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How oil threatens Uganda's biodiversity

Greening our waste

A lack of practical uses for garden and kitchen waste collected from homes means that a proportion of this 'green' compost goes to landfill. Around three million tonnes of green waste is sorted by households for recycling each year and the figure continues to rise. Much of this compost has been spread on farmland (around 47per cent), and the finer compost is eventually re-used in gardens as a peatless compost - but the problem lies with the coarser compost (with particles more than 25 mm) which appear to have no obvious use.

Our research for WRAP (Waste & Resources Action Programme) has looked at the potential of coarser grades of both green and mixed green and food composts for use in sustainable drainage (SUDS). SUDs include a variety of devices among them porous paving systems, grassed rooftops, constructed wetlands, swales (grassed ditches), vegetated barriers, retention and detention ponds. This approach allows large volumes of water to drain slowly and naturally rather than being forced through networks of concrete pipes. It also means waste materials in the water are absorbed and processed - with vegetation and microbes making use of the nutrients available in what were toxic materials - enabling water which flows through the sustainable drainage system to be filtered rather than contaminated.

While such approaches have been embraced for more than 25 years in the US, Sweden, France and for over 15 years in Scotland, the take-up has been less than enthusiastic in England and Wales because of concerns over costs and management. Future cities will need to look new technologies such as these, as well as to the distant past and the efficiency of natural processes, if they are to remain viable and human places to live in. Previous research has claimed that just a 10 per cent increase in green spaces in cities is enough to mitigate the expected impact from climate change.

There are real advantages to the use of coarse grades of compost for water quality improvement purposes: the open spaces within the compost allows for easy progress for storm water, and allows for increased oxygen levels which encourages more diversity in the microbial population. As vegetated devices, the plants in swales trap pollutants in their stems and leaves and also take them up systemically, therefore improving water quality. Stormwater infiltration into the soil improves water quality by trapping associated pollutants in the soil but also by treatment in the biofilm which is found naturally within the soil - the systems of bacteria, fungi, protists and animals. Biofilms are complex and dynamic systems, and as they grow and reproduce they can biodegrade pollutants such as oil. The construction of swales and filter strips (grassed slopes) usually requires careful excavation and use of topsoil before grass seeds are sown or turf is laid.

If compost is to be used in a SUDS system, to either wholly or partially replace topsoil, it must perform at least as well in terms of dealing with pollution. In our studies we looked at how green compost and mixed compost performed by applying pollutants, as well as looking at the potential for developing biofilm in the composts. In the tests of performance for removing pollution and contaminants, the mixed compost appeared to perform least well, while green compost and topsoil were similar in their potential ability. Microbiological analysis of the composts revealed that mixed compost had the highest numbers of bacteria and fungi while topsoil had the least. This is reflected in their ability to deal with oil as a pollutant in the leaching columns. This experiment was very small scale and added the equivalent of a month's oil loading in a typical urban environment every two weeks, so double the normal amount, but the composts were still able to degrade between 65 per cent and 80 per cent of the oil added. If a swale were installed in an area likely to suffer significant oil pollution, like a lorry park in a motorway service area, it would seem that mixed compost would be better able to degrade this excess oil than either green compost or topsoil.

Field trials are needed, but the coarse grades of compost tested here appear to demonstrate potential to replace some of the topsoil currently used in SUDS devices. It does provides a means of tackling pollutants and could therefore be used in other SUDS devices, such as brown roofs (similar to green roofs, but using locally sourced waste material) and porous paving.

Nothing would be more damaging to the successful growth of a culture of recycling than the knowledge that garden and kitchen waste could just end up in landfill. Using compost for SUDS is an ideal platform with genuine sustainability credentials and provides a market for a material which was once considered a wasted waste.

Dr Susanne Charlesworth is a reader in urban physical geography at Coventry University.

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Agroforestry comes of age but will UK farmers embrace it?

The UK farming community has been sceptical about the concept of agroforestry

The evidence suggests agroforestry in the UK has something to offer to both commercial farmers and smallholders alike. The challenge now, says **Ed Hamer**, is how to persuade sceptical farmers that planting trees on farmland is a good idea

Agroforestry - growing trees on farms - is nothing new. In fact its decidedly old. The patchwork of copses, briars and hedgerows we see across the countryside are testament to the fact that our farmed landscape was actually carved out of the woods in the first place. Despite this, the estimated 14,000 miles of hedgerow and thousands of farmland trees we've seen scrubbed up within the space of a fortnight suggests that our tolerance for mixing trees with crops is not what it once was.

Of course, parkland trees weren't always just romantic backdrops for period dramas, and there are practical reasons too why hedgerows contain a diversity of species. And although grazing sheep in orchards may be one of the only examples still widely in use - there are still those who champion the role of the tree in the farming landscape.

Agroforestry has seen something of a two-pronged renaissance over the past decade or so. The first of these was arguably inspired by the late Robert Hart, a passionate agroecologist who dedicated his later life to creating the UK's first temperate forest garden at his home in Shropshire. While Robert regarded his plot very much as an experiment, there's no denying that his work has been largely responsible for sparking today's forest gardening movement, embraced by permaculturists up and down the land.

The second prong of Agroforestry's revival has been led by a handful of the UK's leading forestry colleges and universities, most notably Bangor and Aberdeen. Initially inspired as a solution to the bottom falling out of the homegrown timber industry, planting trees on farms has since been promoted as an economic incentive for struggling farmers as well as a land management tool for anything from flood prevention to bioremediation.

Despite a good deal of enthusiasm however, there are still only a handful of farms deliberately practicing agroforestry in the UK while forest gardening remains the preserve of urban allotmenteers and small scale experimental gardeners.

So if it really lives up to the talk – why haven't we seen a full-scale agroforestry revolution in the UK?

Agroforestry comes in two broad categories; silvo-pastoral - trees and pasture - and silvo-arable - trees and crops. To many it may seem contradictory to plant trees on the same plot of land you're using to raise crops or animals but believe it or not there is something to be gained from this. And while this is arguably proved every time a hedgerow shelters a calf or drops its leaves on a patch of spring wheat, a handful of dedicated individuals have made it their business to demonstrate agroforestry's full farm-scale potential.

Seeing the sheep for the trees

Henfaes Research Farm, clinging to the bleak north coast of Wales, is the UK's longest running silvo-pastoral research station. Since 1992 the 14 hectare site has hosted a flock of Welsh mountain ewes grazing in and among several blocks of sycamore and alder trees planted in various patterns and random spacings. The idea of the experiment is to measure the effects on the productivity of both the sheep and the trees compared to a control next door where trees and sheep are kept entirely separate.

> It seems the main differences between agroforestry and forest gardening are in terms of diversity and scale.

The site is owned by the School for the Environment and Natural Sciences at nearby Bangor University where Ian Harris is the research farm manager. 'What we're demonstrating here at Henfaes are the multiple benefits that can be achieved with a silvo-pastoral system,' Ian tells me. There are of course the obvious benefits to the sheep who are sheltered in the winter and shaded in the summer, and also to the trees which inevitably benefit from nutrient cycling by the sheep and grazing that controls competitive seedlings. But Ian and his team have discovered some surprising and less obvious benefits.

'Both soil structure and fertility have been improved, the tree roots themselves and their associated micorrhizae, but also by the cycling of leaf matter which brings in earthworms, microbes and biota. The alder blocks demonstrate that nitrogen can be fixed naturally in the soil using agroforestry, while the indirect benefits demonstrated include improved groundwater infiltration and increased biodiversity as the trees bring with them their own micro-habitats and food chains'.

The model Ian is describing has been practiced for centuries in temperate orchards around the world where farmers have made the most of a rich crop of spring grass before the trees come into leaf. Although the results of the experiment show no measureable increase in the growth rate of the ewes there is, importantly, no measureable difference suggesting that the presence of the trees is detrimental to the herd.

In addition to the environmental benefits, Ian has some reasons why this system could appeal to established livestock farmers, particularly in the west of the UK. 'From the farmer's point of view he's improving the productivity of his land, improving the health of his soil and, looking at the longer term, generating additional income from the tree thinnings. Importantly we're demonstrating all of this on an exceptionally exposed site. We'd like to think that another farmer trying this on a more sheltered site elsewhere in the UK would see a marked improvement on what we've achieved.'

Mechanised agroecology

A couple of hundred miles south east from Henfaes is Wakelyns Agroforestry Research Farm in Suffolk. Wakelyns

Britain's woodlands could be made more economically important.

is arguably the silvo-arable partner to Henfaes where Professor Martin Wolfe has established six separate alley cropping treatments across 23 hectares. The experiment was set up in 1994 to demonstrate 'how immensely productive natural systems can be. using no inputs other than sun, air, soil and water.'

Mixing trees with crops is slightly more restricted than combining trees with animals for the simple reason that the crops need to be harvested mechanically so require relatively straight rows. Taking this into account, trees are planted in rows along a north-south axis with a cropping alley in between them. They are also pruned regularly to remove their lower branches. This improves the quality of the timber, allows the crops to be harvested conventionally and keeps shading to a minimum.

Martin Wolfe is refreshingly down-to-earth in describing the Wakelyns experiment: 'Put simply - agroforestry is creating a woodland edge habitat without a woodland' he explains. 'Woodland edge is perhaps the most diverse habitat we have in this country. What we're doing is demonstrating a compromise between appropriate agricultural systems and this natural world approach.'

Wakelyns uses cereals (wheat, barley, oats and others), clover ley and potatoes in the crop rotation, alley-cropped between rows containing several different tree species. 'We've found that a diversity of species increases productivity and resilience' Martin tells me, 'A diversity of trees means a concentration of one nutrient or another in the top soil in which the cereals are growing. Under an organic rotation we use no inputs at all to achieve seven to eight tonnes of cereals per hectare. This is largely down to the impact of the clover ley phase in the rotation together with organic matter and nutrients provided by the trees, the shelter which increases the average temperature and the presence of mycorrhizae which recycle both organic matter and nutrients.'

Like Ian Harris, Martin Wolfe is quick to identify the ways in which his soil has benefitted from silvo-arable planting. 'First and foremost soil structure is maintained by the continuous growth of tree roots in the soil. This means that infiltration is improved in times of flooding and water retention is improved during times of drought.'

Martin has also demonstrated how the productivity of his trees has benefited from the silvo-arable set-up. 'Obviously the trees respond to being thinned and having the usual competition from their neighbours controlled. We were however encouraged to find that our trees are considerably more advanced for their age than Forestry Commission guidelines for girth at breast height.' The net result of the Wakelyns alley cropping experiment with willow, demonstrates a land equivalent ratio of 1.4 for this locality. This means that 1.4 hectares of monoculture production of willow and crop would be needed elsewhere in East Anglia to produce the same quantity of output as gained from a single hectare of alley cropping at Wakelyns.

Both Harris and Wolfe acknowledge that the benefits they describe have only been achieved because of the careful management of competition within their respective agroforestry systems. According to Ian 'it has taken a number of years to discover the correct balance of pruning to ensure the canopy is not too dense or too sparse, and we are still learning. It is important for trials like Henfaes to continue as we can learn from these mistakes and build a better picture of what efficient agroforestry looks like in the UK.'

Aside from the general models described above agroforestry systems can, and have been adapted to meet specific environmental needs from windbreaks to contour plantings, forage crops and riparian (river) buffer strips. Since 1999 Bangor University has been involved in a catchment-scale experiment on the Pont Bryn Valley in mid Wales evaluating the potential of farm woodlands to regulate flood peaks downstream.

While both Henfaes and Wakelyns between them demonstrate the very real potential for agroforestry systems to be integrated into commercial farming in the UK, it is arguably at the other end of the spectrum - forest gardening - where there is currently the most interest and certainly the most momentum.

Forest gardening

In line with the popularity of permaculture, which has ballooned over the last decade on the back of the green-lifestyle bubble, 'forest gardening' is now heralded by many as the solution to the global food crisis. It appears to be extremely cool to drop the phrase in activist and permaculture circles while a simple Google search brings up more than 30 UK-based courses on the subject, scores of magazine articles and more than 120 books.

Martin Crawford is the founder of the Agroforestry Research Trust based at Dartington in Devonshire and arguably the country's leading expert on popular forest gardening. Over the past decade Martin has created two acres of agro-ecological bounty in this small corner of England and has upwards of 1,000 visitors to his plot each year. He describes a forest garden as 'a three-dimensional garden of useful plants; trees, shrubs and ground cover plants, all designed to maximise beneficial interaction and minimise competition. The idea of a forest garden is to mimic the structure of a natural forest – specific to each locality – replacing non-edible natives with practical alternatives. I don't just include edible plants but medicinal plants, plants for dying and plants for fibre.'

It seems the main differences between agroforestry and forest gardening are in terms of diversity and scale. Martin Crawford has an estimated 500 species of tree, shrub and ground plant across his two-acre site, compared to around 50 species across 23 hectares at Wakelyns. 'In reality this is largely because I want to show the extent of what is possible but most forest gardens I have visited will have around 200 species growing happily side by side' says Crawford. 'Forest gardens are traditionally designed for subsistence production and as a result tend to be on a scale that can be managed with hand-tools.'

Although he agrees that the popularity of permaculture has played a role in the recent upsurge in forest gardening, Crawford believes it also has a broader appeal. 'People are starting to look for alternatives to mainstream agriculture. Yes there is certainly a crossover with permaculture but people are also starting to grow their own vegetables, allotments are taking off again and there is an interest in sustainability and resilience that is fulfilled by forest gardening. Interest is also growing from the mainstream gardening press and TV programmes.'

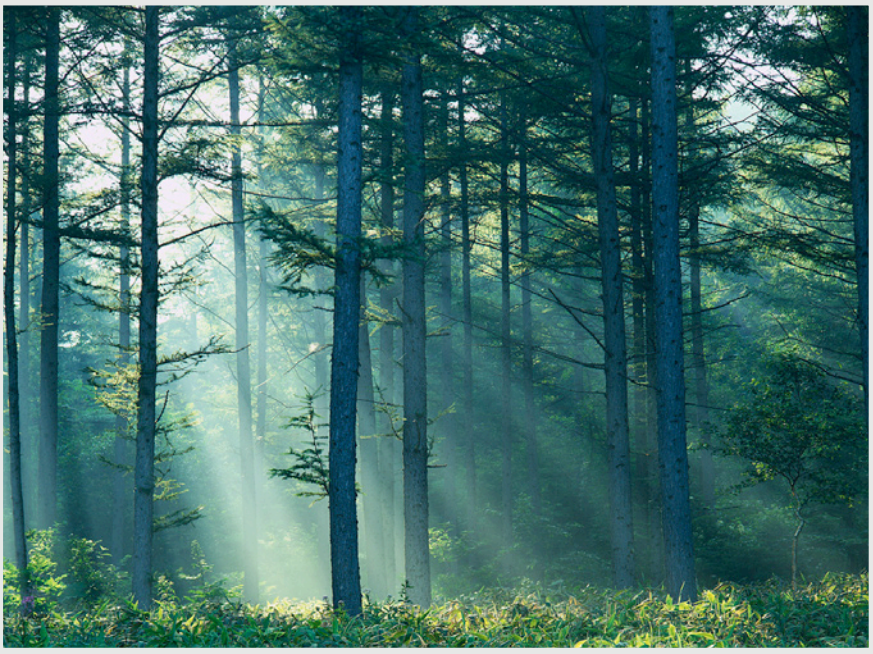
> In 2011 the Foresight report on 'The Future of Food & Farming' highlighted the role of agroforestry in achieving multiple benefits in the farming systems of the future.

He strongly disagrees however that forest gardening is purely an urban phenomenon. 'It's true that urban groups may find it easier to get funding for community growing projects and getting publicity, but in my experience there are just as many people creating forest gardens in rural areas. The courses I run see a complete cross section of people from urban students to rural youngsters and also retired couples.'

And while he is certainly enthusiastic about what he has achieved at Dartington he is also realistic about its limitations. 'Forest gardening can make a contribution to the future of food production but certainly can't supply all of our needs. Carbohydrates for instance usually require a lot more sun than can be provided in a forest garden. Realistically forest gardening in this country is only ever going to provide for three to four people per acre but it's worth remembering that its not only food but also medicine and fibres.'

Taking it mainstream?

It seems then that the practical evidence is there to prove that agroforestry has indeed got something to offer both commercial farmers and smallholders alike. The challenge now seems to be more theoretical - namely how to encourage a traditionally



The fact that agroforestry isn't new could be its greatest asset.

Agricultre and forestry have become seperated.

sceptical farming community that planting trees across their land is actually a good idea.

According to Harris a lot of the problem is in the terminology. 'Rather than "Agroforestry" we are now moving towards talking about "farm woodlands" which could make the idea more accessible to farmers on the ground.' He also points out the very real concern that many farmers have with making such a long-term investment – 'it's also a perceived problem of tying up farmland into one type of management for a number of years when our farmers tend to like to keep their options open to respond to the market.'

It could also be argued however that a lack of enthusiasm is a symptom of our disconnection from a holistic approach to land management. Martin Crawford believes that agroforestry is not that easy for farmers to access because they're not that comfortable with trees. 'For a long time now both agriculture and forestry have become so separated that the majority of our farmers don't have the skills to manage woodlands and the idea of planting trees amongst their crops or livestock seems bizarre.'

There is however a precedent. In the 1950's the British matchstick company Bryant & May Ltd paid livestock farmers in East Anglia to plant poplar trees at wide spacings in their pastures to provide high quality matchwood. The initiative was taken-up enthusiastically and lasted for around 25 years until it became cheaper to buy imported slow-grown poplar from eastern Europe and the payments stopped. This suggests that farmers could well be persuaded to try some form of agroforestry but only if the money is right.

And the money could very soon be right. In 2011 the Foresight report entitled *The Future of Food & Farming* highlighted the role of agroforestry in achieving multiple benefits in the farming systems of the future. Under the heading 'Reducing GHG emissions from the global food system' the report highlights agroforestry's potential for 'long-term carbon capture on farmland' as well as 'reducing soil erosion, producing renewable fuels and the storage of carbonised wood (biochar).' As the age of the carbon-economy dawns, it is easy to see how agroforestry could very soon be subsidised out of obscurity.

Reluctantly, Crawford agrees that agroforesry is only really going to take off when farmers are specifically paid to do it. 'EU CAP funding at the moment does not incentivise planting trees on farms. However the most recent round of CAP reforms are set to encourage more mixed farming with direct environmental benefits. A few years down the line, it's not unfeasible to see it paying for agroforestry plantings. Although I certainly prefer change taking place from the bottom up, it may be that in reality, this change must be encouraged from the top down.'

Wolfe agrees, but cautions against the very real possibility that the roots of the science could well be lost in the process. 'We need to be careful that we don't simply pay farmers to grow monocultures of cereals underneath cloned lines of trees in an effort to chase a payment for a certain model of farming. We don't gain anything from chemical farming whether it's done underneath trees or not. There needs to be a clear distinction which encourages a holistic approach that makes the most of the benefits of biodiversity.'

That there appears to be a reluctance among the farming community to adopt an agroforestry set-up, despite evidence of its benefits, shouldn't come as a surprise. British agriculture has suffered enough misguided interventions over the past half-century that, sensibly, farmers tend to be suspicious of anything new. As Wolfe points out however, the fact that agroforestry isn't 'new' could well turn out to be its greatest asset. 'Until relatively recently most food production was a form of agroforestry. Woodpasture systems are traditional to the UK and people have forgotten this. Rather than introducing something new, we need to modernise what was done everywhere else in the past. If done in this way agroforestry could very well be a stepping stone on the way from monoculture to agricultural diversity.'

Ed Hamer is a young farmer and co-editor of The Land magazine where a version of this article first appeared

Love food hate waste: could you live without throwing food away?

Madeleine Cuff challenged herself to spend a week reducing her food and packaging waste. So did it work, and will consumers and supermarkets take note?

Bin it: reducing the amount of waste we generate is a challenge for consumers and supermarkets, but the Love Food Hate Waste campaign is attempting to tackle the problem.

To my left, someone is eating a mozzarella and tomato panini fresh from its packaging. It smells incredible. On my right, a cheese baguette is heartily devoured. I look down at my flask of 'fridge soup' and sigh. A blend of stalks, offshoots and tail ends of the week's vegetables, it is less soup and more of a thin, tasteless broth.

A week ago I would have emptied the flask straight down the sink without a second thought. It would have seemed irrelevant whether I ate it or not. But I am in the middle of a challenge, inspired by the Love Food Hate Waste campaign, not to throw away or waste any food for an entire week. As someone who grew up in a house of seven, cooking for just one person has been a huge adjustment. I always, without fail, cook too much food, and have no real idea what constitutes a portion for one. I am - like most of us - a food waster.

I had high hopes this challenge would help me to tighten my belt in more ways than one. It seems crazy at a time when millions of people are facing financial hardship but food waste is costing UK households £2 billion each year, according to some estimates. That's the equivalent of throwing £50 into a black bin bag every month and sending it to landfill.

Love food, hate waste

The environmental impact of this madness is severe. If we all stopped wasting food and drink every year, it would have the same positive impact as taking one in five cars off our roads, according to Emma Marsh, head of Love Food Hate Waste.

An offshoot of WRAP, the Government-sponsored body dedicated to reducing waste in our system, Love Food Hate Waste works with consumers and businesses to address the issue of domestic food waste.

Recently, progress has been made. The Courtauld Commitment – a voluntary agreement signed by 52 leading food retailers – is starting to bear fruit. Drawn up by Love Food Hate Waste in 2008 to develop technologies designed to reduce the level of food and packaging waste, its recent successes include signatory Tesco trialling new, more effective packaging seals on their fresh produce.

Likewise, in February, both Sainsbury's and Marks and Spencer changed their freezing guidelines on food in an effort to encourage consumers to waste less. New technology continues to develop, promising a more food efficient future. Just two weeks ago, scientists at Tufts University in America, unveiled edible silk food sensors. Pasted onto food or floating in milk, they are designed to warn consumers when food is on the turn.

A lot of people's immediate reaction is that it's the supermarkets. But actually, nearly 50 per cent of all the food and drink we throw away in the UK comes from our homes

Don't blame the supermarkets

But it is down to us, not supermarkets, to address this issue says Love Food Hate Waste's Marsh "the really key thing about the scale of waste is that a lot of people's immediate reaction is that it's the supermarkets or it must be other people that are doing it. But actually, nearly 50 per cent of all the food and drink we throw away in the UK comes from our homes,' she says.

Taking a leaf out of Love Food Hate Waste's book, my waste-free week gets off to a bad start. Old habits die hard, as I throw a half eaten apple in the bin without thinking. At dinner I am determined to make up for it, so I use up the rest of my mushrooms to make a risotto. Predictably, I make too much. In an attempt to eat my way out of the situation it goes past the point where I can save the leftovers for another meal. My only option now is to eat it all. I feel like Bruce Bogtrotter. My stomach is painfully swollen, and I have to have a lie down before I am capable of washing up.

Eco- chef Tom Hunt runs 'Forgotten Feasts' around London – banquets of waste food from local businesses. He reckons the secret to efficient cooking is managing it like a professional kitchen. 'It's just good housekeeping' he says.

'The supermarkets offer all these two for one offers and different ways to make people buy more but then people end up buying too much and not using it properly. It all relates to running a kitchen in a professional sense really - people just need to take the time to manage their fridge and check what needs using before it goes off.'

Consumer waste

I take this advice on board and start day two on a much brighter note. I adapt a strategy of eating things that are next in the queue – the brownest banana, the potato with the most sprouting growths. Unfortunately, some things I just haven't caught in time.

The spring greens that have been patiently waiting in my fridge since last weeks shop are yellowing slightly on the outside – nothing I can't cope with. But then I slice into the stem, and recoil as a dark brown gunge greets me. Rotting from the inside out, these greens are destined for nowhere but the bin.

Seeing the packet of vegetables in the bin really brings home to me what a waste it is. Apart from the fact that I have effectively thrown £1.50 down the toilet, it's a waste of time, energy and effort. More than four million tonnes of good food in the UK ends up in landfill every year because it has 'gone off.' Part of the problem is that we rely too much on food labels that we don't understand, Emma tells me. Much of Love Food Hate Waste's work centres on educating

> Warburtons have removed sell by dates from their loaves, after evidence emerged that customers were confusing them with a 'best before' labels.

people about the difference between a 'best before' and a 'use-by date'.

The Government's waste strategy, published in 2011, sets out its ambition for a 'zero-waste economy', but their plans have been criticised for being heavily reliant on voluntary targets. Pressure is mounting for politicians to take decisive action on food and packaging waste, and recently this debate has been taken to the world stage.

'Grandmother's knowledge'

In January Ilse Aigner, the German agriculture minister, bemoaned the loss of 'grandmother's knowledge' of how to cook, telling an international conference: 'We must change our way of thinking, we must have a discussion about best-before dates.'

Steps have been taken in the right direction – Warburtons have removed sell by dates from their loaves, after evidence emerged that customers were confusing them with a 'best before' labels.

The next day I decide to test my 'grandmother's knowledge' and make dinner out of what would normally be waste. I save my potato peelings from the night before and set about making a potato peel gratin from a recipe found on the internet.

I am dubious tat first, but end up with a creamy, woody flavoured dish to accompany my dinner. Spurred on by my frugal achievement, the next day I make 'fridge soup' for lunch. It is disgusting. My enthusiasm for eating waste takes a nosedive.

Leftovers

On my last day of the challenge I go to a dinner party at a friend's house. I am amazed by the sheer abundance of food. There is far too much for us all to eat and by the end of the evening the kitchen is littered with half-finished plates and heaps of food left in the pans. I'm a little worse for wear at this point but I make my best attempt to Tupperware and cling film anything I can get my hands on. My friends think I have gone a little batty. When I ask if they worry about food waste, the answer is a clear no.

This is an attitude that chef Tom Hunt encounters regularly. 'It always surprises me but I think the general public, at the moment, are not aware of food waste. Even my friends – quite conscious people – don't really understand the situation of food waste,' he says. 'Educating people, and letting them know they can make a difference quite easily is the trick.'

My waste-free week has not been easy. Being very conscious of my food footprint has meant I had to eat what was next in line rather than what I fancied that day. I have certainly had to readjust how I perceive and value food and understand the costs beyond my wallet. But I think I have emerged on the other side with a more careful attitude towards food. The cumulative carbon impact of growing, packaging, transporting and cooking food only to waste it amounts to 17 million tonnes of CO_2 each year. Maybe one person can't fix the system but as Tesco says, 'every little helps'.

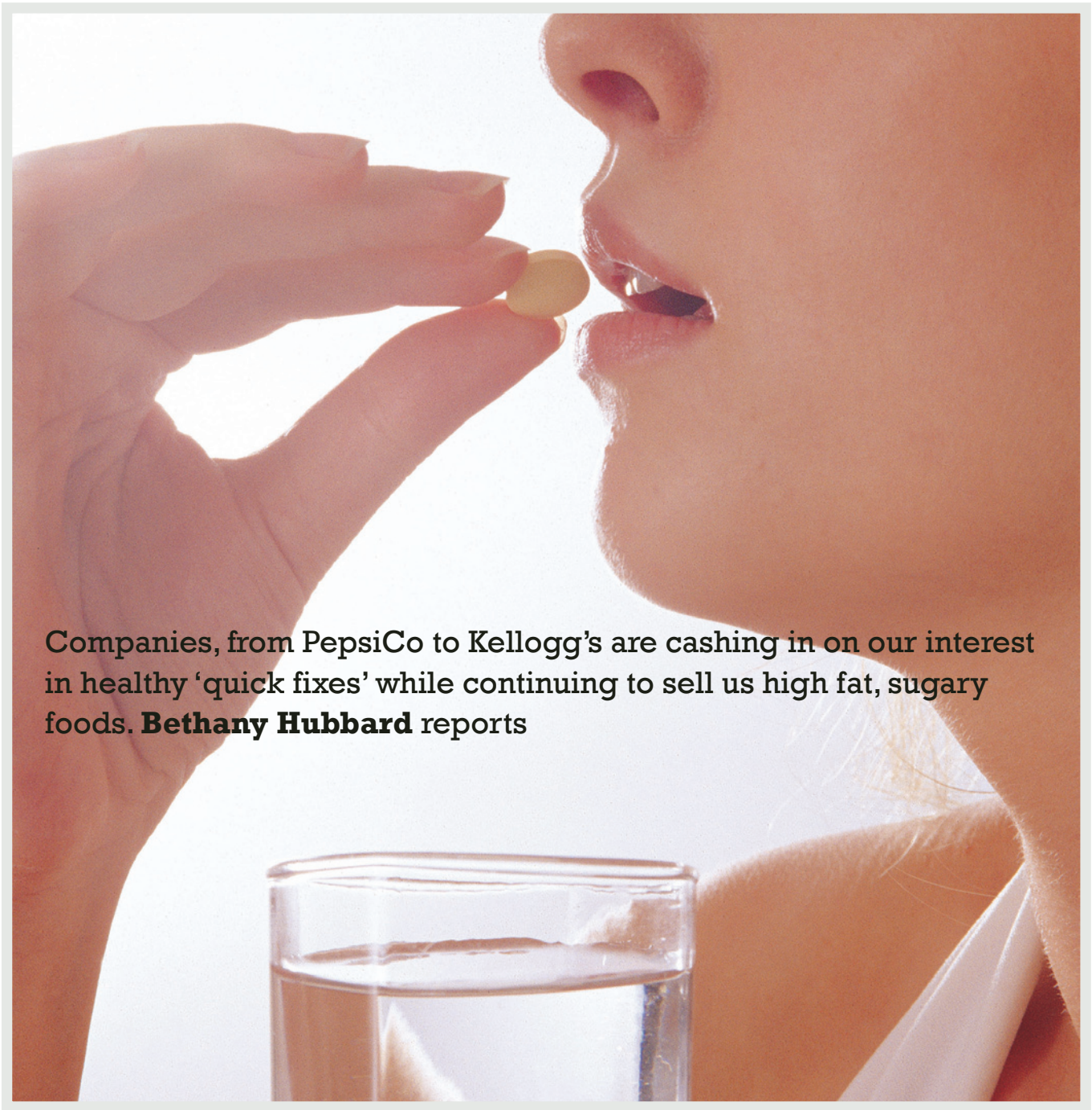
See www.lovefoodhatewaste.com for more tips and ideas.

Top tips to waste less

- Exercise portion control: For rice, use ¼ of a mug per person, for pasta 100g per person.
- Keep apples in the fridge – they'll last for two weeks that way
- Put paper at the bottom of your vegetable drawer in the fridge. It will absorb the water, meaning no more damp vegetables.
- Keep cheese in tinfoil to stop it sweating.
- Visit www.lovefoodhatewaste.com for more tips

Food waste is a growing problem.

The rise of nutraceuticals: how the 'placebo-driven' industry has got us hooked



Companies, from PepsiCo to Kellogg's are cashing in on our interest in healthy 'quick fixes' while continuing to sell us high fat, sugary foods. **Bethany Hubbard** reports

Every time you visit the supermarket, you're likely to notice a new product promising good health and renewal. Water is enhanced and conveniently sold in bottles. Fibre is tucked into yogurts and cereals. And antioxidants are injected into just about everything. We're told on a daily basis that such products are essential for our wellbeing. Plain old whole fruits and vegetables appear archaic in a supermarket stuffed to the brim with nutraceuticals promising to make us fitter, faster and younger. And on top of the 'functional foods' we consume, we continue to swallow daily doses of dietary supplements (a market worth) £674.6 million a year, with multivitamins and fish oils topping the list, according to the NHS.

> ...even without scientific proof of their effectiveness, we continue to buy these supplements and cereals, hoping they will eventually slim, fortify and de-age us

But the companies behind such nutraceuticals may surprise you. From PepsiCo and Kellogg's to Monsanto, and big businesses are scrambling to get in on the health food craze and capitalise on our insecurities. Many of these companies market sugar-laden products to (us as) kids and promise to reverse the damage done with nutraceuticals when we're older. We down Mountain Dew as teens and wash it away with SoBe V-Water 20 years later, or chow down Coco Pops as tots and opt for Special K as adults, hoping to curb our sugar addictions.

But the products promising a rush of nutrients may not be providing any benefit at all, claim some commentators. A leading expert says the industry is largely placebo-driven. This may in part be due to a reluctance to invest in clinical research; although even without scientific proof of their effectiveness, we continue to buy these bars, drinks, supplements and cereals, hoping they will slim, fortify and de-age us. As a result, the nutraceuticals market is expected to reach $207 billion worldwide by 2016, according to a report by Companies & Markets.

The start of something big

The word nutraceutical, a combination of 'nutrition' and 'pharmaceutical,' was coined by Dr. Stephen DeFelice in 1989. 'It is a food or part of a food that has a health and medical benefit, including the prevention and treatment of disease,' he told *the Ecologist*. Probiotics, antioxidants, vitamins, fibre, fish oil and lycopene all fall into the category, but so do energy bars, fortified cereals and enriched yogurts.

DeFelice recognised a need for a new word encompassing everything from dietary supplements and pharma foods to herbal remedies. A single term would not only make it easier for governments to eventually regulate such products, but also bring some order to the 'chaos' that he says rules the industry.

A staunch advocate for clinical research, DeFelice established The Foundation for Innovation in Medicine in 1976, 'a nonprofit foundation whose primary purpose is to accelerate medical discovery by creating a more productive clinical research community.' In 1989, and again in 2002, DeFelice lobbied to bring clinical research into the nutraceuticals industry by proposing his Nutraceutical Research and Education Act (NREA) to the U.S. Congress. 'It became apparent to me, that unlike the pharmaceutical industry, which is a proprietary high-profit margin industry driven by clinical research, the [functional] food and dietary supplement industry is a commodity business with low profits and very little clinical research to prove that their products work,' he says.

DeFelice saw an opportunity for companies to not only conduct studies to support the claims they make but to also make money; something he thought would appeal to the major players in the industry. 'If you want to do a study on your cereal to show that it lowers cholesterol, you can make a claim on that cereal and nobody else can,' he says, adding that this is a big marketing advantage. But DeFelice was dismayed to find little, if any, support for his bill. 'It's a marketing driven industry, not a research driven industry.'

Julie Carrier, professor of biological and agricultural engineering at the

Food companies are cashing in on our love-affair with pills.

Addicted to supplements: functional foods are at the centre of the nutriceutical industry

University of Arkansas, says testing in the industry is getting much better, but a lack of funding will always be a hindrance. 'The pharmaceutical companies are not interested in funding this type of research because the molecules are not patentable, so there's no money to be made,' she says. 'So there are very few studies going on, at least in the U.S., that are looking for correlation and understanding of biological activity compared to the whole big scheme of pharma.' For example, she says, a bottle of milk thistle may cost $8 or $9, which is nothing compared to the profits derived from pharmaceuticals. 'So the profit share in the nutraceuticals industry approaches much more that of the food industry, which is pennies compared to the pharma profits.'

But DeFelice believes a great opportunity was missed, and though he doesn't look negatively at the industry, he says it isn't living up to its potential. 'The dietary supplement and the functional food industry is primarily a placebo-driven industry,' he says. 'I say that's good because the risk is not great and the benefit is very, very good. On that alone, I would say 'bravo,' but it's a shame. It could do so much more.'

Big brands invest

The abundance of choice in Western culture can be a detriment to health, Carrier says. 'In other cultures they don't have the luxury of deciding whether it's going to be lentils or Doritos,' she says. But U.S. consumers are constantly choosing between "good" and "bad" foods. 'We're all trying to find a way to consume these high fat, sugary foods and still be OK,' she says. 'What the multinationals are doing is recognising this and trying to give us guilt-free bad choices.' In the past few years, big food and beverage brands have taken notice of the growing popularity of nutraceuticals, forming partnerships aimed at developing such products.

In 2010 cereal giant Kellogg's teamed up with Ajinomoto, a Japanese company. A large producer of aspartame, Ajinomoto is also known for the controversial monosodium glutamate (MSG)

In 2010 cereal giant Kellogg's teamed up with Ajinomoto, a Japanese company that specialises in the production of nutraceuticals. A large producer of aspartame, Ajinomoto is known for the controversial monosodium glutamate (MSG), developed by the company in 1909. Together, Kellogg's and Ajinomoto 'plan to focus on developing products that deliver benefits in the areas of weight management, sugar reduction, and sodium reduction,' using ingredients such as the fat-burning capsiate 1 and sweetener monatin 2.

Known for cereals like Special K and Optivita, which are marketed as slimming, Kellogg's also produces sugary breakfast favourites like Pop Tarts and Coco Pops. The company was recently slammed for denying a link between sugar and obesity on the website for its chocolatey cereal. Following a ruling by the Advertising Standards Authority (ASA), Kellogg's is revising the recipe for Coco Pops to ensure that none 'will have more than around 10 per cent of your GDA for sugar per 30g bowl.' Even so, the company continues to shun criticism stating on its website: 'Sugar has been an important part of our diet for years as it is an important form of carbohydrate and a good source of energy, especially for the brain.' Kellogg's did not respond to *the Ecologist's* enquiries.

In 2010, food conglomerate PepsiCo acquired 66 per cent of Russia's leading food and beverage company Wimm-Bill-Dann in a 3.8 billion dollar deal. 'Our acquisition of WBD and its market-leading Russian dairy business gives us substantial, exportable capacity in a segment

providing key benefits, such as calcium and protein, which provide functional benefits such as improved bone health,' Marina Kagan, of PepsiCo Europe, told *the Ecologist*.

Known for its colas and crisps, PepsiCo also owns Naked Juice, Gatorade, SoBe and Tazo, all of which are marketed as having health benefits. 'We think health and wellness will be a $30 billion global business for PepsiCo by 2020,' Kagan says. 'As our consumer research shows, healthy food and drink categories are among the fastest-growing, worldwide - and there's a continuing trend toward healthier foods as the world's population ages.'

It's not just food companies cashing in. Just last month pharmaceutical giant Pfizer purchased Alacer Corp. maker of Emergen-C dietary supplement. And in 2010 agro-biotech giant Monsanto partnered with global soya ingredient company Solae to develop Soymega, the first omega-3 oil derived from soyabeans. Unlike conventional soyabean oil, Soymega contains stearidonic acid, which 'is more efficiently converted to heart-healthy EPA (eicosapentaenoic acid) compared to ALA (alpha-linolenic acid),' according to the company.

Other companies that have invested in the industry include Kraft, Coca Cola, Unilever, General Mills and Mars.

The future of food

But has our preoccupation with food fads made us forget the basic principles of a good diet? In the end, nutrition still boils down to common sense and a balanced meal, say experts. 'No single food contains all the essential nutrients the body needs to be healthy and function efficiently,' says Aine O'Connor, of the British Nutrition Foundation. 'A healthy and varied diet can help to maintain a healthy body weight, enhance general wellbeing and reduce the risk of a number of diseases including heart disease, stroke, cancer, diabetes and osteoporosis.'

For DeFelice, this principle is at the core of the industry he helped bring to life. 'The greatest nutraceutical in the world is a meal,' DeFelice says. 'No matter where you are, no matter what you eat, you live. Food keeps you alive.' But natural substances don't work alone - they work in combination, he says, and this is where the nutraceuticals industry went wrong. 'There was a burst of time where they were doing clinical studies and they came out a little negative and everyone backed off,' he says. Substances, such as vitamin E, were tested alone – as they would be in a pharmaceutical setting – rather than in combinations as they should be, DeFelice says. These 'flawed' studies were never refuted by the nutraceuticals industry, and they went back to basing claims on theoretical evidence. 'The dietary supplement, functional food industry is stuck,' he says. 'It's exactly where it's been when it started with a little bit more sophistication.'

Are nutraceuticals just a placebo?

But there are companies taking steps to 'pioneer a new industry between food and pharma' and Nestlé says it's leading the way. Known for Kit Kat, Nesquick and Smarties, Nestlé also oversees Nestlé Health Science, which 'offers nutritional solutions for people with specific dietary needs related to illnesses, disease states or the special challenges of different life stages, used under healthcare professional supervision,' Hilary Green, of Nestlé SA, told *the Ecologist*. The company calls its research centre in Switzerland the 'world's largest private nutrition research institution, specialising in food, nutrition, safety, quality and life sciences.'

But Green emphasised that, although Nestlé is the brand behind Boost, Nutren Junior, PowerBar, Gerber Organic and Jenny Craig in the UK, the company 'is not in the business of nutraceuticals, nor so called "functional foods," which she calls problematic. 'Foods are not

Can we really trust what we are being encouraged to take?

single molecule compounds that act in a pharmaceutical–like manner,' she says. 'Functional foods, and the diet they are part of, are complex mixtures of many molecules that affect many different biological mechanisms in complex ways.'

In 2011, Nestlé Health Science acquired CM&D Pharma Ltd., which 'specialises in the research and development, marketing and sale of FSMPs products - food for special medical purposes tailored for patients with kidney disease, inflammatory bowel disease, and colon cancer,' according to Green. One such "food" is Fostrap, a chewing gum for kidney patients suffering from hyperphosphataemia, elevated levels of phosphate in the blood.

Dr. Danilo Massari, founder and president of CM&D, says his company aims to take substances that are commonly used in nutrition and develop them as you would a pharmaceutical product. Such substances are extracted from foods like flax seeds, artichokes, shellfish, eggs and peanuts, purified, and tested for effectiveness and safety. 'Basically we use evidence-based medicine to prove the efficacy of our products,' he told *the Ecologist*. 'In a certain way we are in between the foods, or nutraceuticals, and drugs.' More in the realm of medical foods than full-fledged pharmaceutical drugs, the products are still treated as such when prescribed. 'In other words we need a patient, we need a disease and we need an M.D. recommending this product for use in that specific disease.'

'One wonders whether people are using certain products without medical recommendation due to the fact that they don't trust their doctors anymore,' says Massari.

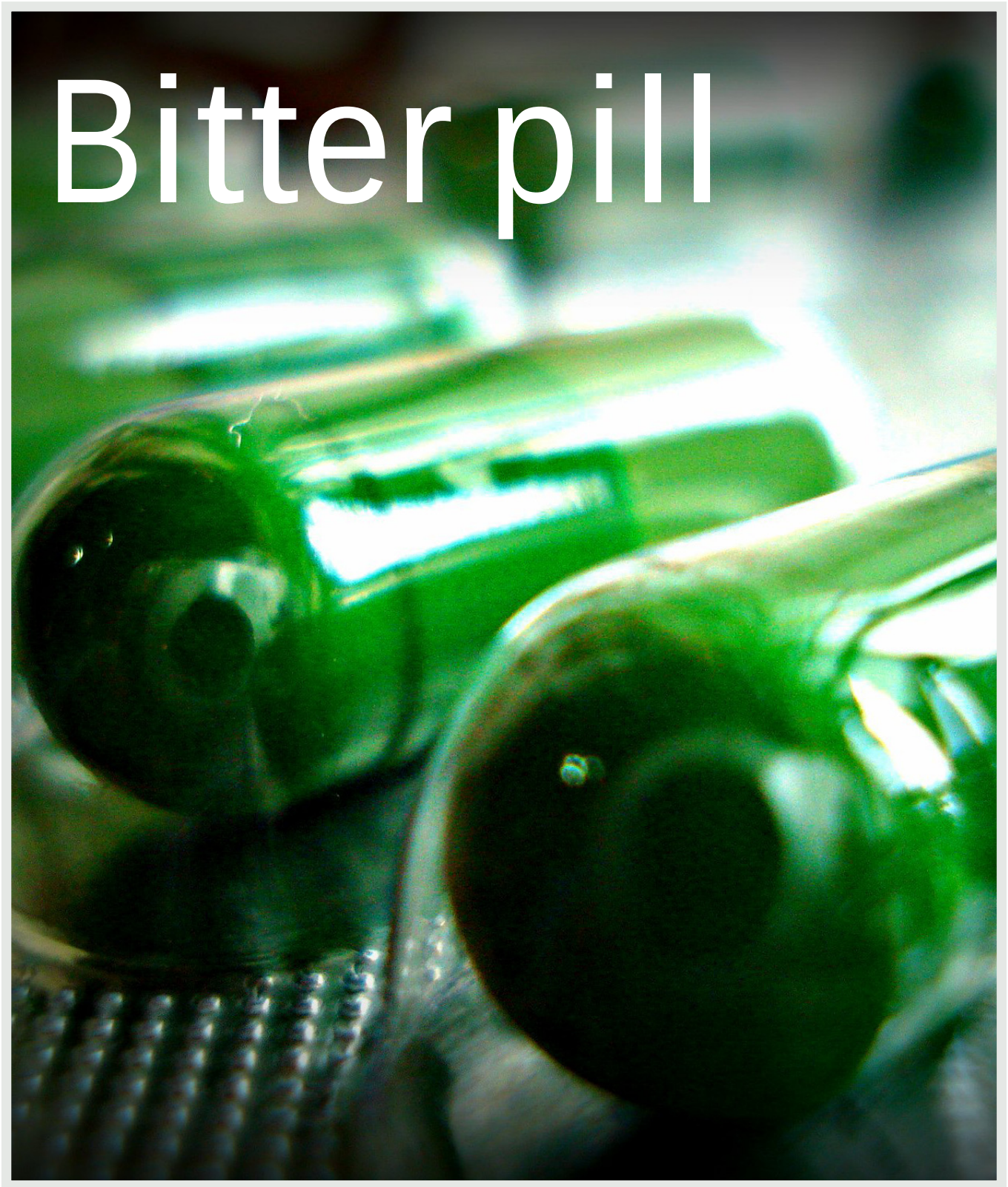
DeFelice says Massari is one of the few who succeeded in making clinical testing an integral part of the development of alternative products. But Massari says his company isn't alone, naming a number of others. He does however, agree that many of the products lining supermarket shelves have not been properly tested. 'There are a number of products there that are indirectly making claims that are totally unsubstantiated,' he says.

Conventional wisdom should not be dismissed; it should be tested, says Massari, who will be speaking at Vitafoods Europe, a nutraceuticals conference held in Geneva in May. And doctors need to be more receptive to patients who are interested in such alternative remedies.

'One wonders whether people are using certain products without medical recommendation due to the fact that they don't trust their doctors anymore,' says Massari. 'Doctors have also to be available to explore alternatives to the classical mainstream of big pharma. Big pharma has an impact with doctors that our segment doesn't have. We plan to go with plain science, and bring evidence and hopefully convince them that this is a new way to go.'

But DeFelice says nutraceuticals remain largely untested and placebo-driven, merely giving us hope for our health. 'I'm all for that,' he says. 'But you stay as a commodity, low-profit marketing operation and you don't elevate yourself into showing that your product works and helps people for real.'

Bitter pill



Official data obtained by *the Ecologist* suggests antidepressants, antipsychotics, anti-smoking drugs, vaccines and even paracetamol can cause adverse reactions and, in some cases, death. So just how safe are they? **Andrew Wasley** and **Bethany Hubbard** report

A drug used to treat schizophrenia and thought disturbances in patients with Parkinson's disease is the medicine most likely to harm or kill you, figures obtained by *the Ecologist* reveal. Antidepressants, drugs to help patients give up smoking and vaccines against meningitis, Human Papilloma Virus (HPV) and swine flu are also among medicines most likely to result in adverse reactions, data compiled by the UK's official drug watchdog indicates.

The statistics, recorded by the Medicines and Healthcare Products Regulatory Agency (MHRA), also show that substances used to treat rheumatoid arthritis, eye diseases and blood clotting are among those with the highest number of reported adverse reactions involving a 'fatal outcome'.

The figures record the total number of suspected adverse reactions reported both physical and mental side effects to the body during a period spanning more than a decade.

A range of medicines were linked to 274,123 suspected adverse reactions recorded by MHRA between January 2000 and November 2011. 12,020 deaths linked to these adverse reactions were also noted.

The MHRA compiles the data via its Yellow Card Scheme that enables doctors, drug companies and patients to report reactions they suspect have arisen from specific drugs or medicines. Patient groups and some medical experts say that officially-recorded figures are only the tip of the iceberg, with many adverse reactions linked to prescription drugs going unreported. 'Consultants and doctors do not [always] report adverse reactions,' Millie Kieve, from the Adverse Psychatric Reactions Information Link (APRIL), said. 'Patient Yellow Card reporting is not well publicised'.

> 'Harms are often unrecognised, ignored, denied, hidden, or attributed to other causes'

'Harm is often unrecognised, ignored, denied, hidden or attributed to other causes,' Professor Andrew Herxheimer, pharmacologist and Emeritus Fellow of the UK Cochrane Centre, told *the Ecologist* in a written statement.

A 2004 study by the University of Liverpool suggested that as many as 10,000 patients were dying every year in the UK because of adverse reactions. The researchers stressed the overwhelming majority taking medication do not suffer side effects.

A later report by the think tank Compass claimed that more than a million patients were admitted to UK hospitals in 2006 as a result of the drugs they were prescribed, and estimate the problem cost the NHS nearly £2 billion a year.

MHRA acknowledges that the true number of adverse reactions is higher than official figures show as the Yellow Card Scheme is associated with 'an unknown level of under-reporting.'

In most cases, however, the number of those suffering from reactions to specific drugs is very small in comparison to the volume of patients taking the medicine with no apparent side effects. Many of the side effects prompting reports to the Yellow Card scheme are minor reactions causing little or no long term harm.

Doctors point out that all medicines used in the UK have to go through a strict testing and licensing procedure in order to be approved, and claim medicines are constantly reviewed by drug manufacturers. They also caution that proving that a drug caused an adverse reaction is fraught with difficulty.

(Above and right) Although most people take prescription drugs without suffering side effects, for some patients medications can lead to serious adverse reactions

Serious side effects

According to the figures, Clozapine – used to treat patients suffering from schizophrenia – was the subject of 17,649 suspected adverse reaction reports between 2000 and 2011. The drug was linked to the deaths of 1,972 patients in the same period, MHRA data reveals.

Clozapine, which is also used to treat patients with Parkinson's disease, has been linked to a number of serious side effects including blood disorders. One of the conditions associated with the drug is agranulocytosis, which sees the number of white blood cells decrease

and impairs the body's ability to fight off infections.

The drug - usually administered after other antipsychotic substances have failed to work - has been the subject of a dedicated Patient Monitoring Scheme since 1990 where patients receive regular blood tests for agranulocytosis and blood counts are routinely monitored.

MHRA figures also show that Neisseria meningitidis vaccine - used to protect against bacterial meningitis - has been the subject of 13,460 suspected adverse reaction reports between 2000 and 2011.

The drug, administered via an injection, is routinely prescribed in the UK to children over two months, to adolescents and to adults. Many adverse reactions linked to the vaccine are relatively minor including headaches, irritability, fainting and dizziness, although cases of lymphadenopathy - swelling of the lymph nodes – and other more serious reactions have been reported.

Bupropion, used to treat depression and to assist patients who want to give up smoking, was linked to 9,306 suspected adverse reactions in the 11-year period. The drug is one of several antidepressants used to treat nicotine addiction appearing in the MHRA figures.

> All medicines have side effects – no effective medicine is without risks. Our priority is to ensure that the benefits outweigh the risks

Varenicline was the subject of 7298 suspected adverse reactions, 80 of which had a fatal outcome although 39 of these reports were suicide, according to the MHRA. The vaccine for Human Papilloma Virus (HPV), a common sexually transmitted infection that can lead to cervical cancer in women, was linked to 6095 adverse reactions.

The swine flu vaccine was reported for 3,561 suspected adverse reactions. Ranibizumab, prescribed to treat the eye disease, age-related Macular Degeneration (AMD), which sees patient's ability to see straight ahead, read, write or perform other everyday actions decline was linked to 549 deaths in the period covered by the data.

Infliximab, used to treat rheumatoid arthritis, Crohn's disease and psoriasis, among other auto-immune disorders, was linked to 4,428 adverse reaction reports, 520 of which had a fatal outcome.

According to one manufacturer of Infliximab, the drug has been linked to serious infections in some patients, including tuberculosis and histoplasmosis. Some of these infections have proved fatal.

Cancers have been reported in some patients being treated with the drug. Another drug used to treat similar conditions, Adalimumab, was the subject of 295 suspected adverse reaction reports with a fatal outcome.

Warfarin, administered to help prevent blood clots forming, was reported in relation to the deaths of 191 people.

Paracetamol – one of the few drugs featuring in the data that is available over the counter without a prescription – was the subject of 162 suspected adverse reactions with a fatal outcome.

'Focus on harm, not benefits'

Campaigners say the issue of adverse reactions continues to be little understood by the public and want more research into side effects, better education of doctors and clearer warnings for consumers.

Millie Kieve told *the Ecologist* 'doctors fail to recognise adverse reactions, in particular psychiatric reactions, and often increase the dosage with serious consequences.'

Kieve, who founded APRIL after her daughter died following 'years of adverse reactions', said that the training of medical students does not include enough emphasis on recognising or treating adverse reactions.

She also said literature outlining the side effects of particular medicines was not always made available to patients: 'Patient Information leaflets are not always included in the package if they are split or taken from bulk supply' she said.

Andrew Herxheimer believes there needs to be a 'complete rethink' of the current monitoring system:

'A basic fault is that research aiming primarily to find benefits of drugs, devices and procedures gets vastly more funding than the investigation of potential and actual harms from them. 'The ratio between the two seems not to have been properly estimated. We need the data: ethics and common sense demand parity of funding for research on positive and negative effects of treatments,' he said.

Herxheimer also said that spontaneous reporting alone – such as the Yellow Card scheme – 'is not an adequate solution and can only supplement proactive research on adverse effects.'

'Research on harm cannot be left to the industry – manufacturers cannot be expected or made to do it,' he said. 'The priorities and the funding must come from society as a whole, and logically that should apply to all therapeutic research.'

Campaigners have previously highlighted the MHRA's links to industry funding – the agency is partly paid for by fees from pharmaceutical companies – although the body denies there is any conflict of interest and says complex licensing decisions are referred to independent advisory committees.

Last year an *Ecologist* investigation revealed how an increasing number of UK patients claim to have been 'poisoned' by the commonly prescribed antibiotic Ciprofloxacin. Many claimed to have experienced a 'frightening' number of mental and physical side effects after being prescribed the drug that has been linked to more than 40 deaths and 1200 adverse reaction reports in the UK since 2000.

MHRA statistics:

1. Top 10 substances for which UK spontaneous 'suspected' adverse reactions have been reported between 1st January 2000 and 20th November 2011

Drug Name | Number of adverse reaction reports

Clozapine *17649*
Neisseria *meningitidis vaccine (meningococcal vaccine) 13460*
Bupropion *9306*
Varenicline *7298*
Human Papilloma *virus vaccine 6095*
Infliximab *4428*
Rofecoxib *3618*
Swine origin *influenza virus vaccine 3561*
Simvastatin *3434*
Paroxetine *3084*

2. Top 10 substances for which UK spontaneous 'suspected' adverse reactions with a fatal outcome have been reported between 1st January 2000 and 20th November 2011

Drug Name | Number of fatal reports

Clozapine *1972*
Ranibizumab *549*
Infliximab *520*
Adalimumab *295*
Warfarin *191*
Olanzapine *189*
Methotrexate *177*
Risperidone *167*
Etanercept *162*
Paracetamol *162*

Source: MHRA, December 2011

'No proof of reactions'

Medical experts have warned against drawing firm conclusions over adverse reaction reports, arguing that in most cases, it is very difficult to pinpoint whether a specific drug is responsible for a specific reaction.

They also point out that the figures need to be considered in the context of the often-serious illnesses that the drugs are being used to treat, and say that in many cases people prescribed particular drugs suffer no adverse side effects at all.

Jeffrey Aronson, President Emeritus of the British Pharmacological Society, previously told *the Ecologist*: 'Only in a very few – and rare – cases [of adverse reactions] can you be sure. In 99.9 per cent of cases you don't get obvious proof.' Aronson said that there is an assumption that people 'take a tablet, get an effect', and therefore that the two are linked. But the reality, according to Aronson, is that 'things happen coincidentally; there is a tension here as [drugs] can cause adverse reactions but whether directly to blame for specific symptoms, that's different,' he said.

MHRA stated that: 'all medicines have side effects – no effective medicine is without risks. Our priority is to ensure that the benefits outweigh the risks. It is important to note that a report of an adverse drug reaction does not prove that it was caused by the drug. Other factors such as the underlying disease or other medicines may contribute to

suspected adverse reactions.'

In relation to the drug substances with the highest number of suspected adverse reaction reports, the body said: 'These are medicines for which reporting is recognised to be high as they include newly introduced medicines (such as swine flu vaccines, Adalimumab and Ranibizumab which are/were on the intensive monitoring scheme), medicines which are widely used (such as Simvastatin, morphine and Warfarin), those that are the subject of considerable public interest (Varenicline) or those that have a dedicated Patient Monitoring scheme (Clozapine). 'The number of reports of adverse reactions that are received in association with a drug depends on many factors including the extent of use of the drug and the publicity surrounding the drug. In addition, reporting tends to be high for newly introduced medicines,' MHRA continued.

The body said that when interpreting the data, it was important to note that causality has not been established.

'The fact that an adverse reaction has been reported does not necessarily mean that the medicine has been proven to cause the reaction. Many factors have to be taken into account in assessing the relationship between a drug and suspected reaction including how long after taking the suspected drug the reaction occurred, the possible contribution of other drugs being taken, and the underlying disease,' MHRA stated.

'Every week we receive emails from the public giving details of suicides, agitation and self-harming linked to adverse drug reactions.'

In relation to one of the more well known drugs featuring in the statistics, Varenicline – linked to 39 suicides – MHRA stated: 'Smoking cessation, with or without drug treatment, is associated with various psychiatric symptoms including depressed mood. 'Smoking cessation is also recognised to be associated with the deterioration of pre-existing mental health illnesses. A significant proportion of cases of suicide-related events reported for [Varenicline] occurred in people with a history of mental health problems.'

APRIL is lobbying the Government to incorporate greater vigilance of those believed to be suffering adverse reactions – including pyschiatric problems linked to withdrawal from certain drugs – into the National Suicide Prevention Strategy.

In a letter to the Department of Health last October, signed by several leading pharmacologists, the group stated: 'Every week we receive emails from the public giving details of suicides, agitation and self-harming linked to adverse drug reactions. We have been informed about young people who died by suicide having been discharged, when agitated and suicidal, from A & E without their families being contacted. 'Akathisia (extreme agitation) is an adverse side effect that if not recognised can lead to tragic harm to the patient or others,' the letter continued.

In December, lawyers warned that doctors face being sued for 'creating prescription drug addicts' amid claims that some failed to follow safety guidelines when prescribing tranquilisers known as benzodiazepines. Some patients have reportedly developed a tolerance after regular doses of the drugs, resulting in the need for a higher dose to have the same effects. Although not all patients have suffered adverse reactions while taking benzodiazepines, for some, withdrawal from the drugs has led to serious psychological and physical side effects.

Useful links:

Adverse Psychatric Reactions Information Link (APRIL)
Medicines and Healthcare Products Regulatory Agency (MHRA)

Oil deal 'threatens Ugandan biodiversity'

The discovery of oil in Uganda was a blessing to the East African country. But before the oil has even started pumping, disputes over tax, accusations of corruption and fears for the environment have plagued the sector. **Alice Klein** reports from Hoima

Drilling begins outside Hoima - not everyone is pleased.

Could Hoima's villagers end up like these refugees? Photo: UN

More than two billion barrels of crude oil are located under Lake Albert, which sits on the border between Uganda and the Democratic Republic of Congo. The World Bank has excitedly predicted 'black gold' could provide revenues of £1.3 billion per year during peak production which could help to lift Uganda's population out of poverty, 40 per cent of whom live on less than 80p per day.

Oil rights in western Uganda are owned by Anglo-Irish firm Tullow, which recently sold a third each to Total of France and the Chinese state oil company CNOOC in a deal worth £2.9 billion. Controversially, say critics, two rounds of exploration and extraction contracts between Tullow and the Ugandan Government - known as Production Sharing Agreements (PSAs) – have not been made public.

Campaign group Platform leaked the original PSAs in 2010 but the new agreements, hurriedly signed by President Museveni in February 2012, remain confidential. Platform has criticised the lack of environmental protection in the deals, saying the agreements fail to include penalties for pollution as found in other countries, such as fines per barrel of oil spilt, most recently seen in BP's £27 billion bill for the US Gulf Coast disaster.

But while lawyers wrangle over papers, it is the communities that fish Lake Albert and live along its shoreline who are most concerned about potential oil spills, which they fear threaten their way of life. 'Tullow has a bad name here in Sebagoro,' says resident Harriet Namono, 28, who sells petroleum, tomatoes and fish on a rickety wooden table outside her hut. 'People came to investigate and do an impact assessment to see how the life of people by the lake is going to be affected by the oil, but they didn't tell us the proper results. Now we don't know what the results are or what the risks are,' she says.

> The impact assessments are carried out by local consultants, potentially susceptible to bribery or bias say campaigners, rather than international consultants brought in from outside.

She claims the company's activities stopped people fishing for a month and gas flaring took place closer than the stipulated 100km offshore, causing

children to fall ill. Namono now worries that without more rigorous environmental checks, an oil spill could occur which would devastate their 'motherland' from which 'everyone gets food.'

Tullow says the accusations are unsubstantiated. Jimmy Kiberu, a Tullow spokesperson, says: 'This activity was preceded by a comprehensive Environmental Impact Assessment[...] we are very conscious of our responsibility to ensure we mitigate any possible negative impacts of our operations.'

The impact assessments are carried out by local consultants, potentially susceptible to bribery or bias say campaigners, rather than international consultants brought in from outside. Their reports are then reviewed by the Petroleum Exploration and Production Department at the Ministry of Energy, and the National Environment Management Authority (NEMA).

But some commentators have questioned the lack of independence in the assessment process. Peter Veit of the Washington-based World Resources Institute says the 'semi-autonomous' NEMA, created by the government to regulate environmental management in Uganda, may be under political pressure when reviewing impact assessments.

Wildlife haven

Veit says the body has allowed drilling to take place in Murchison Falls National Park, for instance, a conservation area that comprises a big part un Uganda's booming £390 million tourism industry. The park, where the Nile winds its way through ancient forest before crashing through the falls and into Lake Albert, attracts hundreds of thousands of visitors every year. Alongside the waterfall, many hope to catch a glimpse of the elephants, hippos, giraffes, buffalo, chimpanzees, crocodile and more than 360 bird species inhabiting the 5,000 square kilometre forest.

> The construction will displace 30,000 people which the government has promised to relocate and compensate through a 'Resettlement Action Plan'

Alongside its wildlife, the UN says it provides an important species corridor that warrants protection. Subsequently, many fear disturbance from the oil industry could drive away animals and their visitors, leaving Uganda's vital tourism economy in tatters.

Grace Aulo, the tourism development commissioner, says drilling is phased to prevent disturbance to the animals and associated tourists. 'Of course you cant deny that there are impacts. The impacts are there but we're trying as much as possible to minimise them. There's light and heat but we make sure drilling is buried and the landscape is maintained so that not much impact is felt,' she said.

But Taimour Lay, former researcher with Platform, says the oil contracts and unfinalised national oil bill deter the government from adding environmental provisions, should they become necessary to protect Murchison Falls in the future.

'Leaks of the renegotiated PSA just signed by Tullow show a slight improvement because the clause has been narrowed. But the oil bill before Parliament is still an inadequate framework for holding the companies to account and contains provision for only very low fines,' he says.

Though Tullow insists the contracts contain strict provisions around environmental management, without legally binding protections and given the track record of oil companies in Africa, many fear Uganda risks falling victim to the same environmental destruction that has plagued nations such as Nigeria.

The Ughandan government is confident that the country will not make the same mistakes and insists it is taking the environment

Wildlife is also under threat.

The arrival of oil is threatening Uganda's biodiversity.

seriously. Energy minister Irene Muloni says: 'We have already begun close monitoring of environment and biodiversity and we have a multi-sectoral team set up to look at these issues.'

She says all companies are legally-bound to follow the guidelines issued by NEMA, including that which will construct a proposed pipeline to run the oil from Lake Albert to Africa's east coast for export. Rumours are rife it will travel through Kenya and surface in Mombasa or a proposed new port at Lamu, a previously picturesque tourism destination until westerners were kidnapped there in 2011, sparking Kenya's invasion of Somalia.

Some oil will remain in Uganda and preparations for a £3 billion refinery have begun in Hoima district. The construction will displace 30,000 people which the government has promised to relocate and compensate through a Resettlement Action Plan. But Hoima's population, who are mostly subsistence farmers, are worried for their future.

'We have heard that when there is oil it affects the environment and climate and here, our main activity is farming. We are fearing because we're going to lose our farmland because it will be destroyed,' says Kakura Ouada, 47, chairman of Nyahaira, a village located near the refinery site.

> ...many uneducated residents are purposely targeted by ruthless Kampala-based businessmen attempting to acquire land in the area.

Ouada says he is confused about the relocation process after he was visited by three different people, all claiming to be government officials. 'At first people came to demarcate the boundaries of the refinery a piece of land equivalent to, I think, 500 acres. But then, some other people came who said they were from the Government and the area they identified goes beyond that, so people are worried,' he says.

Hoima's District Councillor, Vincent Opio, says many uneducated residents are purposely targeted by ruthless Kampala-based businessmen attempting to acquire land in the area. Land in the proposed refinery area has increased from approximately £21 (80,000 UGX) per acre to more than £1,315 (5 million UGX) in just three years. The land shortage, he says, is due to land grabs, where land is bought by foreign corporations and used for biofuels or food for export.

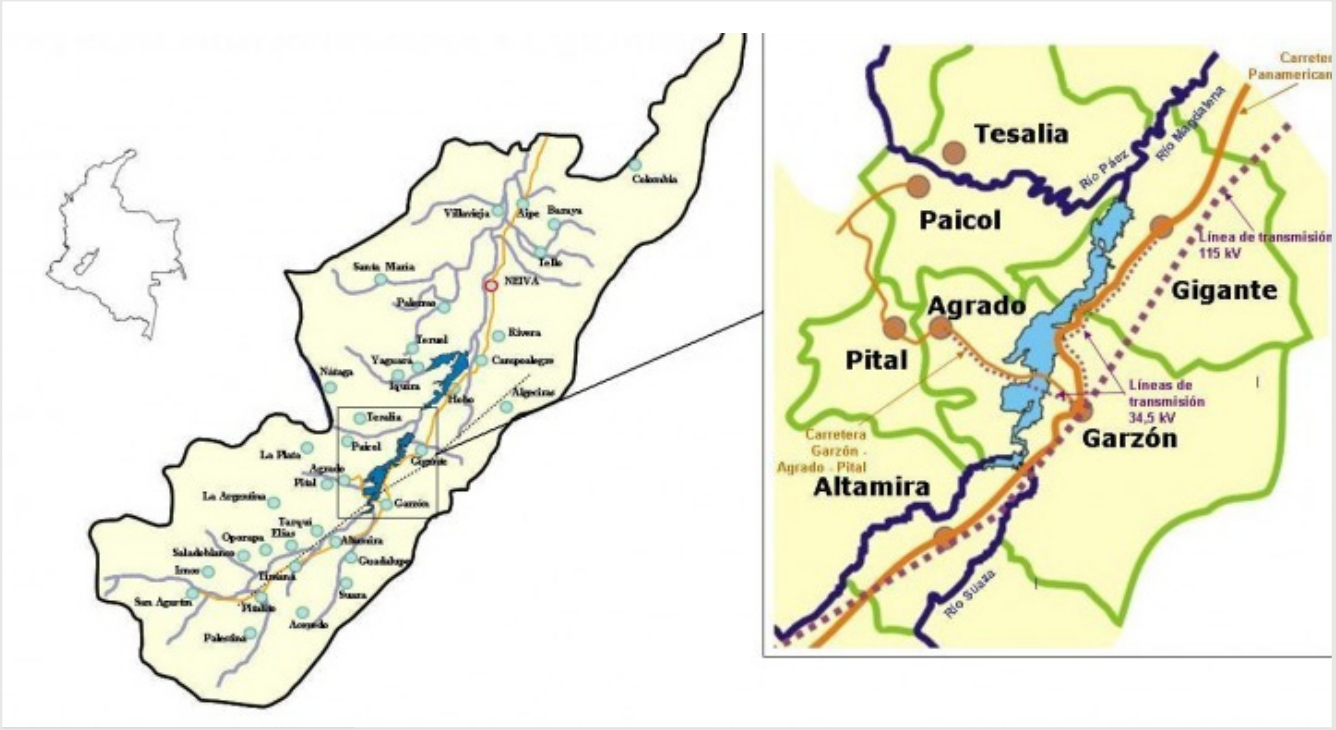
Hoima's subsistence farmers fear that to make way for the refinery, which will include an airfield to transport oil industry staff and officials, they will be moved to small plots leaving them unable to rotate crops of cassava, cabbage, maize and beans, which they depend on for survival.

'I'm not happy about leaving my land when I was born here, leaving my crops and going where I don't know. It's giving me sleepless nights,' says Upenji Seletino, a Nyahaira subsistence farmer aged 73. 'What will we get if we leave our plantations here? This is our only livelihood.'

Controversial El Quimbo dam risks becoming 'Colombia's Belo Monte'

A growing number of fishing communities, miners and farmers are stepping up their campaign against the dam - one of dozens of hydroelectric projects across Colombia - despite violent repression of some protests. **Amy Lieberman** reports

The proposed dam has led to a number of protests. Photo: Colombia es pasión.



The El Quimbo project area. Map: International Rivers.

Riot police shielded in head-to-toe black plastic armour were positioned in a neat row, waiting for the protestors to arrive. Doorless, brightly painted school buses (chivas) halted at the human barricade blocking the road to the Magdalena River, the principal river basin in Colombia. But the protestors aboard the chivas were also ready: for a possible confrontation and for a drawn-out battle against a 400-megawatt hydroelectric power project called El Quimbo.

'We are thinking differently about this dam,' said Jimena Chavarro, 32, an unemployed farm worker from the town La Jagua, 30 miles upstream from the dam's planned site. The mother of one says she lost work within the past year after the Colombian company behind El Quimbo began to purchase land nearby. 'We know our rights. What we want to achieve is difficult, but not impossible.'

El Quimbo, Colombia's first multinational company funded dam, is quickly becoming Colombia's Belo Monte – Brazil's highly contested 11,233-MW dam that stands to displace 40,000 indigenous people, according to the monitoring organisation, Amazon Watch.

El Quimbo, backed by Colombian company Emgesa, a subsidiary of the Spanish Endesa, isn't quite on Belo Monte's scale. About 500 people will be displaced by this dam, say critics, which will flood about 8,250 hectares of land. A disputed number of people, though likely several thousand, will suffer livelihood loses, and possibly be forced to relocate.

An apparent lack of comprehensive environmental analysis leaves environmentalists like José Yunis, country representative for the Nature Conservancy, guessing what long-term impact El Quimbo could have on the rich bio-diverse department of Huila, eight hours south of Bogotá.

'There's no silver bullet when it comes to what's best for building dams – only holistic scenarios,' he explains. 'But that analysis isn't being done in Colombia, looking at things in a broader perspective.' But this community of fishermen, miners and farmers, united under the group Asoquimbo, fears the worst. They have launched a series of sit-in protests over the last two months following the government's refusal to suspend Emgesa's environmental licence.

There are 128 dams presently being planned or under construction across South America's Amazon region, according to Dams-info.org

Locals face an uncertain future.

Spotlight on dams

Regardless of the protests' outcome, they are still bound to blaze a trail for future social responses to dam projects. 'It seems to me you have a lot of communities across Colombia that are paying attention to what is happening here,' says Alfonso de Colsa, director of the South Colombian Observer of Human Rights and Violence. 'They are watching closely, and thinking about if something like this could affect them, too, one day.'

He spoke during a Sunday, March 3rd protest, just off the damp banks of the murky Magdalena. The mood had calmed since the morning, when some of the younger protestors threw stones at police. The police retaliated with non-sensory gas bombs.

De Colsa lined himself between the approximate 200 protestors and the 20-some-odd riot police. 'There's no more possibility for discussion with the government,' De Colsa said. 'Our final option is to declare resistance.'

El Quimbo is one five dam projects planned for the Magdalena, and one of three large-scale dam projects presently underway in Colombia. The USD $837 million project is slated for completion by 2014. Yunis says the Colombian ministry of environment is currently considering 45 proposals for large-scale hydropower dams and 160 proposals for micro hydropower dams. 'Colombia is a great power in water supply and biodiversity. We are going to light up South America as a hub for energy,' Yunis said.

> ... the Colombian ministry of environment is currently considering 45 proposals for large-scale hydropower dams and 160 proposals for micro hydropower dams

The country trend falls in line with a recent 'relative resurgence' of hydropower dam projects across South America, according to Richard Taylor, executive director of the International Hydropower Association - an international non-profit coalition with energy industry representation.

'One of many'

There are 128 dams presently being planned or under construction across South America's Amazon region, according to Dams-info.org, a partner project of non-profits International Rivers, ECOA and Fundacion PROTEGER. There are 28 in the Amazon now in operation.

In Huila, Asoquimbo's concerns centre around the process through which the dam is being constructed – not simply the construction of the dam itself.

Asoquimbo and Emgesa held consultations between 2008 and 2009. Emgesa says it has fulfilled the provisions stipulated in the environmental licence the Colombian environment ministry first awarded it in 2009, then lifted and modified several times since.Asoquimbo says Emgesa violated its agreements in the licence however, and that the licence itself has failed to protect them.

Neither Emgesa nor the Colombian Ministry of Environment responded to *the Ecologist's* interview requests.

'We found about 1,359 more people who will be affected than what the company says,' claimed Miller Dussan, an Asoquimbo leader and a professor at Surcolombiana University, in Neiva. 'There are also a number of people who will be indirectly affected by flooding and won't receive compensation.'

Well into the protest's afternoon hours, Dussan drove his car slowly along a dirt road, weaving through protestors. They were heading inland for a public assembly. About 90 fishermen still remained camped out along the river, attempting to prevent its diversion.

Sit in protests

This demonstration would only last one day – brief compared to the

January 16-day sit-in protest and an eight-day protest in mid-February. It culminated in the forced removal of about 600 protestors. A YouTube video of the event shows riot police throwing what campaigners claim are grenades at protestors - at least one of whom was reported to be injured in the attack.

Colombian President Juan Manuel Santos said last week that the government 'will not permit' protestors to 'block a project as important as this for the country.'

'This project is needed for the country, it is clean energy, it is hydroelectric energy,' Santos told the weekly magazine *Semana*. 'If we want to continue to develop we need this energy.' He has also warned of guerilla insurgency infiltrations into the movement, a tactic Asoquimbo says has been used to discredit its legitimacy.

In early March, the Revolutionary Armed Forces of Colombia (FARC) chimed in on the debate, for the first time condemning El Quimbo's construction. The challenges in the hydroelectric sector aren't new, says Taylor, of the International Hydropower Association but its increasing role in development amplifies the need to 'assure that the social and environmental impacts are better assessed.' 'If it is developed responsibly, this can be a clean and sustainable source of energy,' Taylor added.

The IHA is now rolling out the Hydropower Sustainability Assessment Protocol, a new tool that Taylor says can help guide the industry. Others counter it doesn't have strong enough teeth, and is backed too heavily by corporate interests.

The survey will judge hydropower projects on a scale from one to five, in more than 20 categories of sustainability impacts. The protocol has yet to be applied in Colombia, which lacks a 'pilot,' Yunis says, in guiding environmental development.

By the time nightfall crept in on the Asoquimbo protestors that Sunday, they seemed resigned to their efforts falling short. The river was diverted, they learned, and people got quickly back onto waiting buses. Some still seemed determined to continue.

'I have to keep on fighting. This isn't just for my town – this is for my country. We have to defend our land,' said 48-year-old Alexander Naranjo Tellez, of La Jagua. But the farm worker hasn't been able to find steady work in over a year, and conceded that he's thinking about moving his family away soon. He says he might not have any other options.

Protestors confront police. Photo: Colombia es pasión.