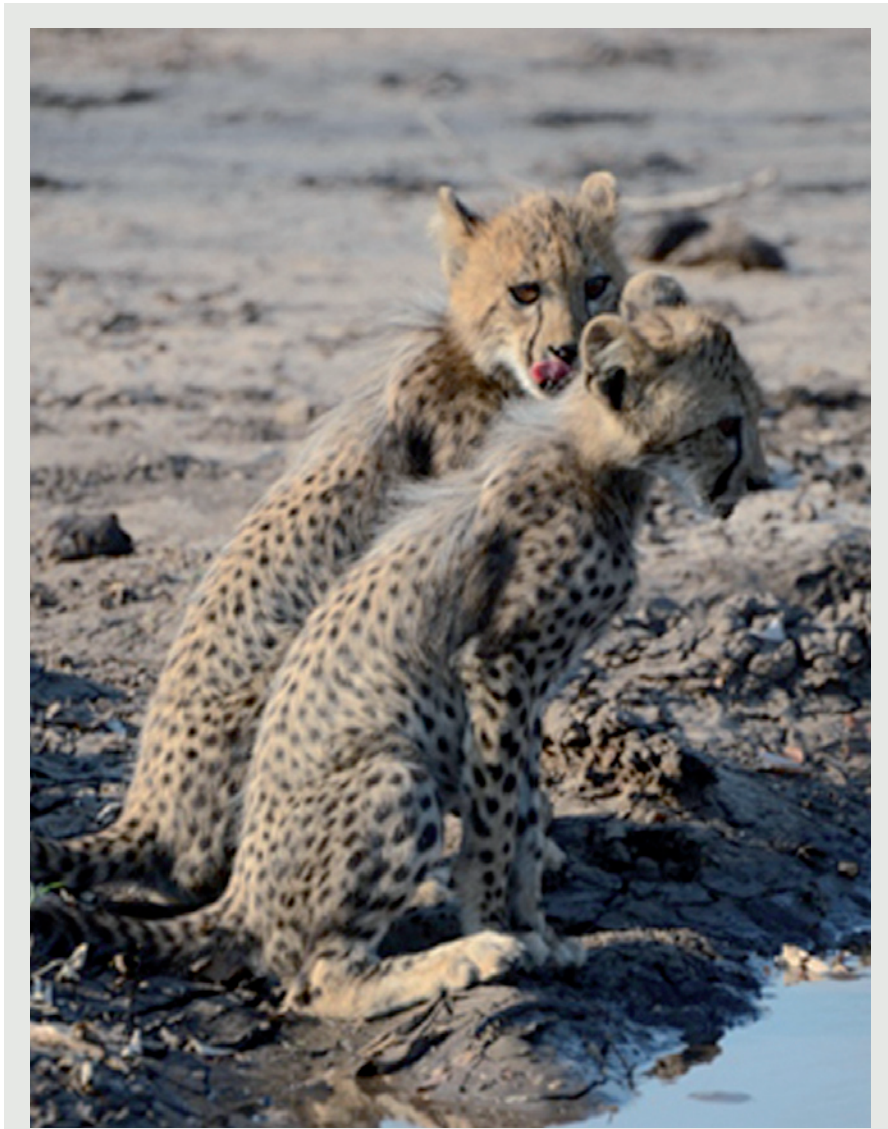
A bowhead has a mouth as wide as a ferry ramp. This whale is also notable for longevity, only recently revealed when spearheads from the 1800s were found embedded in living specimens.



Numerous studies have shown the impact that industrial shipping can have on marine life

Is there room for wildlife as Africa grapples with development?

As part of our current special focus on African wildlife **Curtis Abraham** reports on how poaching for the illegal wildlife trade, intensive farming, climate change and population growth all threaten some species



Many of Africa's enigmatic species face threats as the continent modernises

The reported crash of wildlife populations in the Maasai Mara reserve in Kenya is the most well-publicised example of a crisis that's unfolding throughout East Africa.

The region's 'Big Five' species and other wildlife are currently facing their most serious crisis in modern times. Significant populations of elephants, lions, rhinoceros and other species are on the decline, threatening not only the regions fragile ecosystems but also economic livelihoods that depend on ecotourism revenue. Elephant populations are particularly vulnerable.

Following the 1989 ban on ivory, the poaching of sub-Saharan African's elephant population was reduced to a mere trickle. However, over the past couple years there has been dramatic increase in poaching activities and a sharp decline in elephant populations.

In May this year, a shipment of 115 pieces of illegal ivory (packed into 13 metal boxes and weighing 1,304 kilograms) was seized at Jomo Kenyatta International Airport. The ivory was destined to Lagos, Nigeria purportedly from the Brunei and Papua New Guinea Embassies in Nairobi. The contraband was disguised as diplomatic luggage. However, there are no such embassies in Kenya.

This past March 2,033 kg of elephant ivory (247 tusks up to two meters long) was seized by Thai Customs officials at the Bangkok seaport on the Chao Phraya River. This had been shipped through the Mombasa sea port. The

elephant tusks were valued at over 274 million Kenya Shillings being smuggled through a Bangkok port from Kenya was hidden in a shipment of frozen fish. The Kenya Wildlife Service (KWS) says that the ivory seized may be equated to at least 123 elephants. However, Kenyan authorities were unsure if all the animals were poached in Kenya.

According to Kenya Wildlife Service (KWS) figures in 2010 some 187 elephants were illegally killed. By April this year, that figure stood at 80 elephants.

But Kenya's neighbour to the south is worse off. Tanzania has been implicated as the source of nearly 50 per cent of the ivory seized worldwide. According to a report, seizures involving Tanzania between 1989 and 2010 represent one third of all ivory seized globally, and Tanzania ranks first among African countries in terms of the total volume of ivory reported by large-scale seizures.

China and the rise in ivory smuggling

China has a significant presence in East Africa. Chinese companies are upgrading Kenya's road network, while Chinese contractors aim to participate in refinery projects and the development of a major port at Lamu on the coast. In neighbouring Tanzania, China's Sichuan Hongda signed a \$3 Billion USD coal and iron ore deal at the beginning of this year. They might also invest \$3.5 billion in a 600-megawatt power plant. In Uganda various Chinese construction projects are in full swing. China is also expected to participate in the country's new found oil wealth.

This increasing Chinese presence in East Africa and other areas of the continent has led to a dramatic increase in ivory smuggling. China's nouveau rich have developed a voracious appetite for ivory ornamental objects. In fact, over the past couple years numerous Chinese nationals have been arrested in the possession of illegal ivory in East Africa. This new demand from China's nouveau rich has driven the price of ivory to \$700 a pound or more and has led to rampant poaching of elephants in some regions.

Other 'Big five' species are also at serious risk

In Tanzania, there have also been recent seizures of rhino horn that is suspected

to have come from the Selous Game Reserve in southern Tanzania (part of that coffin smuggling episode that took place in Kenya in 2009 also included black rhino horns). Rhino horns are used by the Chinese for their traditional medicines and in some Middle Eastern countries for ornamental purposes like the handles of daggers.

Stopping the illegal trade

Trying to stop the illicit trafficking of ivory is difficult. It requires knowledge of the geographic origin of the ivory itself. Pioneering research by Dr. Sam Wasser, Director of the Center for Conservation Biology at the University of Washington, Seattle has developed special DNA analysis techniques in tracing the origin of illegal elephant ivory.

This has led to discovery that African elephant ivory are coming from certain 'Hotspots' in sub-Saharan African rather than all over the continent's forest and savannas areas as was previously thought. Experts and law enforcement officials have discovered that sophisticated criminal networks have targeted certain African elephant populations for their ivory.

Last May, the Ivory and Rhinoceros Enforcement Task Force of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) met in United Nations Environment Programme headquarters (Gigiri, Kenya) to discuss urgent actions against crimes targeting elephant and rhino populations

'Despite considerable successes on the part of the law enforcement community, the smuggling of elephant ivory continues to occur at significant levels and those behind the illegal trade do not appear to be deterred by the regular losses they are suffering at the hands of border control agencies,' says an Interpol statement announcing a new CITES initiative.

According to a recent investigation reported in TIME magazine, the Chinese are secretly attempting to breed imported white rhinos commercially for their horns to be used in medicine - a scheme that would be in direct contravention of national and international laws, and which contradicts statements made in 2010 by Chinese officials at an international meeting and representatives of the traditional Chinese medicine industry.

Crop pesticide killing wildlife

Lion populations in East Africa have declined rapidly over the past decades. Carbofuran (Furadan) poisoning has been the main culprit. According to the Kenya Wildlife Service, Furadan has killed 35 per cent of Kenya's lions, while unspecified poisons killed another 3 per cent. Since 2002, when they numbered 2,749, the lion population has declined by 28 per cent. In their National Conservation and Management strategy for Lions and Hyenas, the Kenya Wildlife Service estimates that only 1,970 lions remain across the country. Carbofuran is a valuable pesticide for agriculture - it keeps insects from destroying food crops like Irish potatoes, soybeans and maize (corn). It replaced DDT when DDT's negative environmental impacts were realised back in the 1960s and early 1970s.

But carbofuran is highly toxic to wildlife, and not only to lions but fish, mammals, birds and many non target invertebrates due to unintended effects of labelled use, misuse due to farmer ignorance, and abuse. Not only are these big cats affected but so too are vultures, birds of prey and wading birds.

When members of a pastoralist's herd is killed or threatened by marauding lions (or leopards), herders like the Bahima of Uganda or the Samburu of northern Kenya, revenge by slaughtering a cow and lacing the carcass with a deadly poison like Carbofuran. However, this not only kills the predatory lions but also scavengers such as vultures.

Such episodes have become commonplace and look set to continue.

'Although suspects have admitted to poisoning carcasses to kill lions, we are not aware of any culprits having ever been brought to justice,' says Dr Paula Kahumbu, Executive Director of Wildlife Direct.

The desperate situation among some East African herders is not about to change anytime soon.

Pastoralists in East Africa not only have to deal annually with what experts label 'dry season stress' but also the crisis of massive livestock deaths due to current and recurrent severe drought conditions. Tens of thousands of livestock have starved and died in recent years. To make matters worse, herding communities are the most vulnerable to the present food shortages and high food prices. So

to lose livestock to predators in this climate of hardship and austerity is only adding insult to injury.

Increases in livestock numbers (cattle, sheep and goats) and their widening distribution have brought about competition between them and surrounding wildlife populations. This is bad news for wildlife inhabiting drought-prone areas as it could lead to starvation. Experts suspect that it's this scenario that caused Kenya's buffalo population to collapse.

Poaching and climate change in Uganda

But it's not only illegal hunting and trade that are fuelling wildlife declines.

In Uganda, some species have declined due to an unfortunate combination of global climate change and rampant poaching. A generation ago Kidepo Valley National Park (KVNP) in northeast Uganda's semi-arid Karamoja region, was one of the most biodiversity diverse areas of Uganda. But during the politically unstable 1970s and 80s the slaughter began in earnest. Much of the park's wildlife was obliterated. This includes the Northern White Rhino, Roan Antelope, and Cornet's Gazelle. Others such as the Kudu, Eland and Giraffe were reduced to insignificant numbers as to be almost nonexistent.

Kidepo once thriving populations of plains zebras have declined dramatically over the last generation. Less than 100 zebras remain in Kidepo Park today,

contrast that with an estimated population of over 500 in the 1980s. So alarming is the recent death rate of zebra colts that Scott

McMillan, an American conservationist and Founder/President of the Kidepo Wildlife Foundation (KWF), predicted that if this dire situation continues then, 'the zebra population in KVNP will cease within 25 year'.

What wildlife poachers could not complete, man-made climate change is trying too. During the mid-1990's, the "El Nino" rains transformed Kidepo's semi-arid, short grass environment to that of high grass savannah. Many

of the Kidepo prey species are not well adapted to this type of habitat. This altered significantly the park's hunting dynamics. Predators such as lions lack the prey they traditionally hunted and resorted to hunting easier quarry like zebras and warthogs. For the zebras, it became difficult to see predators stalking through the tall grass. This situation is self reinforcing and perpetuates the decline of the zebra population.

Decline of predator species

McMillan estimates that during the last half century, Kidepo's prey species had either been reduced to 10 per cent of their original numbers or they have been totally annihilated. This tragedy as led to a fractured ecosystem.

And it isn't just the big beast of the plains whose populations are declining. Raptors are also fighting for survival in the face of poisoning, technological advancement and big business interests. Raptors are umbrella species - they are important indicators that an ecosystem is doing well and providing enough food for all other species. This is because of their huge ranges.

Vulture poisonings in Kenya have been recorded in Laikipia, Tsavo, Athi River, Masai Mara and Amboseli these birds are long lived and are essential to ecosystem functioning in Kenya's wild areas. Scientist has documented significant declines of other birds of prey including eagles and owls.

Vultures are indispensable if humans want to keep the grasslands and savannas healthy. Without these raptors rotting carcasses would piled up, attracting disease and foul smells in places where tourists yearn to

go. Sadly, vulture population, as is the case in India, has been dwindling to the extent that some are termed nearly extinct, threatened or vulnerable.

The African Fish Eagle population fell from 200 in the 1970s to just 67 in 1998, a 57 per cent decline. The Bearded vulture or Lammergeier as it is also known was once commonly found in the indigenous forests of Kenya such as the Mau, Cheranganis and Elgon. Today, there is just one pair in the country surviving

in the Cheranganis. Toxic carbofuran is also the culprit in this case. Scientists of the Raptor Working Group of Nature Kenya have documented an alarming decline of up to 60 per cent of Kenya's vultures primarily due to the abuse of carbofuran

The Martial Eagle, the largest raptor, has a home range of 300 square kilometres. It lays just one egg a year and most chicks die within the first year due to a number of reasons, ranging from human persecution to food for other predators.

The booming horticulture industry at Lake Naivasha in western Kenya has altered significantly the lake and its environs, and yet it is a Ramsar Site - a water body of international importance to migratory birds and water-fowls. Furthermore, as we humans are in pursuit of green technology to seek clean energy like wind farms and biofuels it's a catch-22 situation since it comes at great cost to the environment. The huge windmills on wind farms, though a source of clean energy, have killed many raptors as they fly into the rotating blades.

Human population pressure

Human population growth and the need to feed more mouths have also led to decreasing wildlife numbers. For example, an expansion of cultivation, settlements and fences has also lead to declining wildlife populations in Kenya, Tanzania and elsewhere in East Africa.

In Tanzania's, for example, the Maasai Steppe of Tarangire-Simanjiro Plains, cultivation in areas traditionally used by wildlife has been widely adopted. The causes for this are many.

'Recurrent severe droughts have killed many pastoral livestock and render many families destitute,' says Joseph Ogotu. 'The skyrocketing of prices of maize has forced many families to adopt cultivation after droughts to reduce their vulnerability to droughts. Shifting food preferences among pastoral communities, such as the Masai, who traditionally fed on milk, meat and blood, is further pushing the adoption of cultivation. Human population growth is reducing the number of livestock per person in pastoral households, thus making it impossible for them to depend solely on livestock and livestock products, which is forcing many families to adopt cultivation.'

“An expansion of cultivation has also lead to declining wildlife populations in Kenya, Tanzania and elsewhere in East Africa.”

Revealed: the child victims of pesticide poisoning in India

EXCLUSIVE: Endosulfan is the pesticide of choice for farmers in rural India trying to control insects threatening cashew nut and other crops - but the chemical can have devastating health impacts

Photos: **Peter Caton** *Words:* **Beatriz Lopez**



Abhilash's parents believe that what they endure is the will of God



Endosulfan victim Rishana, aged 12, with her mother Sourabi

A panorama of rolling hills distinguishes the landscape of Kasaragod, a northern district of the Indian state, Kerala. With fertile land and an abundance of water, the cashew industry once flourished amidst dense vegetation, red earth and coconut palms.

These forested valleys are home to rural communities still living off the land, such as Mamatha's family who collect betel-nuts as their main source of income. The household of six adult siblings and their elderly father live in a small, overcrowded cottage, which they may have to sell to fund a series of operations that will remove the tumour distorting Mamatha's face. Mamatha is an endosulfan poisoning victim.

Endosulfan, an organochlorine insecticide, acts as a contact poison for a wide variety of insects and mites and has been used extensively worldwide on food crops like tea, fruits, vegetables and grains. Famed for its capacity to increase agricultural productivity, endosulfan has been officially banned in the state of Kerala for 10 years. In the 25 years leading up to the state ban, indiscriminate aerial spraying of cashew plantations contaminated the soil, water sources, wildlife and the communities of the Kasaragod District.

Already banned in over 80 countries, 127 represented governments agreed

on a worldwide ban at the Stockholm Convention on Persistent Organic Pollutants (POP) in April 2011. The Indian Government delegation contested the otherwise unanimous consensus. Facing huge financial losses due to the national agricultural industry's heavy reliance on endosulfan, an 11-year phase out period with financial support was negotiated, giving Government appointed scientists time to develop a cost effective, alternative pest control.

However, last May, the manufacturing

and usage of endosulfan in India was forced to a complete halt. Indian Chief Justice Sarosh Homi Kapadia of the Supreme Court imposed an eight week national blanket ban on the pesticide until a conclusive study by an expert committee on whether toxicity levels of endosulfan was safe to humans and the environment had been submitted.

Controversially, the current national Union Agricultural Minister, Sharad Pawar, announced shortly after the ban that there was a lack of evidence to prove a negative impact on humans. He also denied anti-endosulfan protest from any state governments other than Kerala and neighbouring state Karnataka. Kerala and Karnataka were the only states where endosulfan was aerially sprayed, an approach not scientifically investigated at the time.

The pesticide victims in Kerala In Kasaragod, the Kerala district worst hit by endosulfan poisonings, Leelakumari Amma, is employed as an agronomist by the Agricultural Department of her local Panchayatt. She has observed an abnormal amount of illnesses in the community, which triggered her suspicions about chemical poisoning.

'People had to walk through these fields that had been sprayed as there was no transportation. Children walked through the fields. There were



Four brothers are unable to eat solids because of a mouth disorder and need full time assistance from their parents and two sisters - but may soon need to be adopted.



Arunkumar, aged 14, is able to feed himself, but with difficulty. His sister needs to be spoon fed. Both he and his sister live off a rice soup diet.

no butterflies; there were no birds; so it was concrete evidence for my suspicions.'

Dr Mohana Kumar, an activist and medical practitioner associated with Pesticide Action Network (PAN), says companies involved have violated human rights by not protecting water sources when aerially spraying the pesticide.

One former employee of a company using endosulfan, Achuthan Manniyeni, used to be responsible for preparing the pesticide for spraying in his area. He says the concrete mixing tub was located in a cashew field several metres from one of the district's water basins, which was not covered properly during the aerial spraying.

“People had to walk through these fields that had been sprayed as there was no transportation.”

It was also common practice to dump empty endosulfan cans in a nearby well. Gloves, soap and towels were not supplied to the employees according to Achuthan. Furthermore, he claims endosulfan was freely handed to local farmers after the ban was imposed on Kerala, and that one of his colleagues was contracted to bury containers on a nearby mountain in order to get rid of excessive stock.

The exact location is unknown as all of his five colleagues have since died from symptoms associated with endosulfan poisoning. Large quantities of the pesticide still remain undisposed of in Kerala, 10 years after it was banned in the state.

Local cashew farmer Ashraf disagrees that endosulfan is hazardous to human

life, citing his own health as an example. He blames natural causes for the ailments people have been suffering.

'Endosulfan has been produced to protect the trees from bugs. An increase of insects can also be harmful to the people.' His business partner Mohammad says, 'They say endosulfan has harmed a lot of people, but when you look at the economic side it is a pathetic situation.' He recalls that when the cashew crops were treated with endosulfan, farmers collected an average of 700 kilos per day. Untreated, they collect 15 kilos to 30 kilos per day. 'People have lost a lot of income'.

Until recently, endosulfan manufactured in India constituted 70 per cent of the global market, with its total exports valued at about Rs 1.8 billion (£22,000,000). Since the Green Revolution in India, agriculture has become a big export with India ranking second worldwide in terms of farm output with almost 30 per cent of its

booming economy coming from the sector.

The lack of a permanent nationwide ban in India has led to growing reports of smuggling across state borders, particularly from Orissa where the chemical is said to still be openly available in the state capital and in Madhya Pradesh where stock is being sold at a premium rate of Rs 500 instead of Rs 250 per litre.

Meanwhile, people neighbouring or living within the predominantly national government owned cashew plantations continue to suffer the consequences of what had become a highly profitable industry; satisfying the demand of western palates at supermarket prices.

The poisoned children

Medical data compiled by health officials in Kerala suggests as many as 4,270 people may have been poisoned

by endosulfan, with over 500 deaths linked to the chemical. Campaigners and families blame endosulfan for causing neurological and congenital deformities in babies:

Abhilash Bhat, who is 10, rolls around with difficulty on a floor mat at home. His head weighs 20 kg, roughly four times the weight of an average adult head. Born with hydrocephalus, a rare medical condition in which there is an abnormal accumulation of cerebrospinal fluid in the brain, his head has swelled to enormous proportions. The cranial pressure has shrunk his brain, causing total mental retardation.

His mother, Sreedevi had already miscarried two previous pregnancies and claims her first child died within

10 days from hydrocephalus. Doctors believed Abhilash would not survive and his parents were warned that conceiving another child would only lead to the same heartache: 'We want another child, but we are scared.'

“People were ignorant about the toxicity of endosulfan, believing in curses and ‘the will of God’.”

The high-risk operation needed to save his life may well bankrupt the family, who already struggle to make ends meet. Over half of their wage, earned from the collection and

selling of betel-nut, is spent on medical and travel expenses incurred from Abhilash needing hospital treatment every three days.

Both born blind, sisters Rahina and Rasna are six and nine years old. Their parents Rajan and Rohina say that the difficulty of supporting two blind children with their minimal income earned through labouring work has forced them to separate the children. Rasna is now living with her maternal grandmother, while Rahina is partly cared for by her paternal grandmother who lives in the family home. After Rahina was born, they gave up on the prospect of a larger family for fear of conceiving another child with the same genetic disorder.

Is God to blame?

People were ignorant about the toxicity of endosulfan, believing in curses and 'the will of God'. Sumitra and her husband Ganeshrao thought they had been cursed by the Serpent God Jataadhari and spent over Rs 200,000 (£2000) on religious rituals performed at a Hindu temple: their 16-year old daughter Soumya and 14 year old son, Arunkumar, would frequently experience fevers that eventually left them mute and crippled.

As the children are partially blind and deaf, they rely on smell to identify people and make simple gestures to have their needs met. Soumya drags herself across the home's concrete floor as she is unable to walk. Rarely leaving their home and with no social services or physiotherapy, they receive little stimulation to improve their condition.

Sujatha was struck down with a



Soumya, aged 16, appears like an 8 year old child. Shy and vulnerable. she identifies people by smell and touch. Unable to communicate, she gestures for help with her basic needs.

reoccurring fever at the age of four which left her hospitalised on several occasions. At 28-years of age, her body has not developed properly and she has limited mobility in her limbs. Unable to support herself on her weak, child-size legs, she lives her life bound to her home.

Frustrated by her speech impairment, she speaks of her ongoing struggle with depression. Sujatha has no opportunity to marry and live a normal life, as she is completely dependent on her mother. Her mother explains that her energy levels prevent her from staying awake extended periods of time and that an exhausting menstrual cycle (3 times per month) causes her low blood pressure.

A year ago, a local youth group arranged monthly visits of a physiotherapist who is also an ayurvedic doctor, but her improvement has been minimal and she is still experiencing ongoing pain in her legs. Medicine was also received from a local government hospital for four months, but the home delivery service was suddenly stopped without an explanation. When questioned, the hospital explained they had run out of medicine. Sujatha was never clear what the prescription was for.

Gulabi lives in a small shack with her husband, mother-in-law and 4 children. An apparent endosulfan victim, she experienced her first symptoms after the birth of her second child. Her medical records say she has a 'locomotor disability'. Gulabi's low blood pressure and weakness in her legs led to a fall which shattered her right femur. An operation to replace the bone has failed to improve her walking ability, and a lack of finance has prevented her from receiving follow up physiotherapy. The family survives on the Rs 150 (£2.10) per day her husband earns as a seasonal forager.

Another Bhopal disaster?

In an attempt to calm growing pressure, a compensation package has been offered by one major company involved in spraying endosulfan. A comprehensive package is also being launched by the Kerala State Health Department to be available in the 11 worst affected Panchayatts. Benefit cards are being registered under



Suhali, aged 16, is unable to walk. Hameed is Suhali's principal carer, as he is too heavy for his mother to carry

three categories; Class A, the worst affected victims, expecting to receive Rs 2000 monthly pensions (£27); an amount barely enough to cover medical expenses, let alone supplement the potential income loss of carers.

'My greatest difficulty is not being able to leave my daughter unattended,' says Sreeja, a mother of two young daughters. Her six-year old daughter Chaithany suffers from a severe neurological disorder and is unable to control her limbs or communicate. Sreeja is a fulltime caretaker, bound to her single roomed home, while her husband keeps the family afloat with menial labour; earning only Rs 250 (£3.50) per day.

In December 2010, the chairman of the

National Human Rights Commission K. G. Balakrishnan went as far as comparing the endosulfan devastation to the Bhopal gas tragedy. Others like activist B. Ashraf from the Kerala-based NGO Thanal, call it a 'government chemical warfare on its own people.'

Pesticide industry blames EU and NGOs

Representatives of the pesticide industry dismiss the health concerns as a EU/Western ploy. The Pesticides Manufacturers and Formulators Association of India (PMFAI) has been reported as saying that the government was folding under pressure from environmental groups. 'This is playing straight into the hands of vested

PESTICIDES



Mammatha, aged 26, was born with a small, red mark at the bottom corner of her left eye, it has grown into a large tumour that covers half her face, the back of her skull and part of her neck

interests such as the European Union, who have a direct business interest in the ban of endosulfan. The overall design of the EU stakeholders is to ban this popular low-cost, off-patent pesticide and replace it with expensive patented products.'

While Kerala suggested alternatives to endosulfan, all other 20 states have denied any knowledge of health problems associated with endosulfan; insisting it was the cheapest pesticide on the market and friendly towards pollinators. Suggestions were made that the 'poisoning' of humans, livestock and wildlife in Kasaragod was an isolated incident resulting from the aerial spraying of endosulfan in Kerala.

Pesticide manufacturers argued that possible causes for health problems within the region could be linked to inbreeding, iodine deficiency and radiation, and that all opposition to the use of endosulfan was politically motivated.

However, reports from Karnataka by consumer activists such as Sanjeev Arora tell a different story, 'people are suffering from problems like congenital deformities, mental retardation and physical deformities. The impact is similar to those affected in Kerala's Kasaragod village.'

According to official figures, 32,604 litres of Endosulfan was aerially sprayed between 1980 and 2000 on

850 hectares in Belthangady and Puttur Taluks in Dakshin Kannada, and a further 11,225 litres were sprayed manually in the region. Nearly 20 villages were affected. 'Health conditions in these villages are scary,' says Sanjeev.

Twenty-seven nations globally are said to still use endosulfan including several African countries such as Ethiopia,

Uganda and Zimbabwe - making endosulfan is the third largest selling pesticide on the global market with a value of £191.5 million.

The danger now, say campaigners, is that, despite all the evidence against endosulfan, big business will be allowed to continue taking precedence over human health and the environment.

Six months after the interim ban was put in place on the production and sale of endosulfan, the Supreme Court is no nearer to reaching a verdict as to whether the ban should be made permanent, with no real solutions of how to appropriately dispose of stock either.

While the question of evidence remains - blocking an immediate, permanent national ban in India - Dr. Kumar puts conflicting scientific evidence into perspective: 'You can argue anything because you cannot test on humans. You have to consider the circumstantial evidence.'

In the meantime, parents of victims like Carmina Costa, who has been promised a consolatory yet miniscule compensation, fear for future generations' lives. 'My prayer is that this should never happen again. So many children, so many mothers are suffering. This is my prayer to the government.'



Although Kerala banned the use of Endosulfan in 2002, locals say smuggling takes place across state borders to meet a huge demand particularly from tea growers