Sustainability in the 21st Century

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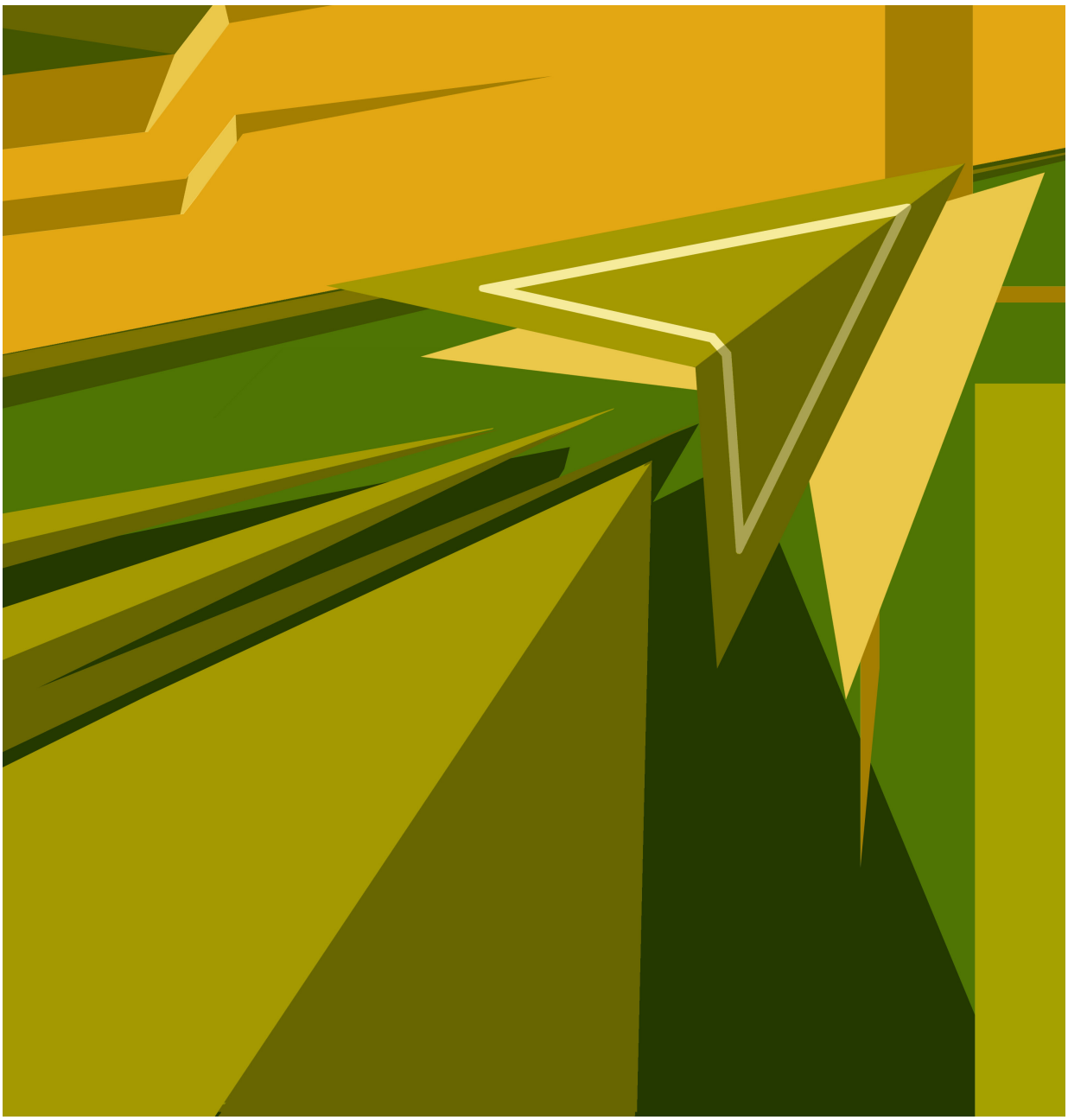

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foreword

We are standing at a critical crossroads, a time of unparalleled prosperity but also unprecedented dilemmas.

On one side there is rapid development of science, technology and materials; on the other, the intensifying threat of global crises, such as climate change and famine. On one hand is humanity's confidence in the results of the global market system; on the other our unease about the increasing fragility of the natural environment.

What do we ultimately want? How much more can we give – and give up? How do we change humanity' standards for evaluating economic activities? How do we influence the structure of the system? Now is the time to ponder these big questions.

With the support and cooperation of the Heinrich Böll Foundation, chinadialogue has published a series of articles over the past year engaging with the ongoing discussion around the values of development. Those articles are compiled here. Some attempt to provoke self-reflection, others to provide fresh perspectives and carve new paths and others simply to document new developments. We have also gathered case studies from around the world, which offer positive examples or lessons learned.

We are grateful to the Heinrich Böll Foundation, which has always promoted the values of equitable development, and hope this publication will help to foster dialogue about the fate of our era.

Xu Nan

deputy editor, chinadialogue's Beijing office

Putting a price on nature could “expel" people from common lands

Schattenblick

Turning ecosystems into commodities undermines collective ownership of natural resources, argues Barbara Unmüßig of the Heinrich Böll Foundation.

Barbara Unmüßig is co-president of the Heinrich Böll Foundation and co-author of the pamphlet “Critique of the Green Economy”. She spoke to German website Schattenblick about the state of the green agenda. Here are translated excerpts from the interview.(Image by Heinrich Böll Stiftung)

Schattenblick: Recently you published the booklet “Critique of the Green Economy”. Do you think that your critical stance concerning green projects has deepened in recent years?

Barbara Unmüßig: Our critique doesn’t aim at green projects, it is targeted at numerous concepts for a green economy proposed by, among others, UNEP, OECD, and, most recently, the World Bank. It is my deeply held conviction that we urgently need a greener economy, or rather, a more ecological world economy. In our essay we are trying to answer the question what such a green economy may look like. Is this a paradigm shift? Is it possible to scale back our economic activity – or is it all just about “greening” existing structures?

This is what the controversy is about. I do argue that because of the limited nature of our planet and the ecological challenges facing us, we have to reconsider the fundamentals of our economy. In that respect, I think, the existing blueprints for a green economy do not go far enough.

SB: In your opening remarks at the McPlanet.com conference [in Berlin in April] you used the term "pacified growth". Is that something that simultaneously denotes anti-capitalism and sustainability?

BU: "Pacified growth" certainly doesn't mean the end of capitalism. We know that growth is inherent to capitalism, and that is how it goes. It's a law. Capital has to yield a profit and that means – especially where credit is involved – that there has to be growth and expansion. We thus have to consider how to scale down our economic activities in a way that respects the limits of our planet, with the art of restraint as part of the vision of a viable economy. In this context, people are thankfully once again trying to find new solutions. This is why there is debate about prosperity without growth; this is why there is debate about how to design a post-growth economy; this is why there is a movement for de-growth as well as a "slow movement". There is a global renaissance of the commons. All of these are part of a search for ways to escape our present, destructive model of production and consumption.

I think this is one of the most positive developments – the re-emergence of people trying to find solutions, of pioneers who seriously think about how to get away from the constraints of the markets, the pressures for efficiency, the modes of production that deplete resources.

SB: Do you think that capitalism bears a fundamental responsibility for the degradation of the environment? Will certain precepts such as the maximising of profits have to go – or be overhauled?

BU: As I said before, capitalism as we know it today needs profits, otherwise it will be unable to pay the interest on the loans it needs for investments. How to escape from this necessity for growth, how to stay within ecological limits, that is the crucial question for the twenty-first century. And this is why I take part in and support all efforts to think about how to overcome the necessity for growth. Still, I don't use the term "anti-capitalism" as I do not yet know what the "anti" – the opposite, the alternative – would be.

We have to reflect; we cannot act as if we knew the answer. The old answer of the Left, that nationalisation will solve the problem of private property, doesn't lead anywhere. What's central are social, democratic, and participative innovations – and such approaches are being shunned by policies for a green economy that promote nothing but technological solutions.

There are a number of leftist governments around the world, in Latin America and

elsewhere, that have successfully implemented redistribution policies, among others Lula da Silva in Brazil. The Brazilians have managed to achieve the Millennium Development Goals to reduce poverty in their country by 2015, yet this social redistribution that is taking place – and I cannot stress enough rightly so – is based on the extraction of resources and thus on the economic model that depletes resources, depletes the land and exploits the people. This has to be made very clear. If this weren't the case, there would be no movements such as those of the indigenous or landless who, in Brazil, fight against this model of development that promotes redistribution by degrading the environment.

SB: Deutsche Bank commissioned Pavan Sukhdev to put so-called ecosystem services and biodiversity on a new economic footing. Don't you think there's a conflict of interest here? [Sukhdev worked for Deutsche Bank for 14 years before taking on the TEEB study]

BU: Deutsche Bank had released Mr Sukhdev so that he could be in charge of UNEP's major study on The Economics of Ecosystems and Biodiversity [TEEB]. I do not want to speculate about a conflict of interest – that is something you would have to ask Mr Sukhdev himself.

I think much of the criticism of the "Economics of Ecosystems and Biodiversity" initiative is valid. A main point of contention is that this will intensify the economisation and mercantilisation of nature and environmental policies. Today there are still millions of people who make use of nature without destroying it. They don't need new market-based approaches such as those that are now being suggested from many quarters. Shouldn't it be possible just to leave nature alone, that is, not to extract resources from the Arctic or virgin forest areas?

Whoever puts economic principles first, thus turning ecosystems and biodiversity into commodities – or "assets" as they're already being called – needs ownership structures to enable trade. This, unfortunately, has the effect to destroy commons, to expel and disenfranchise people.

SB: Do you know of any positive examples where such economic principles have been applied – possibly on a small scale?

BU: We're still in the very early stages of dealing with the economisation of nature. For example, there is something Mr Sukhdev has pointed out: it might make sense to evaluate what services some ecosystems generate, especially in the case of certain accidents, let's say shipping disasters, where an insurance company has to know how much it will cost to repair certain types of damage. This may be especially useful where ecosystems such as the oceans are involved, and here it may make sense to have bases for calculation. This is why, for some time now, economists have tried to evaluate ecosystem services.

Another attempt to evaluate ecosystem services is Ecuador's proposition not to exploit its rainforest oil in order to preserve local habitats. This is the famous case of the Yasuni oilfields, and

the slogan is “leave the oil in the soil”. Here, the question is to gauge the value of the forest for humanity against the value the oil would generate if extracted. This is a positive example and it goes to show that whenever nature is to be evaluated one has to ask: who is it good for? Who owns what? Who’s in control? Such questions point to the greater question of ownership and distributive justice.

I would like to see similar moves in Brazil concerning their offshore oil, which should not be exploited; drilling for oil underneath the seafloor, 1,800 metres below the sea, is such a risky endeavour that it should not be attempted. This is even deeper than Deepwater Horizon in the Gulf of Mexico – and we know what happened there. If those offshore fields were left untouched, there would have to be calculations concerning the economic impact of not exploiting them.

SB: Isn’t it terribly difficult to make such calculations, as there are so many risk factors involved, some of which we’re not even aware of?

BU: That’s right. Unfortunately our approach is trying to find technological solutions for global environmental crises instead of considering scaled-down economic activity, savings, and doing with less – in one word: sufficiency. The point is not to claim that technology can never offer solutions; the challenge is to ask, again and again, what technologies we support and who controls them. Plus, what will be the social and environmental consequences?

What worries me is this trend to regard technology as a panacea, to make it an absolute, without ever discussing lifestyles and patterns of consumption. Many technologies are high-risk – nevertheless they are being introduced with utter recklessness. The consequences such technologies have are hardly ever being evaluated.

All governments in the [global] north, and some in the [global] south, too, spend huge amounts on research and development for high-tech solutions – instead of giving money to research into plants adapted to climate change that then may be cultivated by peasant farmers. Which, once again, poses the question: what research and for whom? Who’s helped by what technology? And who will be responsible for high-risk technologies?

This interview first appeared in German on Schattenblick. It is translated into English by Bernd Herrmann.

The coming DIY revolution

John Elkington

At the margins of the current order, a new breed of innovators has stopped waiting for big business and big government to fix our problems, writes John Elkington.

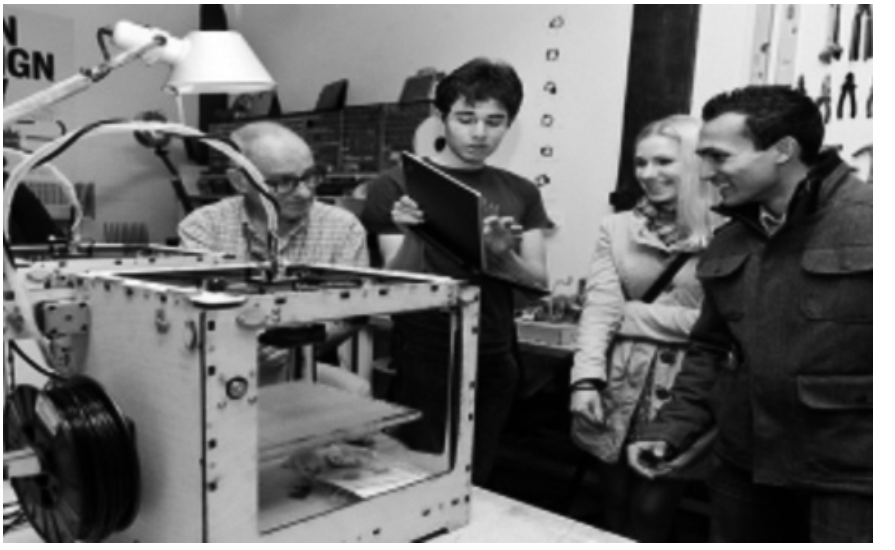


Image by Waag Society

Standing next to me in the baggage line at Heathrow a few weeks ago was Steve Wozniak, co-founder of Apple computer back in 1976. But as I was about to turn and thank him for all the Apple technology I have enjoyed over the decades, someone else did the same. Yes, Apple has been in serious trouble because of working conditions at Chinese contractors like Foxconn, but its beacon continues to burn bright. Indeed, Apple remains something of a "Teflon" company (to which few bad things stick) rather than a "Velcro" company (to which everything sticks).

But the flight Wozniak and I arrived on had come in from San Francisco – and some people there now see Apple as an icon of an older, vulnerable economic order. Having just met some of

these innovators, entrepreneurs and investors in the Bay Area, I think there's something going on here that is worth paying serious attention to, even if many of these people are still Apple devotees when it comes to the tools of their trade.

Instead of waiting for big companies and big government to solve our problems, a new breed of innovators is in the process of creating a "Do-It-Yourself" revolution. We saw elements of this with social entrepreneurs like the Grameen Bank's Muhammad Yunus, the sort of "unreasonable people" who decided that if banks wouldn't do what people needed then the answer was to set up a new sort of bank. Now the champions of the Do-It-Yourself revolution are also encouraging each of us to build everything from phones to satellites.

Among the companies I visited in Silicon Valley was HP, whose founders created their original technology in a garage – as would Apple's Steve Jobs and Steve Wozniak 37 years later. So there is nothing new in this can-do spirit, but what is extraordinary is the sheer range of potentially breakthrough opportunities that this new generation of entrepreneurs is going after.

And that's just as well, given the deeply disappointing results of the UN's Rio+20 summit. Political leaders seem unable to get their collective act together. As their status slides, expect growing interest in the champions of breakthrough capitalism. Among them could be the sort of business superstars you would feel excited to find yourself standing next to in the 2020s and 2030s.

It's true that not all the venture capitalists and entrepreneurs I met were as bullish as their equivalents were when I made similar visits to biotechnology firms in the 1980s and 1990s, or to clean-tech firms a few years back. They worry that there is still weak government support for "green growth", slowing the scaling of market solutions.

This downbeat mood was reinforced when I began to read 2052, a new book published to coincide with Rio+20. Its main author, Jørgen Randers, a leading figure in sustainable development for 40 years since he co-authored the Limits to Growth study, concludes that many of the changes needed to ensure true sustainability are not going to happen – at least on the necessary scale and in the required timescales.

The bit of the book that resonated most powerfully with me was one of the perspectives contributed by external experts, and predicts that the 2030s will see worldwide revolution, as the 1840s did in Europe, driven by disenfranchised young people. "They are already now beginning to wake up to the fact that their parents and grandparents are in the process of leaving them an exploited planet with degraded life-support systems, indebted economies, few jobs, and no affordable housing," warns Austrian biologist Karl Wagner. "In developed countries they also inherit the responsibility of caring for an increasing number of retired people who plan to receive pensions and health care for the next 30 to 40 years."

Revolution is inevitable, Wagner says, "because the old system will not go away by itself". The revolutions, Wagner predicts, will begin in the global north, but spread to Latin America and, somewhat later, to China. By 2100, the surviving young may be better off, but at the cost of the elderly. Unless, that is, a new generation of breakthrough capitalists emerges, triggering seismic shifts in our expectations and ambitions. Happily, a new, scrappy world of innovation is surfacing at the margins of the current order.

Anyone lucky enough to make it to June's TEDGlobal event in Edinburgh would have seen some of these pioneers in full flow. The focus: a global movement that aims to take manufacturing out of factories and into people's homes. And another of the companies I visited in San Francisco was Autodesk, which creates software products used by everyone from architects and city planners through to film-maker James Cameron for his Avatar series. One emerging area of business is 3D printing, with the ultimate goal that any of us would be able to print out a motorbike or microscope at home.

While in the city, I also visited an exhibition featuring the work of Buckminster Fuller, inventor of the geodesic dome, who had a huge influence on my thinking and work. Among the exhibits were copies of the famous Whole Earth Catalog, published between 1968 and 1972, which I read cover-to-cover at the time, and which helped spur a global movement in such areas as appropriate technology. It was no accident that one of Steve Jobs' most famous speeches, atStanford University, quoted the last in the Whole Earth Catalogseries: "Stay Hungry, Stay Foolish".

Most of the political or business leaders who convened in Rio de Janeiro are far from "foolish" in the sense that Stewart Brand, the other Whole Earth Catalog author and Steve Jobs intended – prepared to risk everything to create a potential solution to key world challenges. This is partly a function of their age, partly of the rules of the game they play. Some will adapt ahead of the curve, but most can't or won't. If history is any guide, this means someone else is going to have to do their job for them.

John Elkington is executive chairman at Volans and non-executive director at SustainAbility.

Do we face another food price crisis?

Rob Bailey

Global food prices are on the rise again as drought hits US harvests. Until governments address the issues of biofuel mandates and export controls, writes Rob Bailey, a spike threatens to turn into a crisis.

International food prices are on the rise again. The United States, the world's largest producer of corn and soybeans, is in the midst of its worst drought for half a century. Harvest forecasts are being revised down continuously, triggering alarming run-ups in the price of both commodities. Earlier July of 2012, both passed the peaks they reached during the 2007-2008 food price crisis. At this point it is too early for climate scientists to say whether climate change made this particular drought more likely, but it may well have done. It will almost certainly make such events much more likely in the future.

The concern now is that the supply shock will be enough to tip agricultural markets into a vicious circle of rising prices and declining confidence. This may happen if governments start to panic-buy and hoard, or worse, impose export controls on their agricultural sectors to appease angry populations, driving up international prices further and encouraging others to follow suit. This dynamic was a major contributor to the 2007-2008 crisis, which saw riots in more than 30 countries and left the international humanitarian system hamstrung, caught between spiralling demand for emergency food aid on the one hand, and high food prices on the other.

It was also behind in the 2010-2011 price spike, when Russia and the Ukraine imposed export bans following a devastating heatwave that wiped out large swathes of the Black Sea wheat harvest. The vertiginous rise in wheat prices that followed provided a crucial spark for the early protests in North Africa, which eventually became the Arab Spring.

The good news is that globally the two commodities most susceptible to export bans, wheat and rice, are expected to post good harvests this year. If the price spike remains primarily confined to corn and soybeans then a global crisis is unlikely. Food riots, such as those that occurred in

2008 or 2011, are more often associated with the price of rice or bread (made from wheat flour), commonly crucial expenditures for poor households.

However, there is a chance that the price spike will spread, rippling from one crop to another as consumers switch between commodities as prices rise. And worryingly, there are signs of contagion: wheat prices are on a strong upward trend – rising over 50% in just over a month – probably as traditional corn users in the livestock sector switch to wheat as a cheaper alternative for animal feed. A poor wheat harvest in a key exporting region, such as the Black Sea or Australia, would be precipitously destabilising. The most vulnerable countries to spiking wheat prices remain those of North Africa and the Middle East, as well as Pakistan.

Because corn and soybeans are primarily used in animal feed, price rises in these commodities are less associated with increasing poverty and unrest. Poor people cannot afford to eat meat and so are less affected; rich people can reduce their meat consumption without risking starvation. There are exceptions to this of course, most notably Mexico, where white corn is the national staple and a crucial component of poor household expenditures. Though it is the slightly different US grown yellow corn currently facing a major supply shock, price rises could easily be transmitted from one to the other if livestock producers seeking cheaper feed switch from yellow corn to white. This is precisely what happened during the 2007tortilla crisis, when thousands of protestors took to the streets in Mexico City.

Another emerging economy that has cause for concern is China. Although poor Chinese depend primarily upon rice, a growing middle class has a taste for pork – from pigs fed on imported soybeans. China is now the world's largest producer of pork and its largest importer of soybeans, higher prices of which will contribute to inflationary pressures within the country. The government may choose to make releases from its strategic soybean reserve, which trade data indicate it has been building since the 2007-2008 price crisis, presumably for an eventuality such as this.

One emerging economy currently benefitting is Brazil. It is the world's second-largest producer of soybeans, and high prices will provide some compensation for the drought that ravaged its previous crop. Remarkably, Brazil has also begun to export corn to the United States as the American livestock sector looks abroad for affordable feed. The US accounts for around 40% of global corn production, prompting one commentator to note that the US importing corn is the equivalent of Saudi Arabia importing oil.

Yet even with 2012's disastrous harvest, the United States will produce enough corn to meet the needs of its livestock and food manufacturing sectors and to supply international markets. The reason that domestic consumption and exports are being forced to adjust is ethanol, which currently consumes some 40% of US corn production. Ethanol's demand for corn does not adjust – it is set by government mandate so is perfectly inelastic and completely unresponsive to supply shocks, forcing adjustment on everyone else and amplifying price spikes in the process.

The US agriculture secretary Tom Vilsack recently said that he waspraying daily for the drought to end. An alternative, arguably more effective, strategy would be to relax the ethanol mandate. Recent modelling by the UK government found that halving the US mandate during a price run-up such as this could reduce the magnitude of the spike by about 40%. Unfortunately Vilsack has rejected this option. It is an election year, and the mandate is too valuable to the politically crucial corn-growing states.

Making biofuel mandates flexible, or preferably abandoning them altogether, was a recommendation made to the G20 in 2011 by a group of 10 international organisations, including the World Bank, IMF, FAO and OECD. Unfortunately governments failed to act on this advice, and also failed to agree rules to limit export bans. So the world remains highly vulnerable to volatile food prices: global food stocks remain close to crisis thresholds and are struggling to recover as demand continues to outstrip production growth, markets remain tightly balanced, biofuel consumption continues to expand and no agreements exist to prevent or limit the unilateral imposition of export bans. As a result, we are only one or two bad harvests away from a crisis. And as climate change gathers pace, each year the chance of one or two bad harvests increases.

Hopefully this spike will not turn into another global crisis, but it must provide a wake-up call. Unless governments get serious about dealing with biofuels and export controls, one thing we can be sure of is another crisis, probably sooner rather than later. And governments will not be able to say they were not warned.

Rob Bailey is senior research fellow for energy, environment and resources at Chatham House.

Image by iowa_corn

Don't ditch sustainability yet

John Elkington

A new discipline from Harvard Business School can help corporations work for the planet, its creators say. But John Elkington thinks they've missed some key truths about capitalism.

The second Shared Value Leadership Summit in Cambridge, Massachusetts, left me a little unsettled. At exactly the moment that world leaders were heading to Rio de Janeiro to assess progress on the global sustainability agenda, one of the world's leading management gurus – Harvard Business School's Michael Porter – seemed determined to elbow aside sustainability in pitching what he calls "shared value".

That said, this new management discipline, is undeniably a key step forward in corporate strategy. Launched in 2011 in the Harvard Business Review, "shared value" is now gaining real traction. The idea is that, if business aligns its commercial and societal objectives, it can better evolve scalable solutions to key global challenges. And Porter has a history of environmental sensitivity, so I live in hope.

The central theme is indisputable: "Business and society have been pitted against each other for too long," Porter and his co-author Mark Kramer, of non-profit consultancy Foundation Strategy Group (FSG) argue. "That is in part because economists have legitimised the idea that to provide societal benefits, companies must temper their economic success. In neoclassical thinking, a requirement for social improvement – such as safety or hiring the disabled – imposes a constraint on the corporation."

The net result, Porter and Kramer insist, is that the strategies of many corporations "have largely excluded social and environmental considerations from their economic thinking". They continue: "Corporate responsibility programmes – a reaction to external pressure – have emerged largely to improve firms' reputations and are treated as a necessary expense. Anything more is seen by many as an irresponsible use of shareholders' money."

So far, so good. But if you appear to scoop sustainability up with corporate social responsibility and dump them in the "bucket of history", as Marx attempted with capitalism, you risk antagonising those who have embraced the sustainability framing of the agenda because they

see the systemic nature of the crises we increasingly face.

FSG is now signaling its intention to open the shared-value platform out for wider input, which is welcome, but here are three things Porter said that left me wondering whether fine-tuning may be needed.

First, he enthused that capitalism works like "magic", conjuring value "out of nothing". But anyone who knows anything about industrial capitalism understands that it typically converts natural capital that has evolved over millions of years into things that financial markets value. The Rockefeller Foundation was in the room, as one of the funders of FSG's research. Where did John D Rockefeller make his money? Oil.

If shared value is to create real, long-term value, it needs to acknowledge that capitalism is not invariably a benign process. Indeed – as sustainability proponents have long argued – it can play a key role in destroying vital resources, reducing the planet's biodiversity and destabilising the climate.

Second, FSG reduces corporate sustainability to resource efficiency. That may be what companies can currently measure, but recall that the original formulation focused on the idea of intergenerational equity. At a time when the world population is headed towards nine to 10 billion, our economic model is often dangerously myopic in systematically favouring a few forms of capital – financial, physical intellectual – over others, namely human, social and natural.

If you focus on the narrow commercial interest of particular companies, then it makes sense to encourage chief executives and others to cherry-pick their priority issues from a menu of options. But what if, unlike items on a restaurant menu, the challenges are all symptoms of systemic dysfunctions of modern-day capitalism? Might the shared value approach encourage incrementalism rather than the necessary transformative, systemic change?

Finally, Porter seemed to suggest that shared value offers a values-free way for leaders to select their strategic priorities. What he meant, I am told, was that this isn't so much a shared-values agenda, as an infinitely better way to identify areas where commercial and societal value creation align. Still, declared or not, values are shot through all forms of capitalism, even if masked by market pricing signals.

This is something that PUMA chairman Jochen Zeitz is trying to address with the Environmental Profit & Loss methodology, seeking to place a market value on the environmental impacts of his company and supply chain. In 2010, PUMA calculates that the environmental costs imposed by its business activities were "worth" 145 million euros (US$182 million). Once you know the numbers, whether or not the market incentivises you to address them, it's a matter of values as to whether you decide to take a free ride, or pay your bills.

UN secretary general Ban Ki-moon characterises sustainability as offering "what economists call a 'triple bottom line' – job-rich economic growth coupled with environmental protection and

social inclusion." Porter doesn't much like the triple bottom line concept, which I coined in 1994, seeing it as an attempt to balance off different forms of value creation. But the declared intent was always to achieve what Jed Emerson some years ago dubbed "blended value".

Perhaps the difference of opinion reflects the fact that Porter and Kramer's consultancy, FSG, started out advising foundations on how to direct their philanthropy. Perhaps theirs is an "inside-out" world, where you take a given quantum of resources and use it to achieve the greatest possible impact.

The "outside-in" sustainability movement comes from a different starting point, a world in which our species is moving into theAnthropocene. This is a new reality in which our species has impacts on a geological scale and where the interests of future generations need to be brought back into the present – in ways that today's capitalism systematically fails to do.

Unquestionably, shared value is an exciting, emerging management discipline. But these don't always win universal acclaim. Among previous management disciplines to have a huge impact was Total Quality Management (TQM), which emphasises improvement of quality as measured by customer satisfaction. It led to criticism that certain forms of quality management could be used to design a "concrete submarine" [1]as long as that was what the customer specified, even if the end result was that the submarine promptly sank with all hands.

We have to be very careful how our commercial specifications are set in the Anthropocene. In the end, however, properly addressed, sustainability could be the ultimate form of shared value.

John Elkington is executive chairman at Volans and non-executive director at SustainAbility.

[1] *We have entered a new epoch: the Anthropocene, in which humans not only threaten to destabilise the Earth's systems in dangerous and unprecented ways, but also in which we have great opportunities to shape our shared futures. This is the message over at Anthropocene.info, a website operated by a group of leading research institutions including the International Geosphere-Biosphere Programme and the Stockholm Resilience Centre, and it's growing to be an influential part of the environmental discussion: an outlook that combines Earth systems science with new ways of thinking about technology and global governance.*

Our bounded world

Will Steffen
Johan Rockström
Robert Costanza

The Earth, our life-support system, has "hardwired" limits we must learn to respect, say Will Steffen, Johan Rockström and Robert Costanza. They explain their planetary boundaries concept – and how it can transform our approach.

Image by Greenpeace

This is a shorter version of an article that first appeared in Solutions journal. It is based on the papers "A safe operating space for humanity", published in Nature, and "Planetary boundaries: Exploring the safe operating space for humanity", published inEcology and Society. See these papers for a complete description of the planetary boundaries.

Over the past half century, we have become adept at dealing with environmental problems on a local and global scale. The worst excesses of the industrial revolution have, in many cases, been ameliorated. Rivers, such as the Thames in London, have been cleaned up and the air quality in major cities, such as Los Angeles, is better. Synthetic pesticides once sprayed on our crops, such as DDT, have been banned in most developed countries, and lead has been removed from petroleum-based fuels.

However, to say we have done enough globally would be false on two counts. First, while these problems have been addressed in many European and North American nations, over three-quarters of the world's people do not live in developed countries. For them, many of the local and regional

environmental problems still exist and, in many cases, are worsening.

Second, the environment – our life-support system – is under increasing threat from a wide range of human pressures, many of them emanating from consumption in wealthy countries. The deterioration of the global environment puts even more pressure on the poorest countries to limit growth, even as they struggle to bring their populations out of poverty.

This is an entirely new situation for humanity. In the past, when we fouled our local environment, we could move somewhere else. As human population has grown, these short-term solutions are no longer viable. Furthermore, the impacts of our presence were not usually felt beyond our immediate surroundings. This is also no longer the case. The world population is no longer small, spread out and technologically limited.

Does our planet have boundaries regarding the amount and type of growth it can absorb? We believe it does and that certain preconditions must be set that acknowledge and respect those boundaries.

Since the industrial revolution, the human enterprise has expanded so rapidly that we are now overwhelming the capacity of the Earth system to absorb our wastes and to sustainably provide the services we require. In the period since the Second World War, the acceleration of development has become particularly dramatic. Humanity is fundamentally changing the Earth's physical climate, overwhelming its capacity to provide ecosystem services,homogenising its biological diversity, and substantially modifying the global cycles of key elements like nitrogen, carbon and phosphorus.

So what is the solution to this dilemma? Humanity needs to change course, but in what direction? And what principles should guide the journey?

The problem has been recognised for several decades, and many attempts have been undertaken to define or inform solutions – limits to growth, safe minimum standards, the precautionary approach andtolerable windows, for example. These provide an excellent knowledge base from which to work toward a more sustainable future.

The concept of planetary boundaries, while building on earlier efforts, takes a rather different approach. It does not focus so directly on the human enterprise as most of these earlier approaches, but rather emphasises the Earth as a complex system. Here we identify nine areas that are most in need of set planetary boundaries: climate change; biodiversity loss; excess nitrogen and phosphorus production, which pollutes our soils and waters; stratospheric ozone depletion; ocean acidification; global consumption of freshwater; change in land use for agriculture; air pollution; and chemical pollution (table 1).

By "boundary", we mean a specific point related to a global-scale environmental process beyond which humanity should not go. The position of the boundary is a normative judgment, informed by science but largely based on human perceptions of risk.

This doesn't mean that any change in the Earth system is dangerous. Our planet can undergo

Table 1: Categories of Boundaries

BOUNDARY CHARACTER SCALE OF PROCESS	PROCESSES WITH GLOBAL SCALE THRESHOLDS	SLOW PROCESSES WITHOUT KNOWN GLOBAL SCALE THRESHOLDS
SYSTEMIC PROCESSES AT PLANETARY SCALE	CLIMATE CHANGE OCEAN ACIDIFICATION	STRATOSPHERIC OZONE
AGGREGATED PROCESSES FROM LOCAL/REGIONAL SCALE	GLOBAL P and N CYCLES ATMOSPHERIC AEROSOL LOADING FRESHWATER USE LAND-USE CHANGE	BIODIVERSITY LOSS CHEMICAL POLLUTION

abrupt changes naturally. An example is the sudden switch in North Atlantic ocean circulation when a critical level of freshwater input is reached. But these thresholds and abrupt changes are intrinsic features of the Earth system and cannot be eliminated or modified by human actions, such as the development of new technologies. We have to learn to live with thresholds and respect them.

An abrupt change is a hardwired feature of the Earth system independent of human existence, while violation of a boundary is a subjective judgment by humanity about how close we wish to approach dangerous or potentially catastrophic thresholds in our own life-support system.

Climate change, biodiversity loss, and phosphorus and nitrogen production are just three areas in which boundaries can be determined and measured, and we will use these as examples.

Human-provoked climate change is no longer disputed. Scientists can describe climate change by studying the consequences of increasing levels of carbon dioxide in our atmosphere. Our proposed climate boundary is that human changes to atmospheric carbon dioxide should not drive its concentration beyond 350 parts per million by volume, and that radiative forcing – the change in the energy balance at the Earth's surface – should not exceed 1 watt per square metre above preindustrial levels. Transgressing these boundaries could lead to the melting of ice sheets, rising sea level, abrupt shifts in forest and agricultural land, and increasing intensity and frequency of extreme events like floods, wildfires and heat waves.

A second example is biodiversity loss, which does occur naturally and would continue to some degree without human interference. However, the rate of animal extinction has skyrocketed in the post-industrial age. Compared with fossil records, today the rate of extinction per species is 100 to 1,000

times more than what could be considered natural.

Human activities are to blame: urban and agricultural development, sprawl, increases in wildfires that destroy habitat, introduction of new species into environments and the exploitation of land for human consumption – such as the destruction of the rainforests. There are estimates that another 30% of wildlife will come under the threat of extinction this century if change is not made. The dangers of biodiversity loss go beyond nostalgia for certain animals: entire ecosystems rely on certain threatened species.

Setting a planetary boundary for biodiversity is difficult because there is so little known about the way in which species are interwoven and how they connect to the broader environment. However, we propose beginning by using the extinction rate as a flawed but acceptable indicator. Our suggested planetary boundary is that of 10 times the background rate of extinction. More research will likely change this boundary.

In our third example, we propose that no more than 11 million tonnes of phosphorous should be allowed to flow into the ocean each year – which is 10 times the natural background state. Excessive production of phosphorus, along with nitrogen, is a byproduct of our agricultural system. Excessive phosphorous and nitrogen production pollutes waterways and coastal areas and adds harmful gases to the atmosphere. Current levels already exceed critical thresholds for many estuaries and freshwater sites, and so further research may reduce the current phosphorus and nitrogen boundaries.

We propose that a boundary be set for each of the nine areas and it be respected globally, in order for humans to continue along a healthy, productive path for an indefinite amount of time (table 2). It is important to acknowledge that we don't know precisely where the threshold might lie along the control variable or how much change in a slow process will undermine resilience at larger scales. Thus, we need to define a zone within which we are reasonably sure the threshold lies or beyond which we are reasonably sure that a significant degree of resilience will be lost.

Staying within the "planetary playing field" does not assure that humanity will thrive, or even survive, but straying outside the playing field will make it very difficult for humanity to thrive under any circumstances.

Global to local

Planetary boundaries are explicitly designed for the global scale and are aimed at keeping the Earth within safe ranges that existed prior to the industrial revolution. Although some Earth-system processes, such as ocean acidification, are intrinsically global in scale, others become global only when they aggregate from much smaller scales.

In no way does this mean that local or regional environmental issues have become less important. Efforts to reduce pollution and limit and reverse ecosystem degradation at local and regional scales continue to be very important and in fact have become even more important because of their larger-scale implications. However, we must now also focus on the global scale explicitly – in addition to and not at the expense of

the many environmental issues we still need to solve at smaller scales. A global solution to the sustainability challenge is thus a prerequisite for living sustainably at local and regional scales.

There is much interaction among the planet's features that lies at the heart of the planetary boundaries approach. This is not at all surprising given that the Earth behaves as a single, complex system at the global scale, but it does complicate the formulation and implementation of planetary boundaries. There are cascading impacts, in which transgressing one boundary can have implications for other boundaries. For example, converting the Amazon rainforest to a grassland or savanna could influence atmospheric circulation globally and ultimately affect water resources in East Asia through changes in rainfall.

Table 2: Planetary Boundaries

Earth-System Process	Parameters	Proposed Boundary	Current Status	Pre-industrial Value
Climate Change	(i) Atmospheric carbon dioxide concentration (parts per million by volume)	350	387	280
	(ii) Change in radiative forcing (watts per meter squared)	1	1.5	0
Rate of Biodiversity Loss	Extinction Rate (number of species per million species per year)	10	>100	0.1-1
Nitrogen Cycle (part of a boundary with the phosphorus cycle)	Amount of N_2 removed from the atmosphere for human use (million of tonnes per year)	35	121	0
Phosphorus Cycle (part of a boundary with the nitrogen cycle)	Quality of P flowing into the oceans (million of tonnes per year)	11	8.5-9.5	-1
Stratospheric Ozone Depletion	Concentration of ozone (Dobson unit)	276	283	290
Ocean Acidification	Global mean saturation state of aragonite in surface sea water	2.75	2.90	3.44
Global Freshwater Use	Consumption of freshwater by humans (km^3 per year)	4,000	2,600	415
Change in Land Use	Percentage of global land cover converted to cropland	15	11.7	Low
Atmospheric aerosol loading	Overall particulate concentration in the atmosphere, on a regional basis	To be determined		
Chemical Pollution	For example, amount emitted to, or concentration of persistent organic pollutants, plastics, endocrine disrupters, heavy metals, and nuclear waste in, the global environment or the effects on the ecosystem and functioning of Earth system thereof	To be determined		

Even small changes can have a synergistic effect when linked to other small changes. For example, conversion of forest to cropland, increased use of nitrogen and phosphorus fertilisers, and increased extraction of freshwater for irrigation could all act together to reduce biodiversity more than if each of these variables acted independently. Many changes feed back into each other.

The planetary boundaries approach doesn't say anything explicit about resource use, affluence or human population size. These are part of the trade-offs that allow humanity to continue to pursue increased wellbeing. The boundaries simply define the regions of global environment space that, if human activities push the Earth system into that space, would lead to unacceptably deleterious consequences for humanity as a whole.

Implications for governance

As a practical solution for living sustainably in the modern era, the planetary boundaries approach raises important questions and opportunities for governance and institutions, even to the point of challenging the traditional concept of national sovereignty. We have identified four specific challenges for governance:

Early-warning systems. The nature of Earth-system dynamics strongly suggests that humanity needs a system to warn us when we are approaching potentially catastrophic points. An early-warning system is a prerequisite for being able to recognise and steer away from such thresholds.

Dealing with uncertainties. Each of the planetary boundaries is placed within a zone of uncertainty, some much larger than others. A global governance system will need to live with a certain level of uncertainty, emphasising the need for a precautionary approach when determining the position of boundaries.

Multilevel governance. Interacting with the traditional institutions that currently exist at national, subnational and local levels will be necessary, and probably complex and challenging. Creating effective multilevel governance systems will be especially important for those planetary boundaries that are based on aggregates of many local and regional actions.

Capacity to assimilate new information. Scientific research will continue to uncover more insights into the dynamics of the Earth system. This could lead to the need for additional planetary boundaries or the reformulation of existing ones. The increasing flow of new scientific information will undoubtedly put pressure on any institutional framework to keep up with the pace of new knowledge.

Ultimately, there will need to be an institution (or institutions) operating, with authority, above the level of individual countries to ensure that the planetary boundaries are respected. In effect, such an institution, acting on behalf of humanity as a whole, would be the ultimate arbiter of the myriad trade-offs that need to be managed as nations and groups of people jockey for economic and social advantage. It would, in essence, become the global referee on the planetary playing field.

While humanity is still a long way from meeting this challenge, some creative thinking about new institutions is showing some promise. For example, one proposed institution that moves in this direction is the Earth Atmospheric Trust, which would treat the atmosphere as a global common property asset managed as a trust for the benefit of current and future generations.

Earth-system science is still in its infancy and much more needs to be known to create a robust solution to humanity's global dilemma. Nevertheless, we know enough now about the functioning of the Earth system that we must learn to respect the hardwired limits of our own life-support system. And we must find practical ways to respect those limits.

Will Steffen is executive director of the ANU Climate Change Institute at the Australian National University in Canberra.

Johan Rockström is executive director of two international research institutions, the Stockholm Resilience Centre and the Stockholm Environment Institute

Robert Costanza is professor of sustainability at Portland State University's Institute for Sustainable Solutions.

This is a shorter version of an article that first appeared in Solutionsjournal.

“We will only succeed if we are equal”

Irina Federenko

Social justice is central to the fight for a greener planet – that’s the message behind Oxfam’s “doughnut” concept. Kate Raworth tells Irina Fedorenko about the idea she’s taking to Rio.

Image by AlexPears

Sustainability experts are mobilising to set out new ideas and models for a greener future.

One approach growing in popularity among academics and NGOs is the concept of planetary boundaries, formulated by Swedish scientist Johan Rockström and colleagues in 2009. You can read a detailed account of this approach in "Our bounded world", also published today. But, in short, Rockström identifies nine “earth system processes”, which have boundaries humanity must stay within to avoid catastrophic environmental change.

The processes are: climate change; biodiversity loss; excess nitrogen and phosphorus production; stratospheric ozone depletion; ocean acidification; global consumption of freshwater; change in land use for agriculture; air pollution; and chemical pollution.

So far, humanity is failing in key areas. We are losing biodiversity at enormous pace – 100 to 1,000 times faster than the natural rate; we emit far too much carbon dioxide; and we remove almost 100 million tonnes more nitrogen from the atmosphere per year than is acceptable.

Drawing on this concept, senior researcher at Oxfam Kate Raworth has come up with a new framework, which also takes human welfare into account. The "doughnut" combines planetary boundaries with social boundaries and, says Raworth, shows it is possible to lift millions out of poverty at the same time as protecting the planet. I asked her to explain.

Irina Fedorenko: What is the story behind the doughnut? Why have you decided to draw on the planetary boundaries concept?

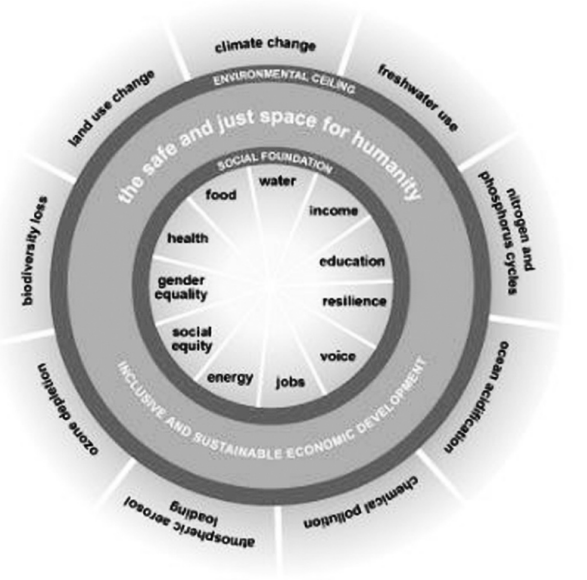
Kate Raworth: I find the concept of nine planetary boundaries really compelling because it is simple to understand and visually clear: it makes Earth-system science accessible to non-scientists, and that's powerful.

But if there is a ceiling of resource use, beyond which lies unacceptable environmental degradation, so too is there a foundation of resource use, below which lies human deprivation. If we are to talk of natural resource constraints and the need to live within planetary boundaries, then we also have to talk about the fundamentals of global resource distribution, and the need to ensure that we also live within social boundaries.

The doughnut is the space between the two – where every person has the resources needed for a fulfilling life, but collectively humanity lives within the means of this one planet.

IF: Scientists warn that the planet is already under stress, while campaigners fight to raise living standards for the world's poor. How do you reconcile these apparently competing pressures?

KR: One of the good news insights of the doughnut is that getting all seven billion people alive today above the social foundation need not be a source of pressure on planetary boundaries. Ending hunger for the 13% of people who are undernourished would require around 3% of the world's current food supply – a fraction of what is lost and wasted in the food chain each year.



The doughnut concept. Source: www.oxfam.org.uk

Likewise, ending energy poverty for the 19% of people who have no access to electricity could be achieved

for as little as a 1% increase in global carbon dioxide emissions. Currently, half of the world's carbon emissions are produced by just 11% of the global population. So the message is clear: it is wealth and extreme inequality – not ending poverty – that is putting this planet under pressure.

IF: Is the doughnut equally applicable to developed and developing countries? What are the implications for countries as different as China and the United Kingdom?

KR: The ambition of bringing all people above the social foundation while remaining within planetary boundaries has to be a global one, and it clearly requires global cooperation. We will only succeed if we collectively achieve far greater equity in global resource use, within and between countries, and also far greater efficiency in transforming those resources in order to meet human needs.

I think the doughnut shows that the developed-developing country distinction is past its sell-by date because, when it comes to pursuing social justice and environmental sustainability together, we are all developing.

In low-income countries, where many people live in poverty, the primary focus has to be on getting everyone above the social foundation – but without getting locked long-term into resource-intensive infrastructure, such as expensive fossil fuel imports.

High-income countries have a clear responsibility to lead first and fastest in decoupling their economic development from resource use. The major emerging economies are demonstrating some of the most dynamic transitions to development pathways that could bring humanity between the boundaries. And the precedent they set will be hugely influential in determining the future pathways open to today's low-income countries.

IF: Were there any concerns the doughnut concept wouldn't be taken seriously?

KR: Some people initially responded by saying that planetary boundaries are objective and scientifically certain, whereas social boundaries are subjective and impossible to define. In fact I'd say it's easier to argue the reverse. Our understanding of planetary boundaries is in its infancy.

Just as doctors started to analyse the limits of the human body centuries ago – investigating how fast the heart can beat before we collapse, how long we can survive without water, how much food we need to avoid malnutrition – so today's Earth-system scientists are acting as ecological doctors, starting to analyse the limits of planet Earth. There are huge areas of uncertainty, including ethical choices to be made about risk. So setting planetary boundaries is in many ways a new and subjective enterprise.

Defining social boundaries is also subjective, but attempts to do it started over 60 years ago, with the Universal Declaration of Human Rights. Consensus around that has developed through international

human rights law, while UN agencies have collected data about people living in unacceptable deprivation for decades.

There is in fact much in common at the heart of these two concepts, and I think that this is partly why the idea of bringing them together has been so well received.

IF: Now you are taking the doughnut to Rio. What kind of outcome do you expect and what's next?

KR: I think that the interest in the doughnut around Rio+20 is partly because it shows in one picture how the three pillars of sustainable development – social, environmental and economic – are interdependent, and partly because the doughnut doesn't tell us all the answers, so it works from many perspectives.

The central message of the doughnut is that we can only pursue environmental sustainability if we pursue far greater social equity at the same time, within and between countries. If we talk of planetary boundaries, then we must talk of social boundaries too, along with all the distributional implications that it brings. If the doughnut can help to convey these messages, to broaden concepts of what economic development means, or help define a vision for sustainable and equitable development in the 21st century, this would be a huge achievement.

What's next? Oxfam is working with others to produce national-level analyses of planetary and social boundaries in several countries, to see whether this way of looking at a nation's needs and resources can help stimulate national debates about alternative development pathways, about and what a vision for equitable and sustainable development looks like.

It will be fascinating to see if and how this concept can be put to work in national policy debates.

Irina Fedorenko is an intern at chinadialogue.

Our future grub

John Vidal

By 2050 there will be 2.5 billion more people on earth. How can they be fed? Science's answer, writes John Vidal, is a diet of algae, insects and meat grown in laboratories.

How can we feed the 2.5 billion more people – an extra China and India – likely to be alive in 2050? The United Nations says we will have to nearly double our food production and governments say we should adopt new technologies and avoid waste. But however you cut it: there are already one billion chronically hungry people; there's little more virgin land to open up; climate change will only make farming harder to grow food in most places; the oceans are overfished; and much of the world faces growing water shortages.

Fifty years ago, when the world's population was around half what it is now, the answer to looming famines was "the green revolution" – a massive increase in the use of hybrid seeds and chemical fertilisers. It worked, but at a great ecological price. We grow nearly twice as much food as we did just a generation ago, but we use three times as much water from rivers and underground supplies.

Food, farm and water technologists will have to find new ways to grow more crops in places that until now were hard or impossible to farm. It may need a total rethink over how we use land and water. So enter a new generation of radical farmers, novel foods and bright ideas.

Algae

How do you free up huge amounts of farmland to grow more food for humans? Easy – switch to commercial algae farms. Algae are simple, single-cell organisms that can grow very rapidly at sea, in polluted water and in places that would normally kill food crops. Major airlines and shipping companies are now investigating a switch to algae oil, and smart clean-tech money is pouring in to the nascent technology.

The prize is huge: scientists say that under optimum conditions, commercial algae farms can

produce 5,000 to 10,000 gallons [roughly 22,730 to 45,460 litres] of oil per acre [nearly 4,050 square metres], compared to just 350 gallons [about 1,590 litres] of ethanol biofuel per acre grown with crops such as maize. In addition, algae could feed millions of animals and act as a fertiliser. Replacing all US ethanol (biofuel) production with algae oil would need around two million acres [just over 8,000 square kilometres] of desert, but, says Arizona State university professor Mark Edwards, it would potentially allow 40 million acres [about 162,000 square kilometres] of cropland to be planted with human food, and save billions of gallons of irrigation water a year.

Algae are at the bottom of the food chain but they are already eaten widely in Japan and China in the form of seaweeds, and are used as fertilisers, soil conditioners and animal feed. "They range from giant seaweeds and kelps to microscopic slimes; they are capable of fixing CO2 in the atmosphere and providing fats, oils and sugars," says Edwards. "They are eaten by everything from the tiniest shrimp to the great blue whales. They are the base of all life and must be the future."

Artificial meat

It looks like meat, feels like meat and it is meat, although it's never been near a living, breathing animal. Instead, artificial or "cultured" meat is grown from stem cells in giant vats.

Scientists say the hunt for meat substitutes is critical because western eating habits are now spreading to China and other rapidly emerging economies, putting intense pressure on governments and farmers to fell more forests and open up new farmland. Cattle now occupy nearly one quarter of all cultivable land, and growing crops for animal feed takes up another 25%. In the United States, nearly 70% of the grain and cereals grown are now fed to farmed animals.

Much of the research into artificial meat is being done in Europe, with scientists in Holland and Britain developing edible tissue grown from stem cells in laboratories. But while the first

artificial hamburger could be developed in 2013, it might taste of nothing at all. Meat needs blood and fat to give it colour and taste, and while stem cells for blood and fat have been identified, this is slow, complex and expensive work.

Nevertheless, studies show that artificial meat wins hands down in the environmental stakes, using far less water, energy and land. In addition, few ethical objections have been raised, largely because mass production of animals in factory farms and use of growth hormones and antibiotics is already considered questionable.

New crops

Few people have heard of Zhikang Li, but history may judge the Chinese plant breeder to be one of the most important people of the century. Last year, after 12 years' work with the Chinese Academy of Agricultural Sciences (CAAS) and the International Rice Research Institute (IRRI) in the Philippines, he and his team developed "green super rice", a series of rice varieties which produce more grain but which have proved more resistant to droughts, floods, salty water,insects and disease.

Zhikang Li achieved this without genetic modification (GM) technology, working instead with hundreds of researchers and farmers in 16 countries and using only conventional plant breeding techniques to cross-breed more than 250 rice varieties.

Green super rice, which could increase yields in Asia enough to feed an extra 100 million people, will be rolled out in the coming years. But better plant breeding – with or without GM – will be key to increasing the yields of all other crops.

However, most research money has gone into GM in the past 20 years. Here, the global agrichemical industry has promised new crops enriched with extra vitamins, enzymes or healthy fatty acids, as well as drought-tolerant corn and crops that can save carbon emissions. But while it looks ahead to bananas that produce human vaccines, fish that mature more quickly and cows that are resistant to disease, its promise to feed the world has been patchy in terms of results.

Last year more than 350 million acres (over 1.4 million square kilometres) – about 10% of global cultivated area, or the size of Germany, France and the United Kingdom together – were planted with GM crops; but this mainly covered only three big foods – maize, oilseed rape and soya – most of which went to animal feed.

Desert greening

Much of the world is arid, with its only nearby water being the sea. So could a technology be found to green coastal deserts in places such as Chile, California, Peru and the Middle East using salt water?

Charlie Paton, a British inventor, has a vision of vast "seawater greenhouses" to grow food and generate power. The idea is simple: in the natural water cycle, seawater is heated by the sun, evaporates,

cools to form clouds, and returns to earth as refreshing rain. It is more or less the same in Paton's structures. Here, hot desert air going into a greenhouse is first cooled and then humidified by seawater. This humid air nourishes crops growing inside and then passes through an evaporator. When it meets a series of tubes containing cool seawater, freshwater condenses and is then collected. And because the greenhouses produce more than five times the freshwater needed to water the plants, some of it can be released into the local environment to grow other plants.

Seawater greenhouses have been shown to work and within 2012 a large-scale pilot project backed by the Norwegian government will be built near Aqaba in Jordan. The Sahara Forest Project will combine different technologies to grow food and biofuel crops and be up and running by 2015.

But this is just one of many technologies being developed to enable food to be grown in unlikely places. One of the simplest, but most ambitious, plans may be the long-mooted Great Green Wall of Africa. This linear forest would be 15 kilometres wide and 7,775 kilometres long, and stretch from Senegal in the west to Djibouti in east Africa. It would, say the 11 countries through which it would pass, help to stop the southward spread of the Sahara, slow soil erosion and wind speeds, help rain water filter into the ground and create micro-climates to allow fruit, vegetables and other crops to be grown.

Insects

Locusts, grasshoppers, spiders, wasps, worms, ants and beetles are not on most European or US menus but at least 1,400 species are eaten across Africa, Latin America and Asia. Now, with rising food prices and worldwide land shortages, it could be just a matter of time before insect farms set up in places such as Britain.

Image by cwh3

Not only are many bugs rich in protein, low in fat and cholesterol and high in calcium and iron, but insect farms need little space. Environmentally, they beat conventional farms, too. The creatures are far better at converting plant biomass into edible meat than even our fastest growing livestock; they emit fewer greenhouse gases; and they can thrive on paper, algae and the industrial wastes that would normally be thrown away.

The advantages of "micro-livestock" farming are great, say the United Nations and European Union, both of which are keen to see if insect rearing could be greatly expanded. The Dutch government is studying how to set up insect farms. But aware of western squeamishness, they have asked researchers to see if they can just extract the protein that many bugs contain.

Meanwhile, the EU is offering its member-states three million euros [more than US$3.9 million] to promote the use of insects in cooking, and has asked food-standards watchdogs to investigate their potential to supplement diets.

http://www.guardian.co.uk/

Why true leaders make us uneasy

John Elkington

Creative solutions come when we are forced outside our comfort zones. The trick is to learn to force ourselves, writes John Elkington.

You know the feeling. The elevator doors are closing behind you and suddenly you are alone with someone you have long wanted to meet and influence. How to connect? I have often been encouraged to develop a 20-second elevator pitch to describe what I do, but have always refused. My counter-argument is that, if busy people insist on getting all their knowledge in 20-second sound-bites, they are unlikely to be open to the sort of deep conversations that the sustainability agenda requires.

But, if pressed, I will say that I am like a piece of grit in the corporate oyster which, if it doesn't get spat out immediately, can become the nucleus around which business wisdom can form – just as a pearl can in certain molluscs.

The best leaders know the future is going to be significantly different from both the past and the present. They see a key part of their role as being to push their people out of their comfort zones and into the frames of mind needed to see new landscapes of risk and opportunity.

Looking back, many senior executives I have worked with over the decades have been opened up to a wider world by a personal, painful, unexpected experience. Think of the late Ray Anderson, chief executive of carpet-makers Interface, who likened reading Paul Hawken's book The Ecology of Commerce to receiving "a spear in the chest". Or think of the leaders of companies like oil giant Shell, sportswear brand Nike or, one of my favourites, Danish pharmaceutical company Novo Nordisk. Whether they were hit by activist campaigns, market disruptions or hurricanes, these companies and their leaders were forced to engage with a different reality.

All of this ran through my mind recently as I was waiting to speak at a leadership conference at

the Swiss business school IMD, an event co-hosted by the World Environment Center and drug giant Novartis. And as I listened to executives from fast-moving consumer goods companies like Unilever and Procter & Gamble, food companies like Chiquita, Danone and Nestle and conglomerates like General Electric, it struck me that the need for epiphanies, or powerful wake-up moments, is now less urgent than it would once have been. Today, a growing number of leaders get to the same point through cold, hard business logic.

Having parachuted into business schools over several decades, I have seen a major shift in their reactions to the sustainability and social change agendas. In the past, there was massive resistance from many business school professors specialised in other areas, who were often considerably more conservative than the executives they thought they spoke for.

But while at IMD, I heard from a professor at another business school, INSEAD, that mainstream business executives are now queuing up to join courses aimed at social innovators and entrepreneurs. IMD itself now offers a joint course with environmental charity WWF called One Planet Leaders, designed to put sustainability "at the heart of business". The aim here is to position sustainability not just as a looming set of corporate headaches, but as a massive, interlinked series of market opportunity spaces.

Sitting in the IMD conference centre, I kept hearing stories of leaders and "intrapreneurs" – change agents within major corporations – who had pushed themselves (and others) beyond their comfort zones. Take the fruit company Chiquita. WhenHurricane Mitch hit Honduras in Central America, which accounted for about 20% of the world's banana supply, it knocked out about 70% of production. Led by its chief executive, the company, which has had a troubled history in the region, launched a number of housing projects designed to help affected communities recover.

Fine, as far as it went, but then as I took the train to Geneva airport, I read a blog on the Fast Company website which made me think that we really do need to keep pushing leaders well outside their current comfort zones and helping them do the same with those they lead and otherwise engage.

Written by Riley Gibson, chief executive of social innovation company Napkin Labs, the blog looks at the key role of discomfort in driving the evolution of creative solutions. It defines "creativity" as "the ability to solve problems in an unexpected or surprising way". And it notes that many people who are perceived as "creative" – designers, developers, writers or entrepreneurs – "don't force ourselves regularly to solve problems that are clearly out of our areas of expertise".

The net result, Gibson argues, is that "we're squandering our greatest creative resource. With routine, people tend to get stuck in patterned forms of thought." By contrast, creative solutions tend to come when we force our minds out of their comfort zones, challenging our assumptions.

So, short of whipping up a hurricane, how do we effectively do this for powerful people? Some imaginative companies now take senior executives on learning journeys, as British bank Barclays

did recently with Leaders Quest in Kenya. At Volans, we have taken groups from places as different as China, Japan, Thailand and Canada to meet social innovators and entrepreneurs in Europe, North America and Asia.

If done well, this sort of experiential learning can have a dramatic impact on the way business people see the world. And it can also open up innovators and entrepreneurs to the possibilities of working more effectively with mainstream business to bring solutions to scale.

So maybe the thing to do in the elevator is to make that powerful person a little uncomfortable. Don't do a sales pitch – ask them a question, a question that will unfurl slowly in their brains, like a chrysanthemum in a teapot. Greenpeace used to call this a "mind-bomb", a simple idea that you hear almost without thinking, but which then opens the windows of your mind to a totally different world. Not a simple task, clearly, but one we must all get much better at.

John Elkington is executive chairman at Volans and non-executive director at SustainAbility.

UN biodiversity summit: Developing nations to demand more cash to protect nature

Joydeep Gupta

Image by Captain Kimo

[This article was published on 10 August, 2012.]

The UN biodiversity summit opens this week with host India seeking more money to protect wildlife and improve livelihoods of those dependent on forests.

Want a greener world? Pay for it. That is the message the Indian government is sending out as it hosts the summit of the United Nations Convention on Biological Diversity (UNCBD) in the southern city of Hyderabad. But in today's environment, money is hard to get at, and there's every chance that the thousands of delegates from over 190 countries will go home with little to show for their efforts.

It need not be like this. There are important issues on which the biodiversity summit could take decisions. The most important is the terms on which pharmaceutical and cosmetics companies access useful plants and animals, and the way the benefits from products they develop are shared with communities that have preserved those plants or animals – the so-calledaccess and benefit-sharing (ABS) issue.

This has been the most contentious issue in UNCBD negotiations for nearly two decades. Perhaps fearing another flare-up, Indian government negotiators ensured months ago that substantive talks on ABS are postponed to 2013 and beyond. "Unless some other country brings it up, only procedural issues

on ABS will be discussed in the CoP (Conference of Parties)," said a senior Indian bureaucrat. And the host will do its best to ensure that no other country brings it up.

So what will the delegates and the hundreds of NGO observers gathered in Hyderabad talk about? There is, of course, the question of increasing the global area of protected forests, and many NGOs will make a strong push for it in this UN decade of biodiversity (2010-2020). But much of that is up to national governments, who in the last decade jointly failed to meet the protected area targets they set themselves during previous UNCBD summits.

Protecting biodiversity in international waters

But there is one area of biodiversity protection that may lead to confrontation at this summit – protection in international waters. The theme of this summit is coastal and marine biodiversity, and governments cannot really shy away from tackling this issue that has long eluded consensus, most recently at the Rio+20 summit this June. It is not that governments oppose biodiversity protection in the high seas. The question is, who will enforce it, and how? What will it mean to territorial claims, especially in disputed waters? There is no answer yet, while the extinction of marine species accelerates. This is especially worrying in coral beds, which are the nurseries of most marine life.

Jayanthi Natarajan, India's environment minister, said on the eve of the summit that her first priority would be implementation of the 20 Aichi targets– so-called because they were drawn up at the last UN summit in Nagoya, which is in Japan's Aichi prefecture, and which include aims like halving the rate of loss of natural habitats by 2020, improving the conservation status of known threatened species by the same year and mobilising the financial resources to implement the strategic plan for biodiversity.

While the goals are unexceptionable, governments around the world have done little to mainstream biodiversity in their financial planning, and all the other goals have suffered as a consequence.

One example is that only seven countries have ratified the Nagoya Protocolon ABS, India becoming the seventh just three days before the summit opened. Indian NGOs, which came together in late September to discuss the summit issues, are worried that most countries are still unprepared for implementing the protocol, because they have not even passed the laws by which communities that have preserved medicinally useful knowledge for centuries can be paid for it by their own governments. A spokesperson for WWF India, which coordinated the NGO meeting, said: "An institutional mechanism should be established or defined for post access monitoring and compliance of the access agreement."

Money talks

Money has become the fundamental issue ever since academics, then NGOs and then developing country governments started saying that if the world wants them to preserve a forest, it should pay, because the benefit goes to the whole world, while the "opportunity cost" of not

turning the forest area into a factory, for example, is borne by the local community and the government. This concept of "payment for ecosystem services" has now been well-established by academics and supported by UN institutions as well as NGOs, but has not really been implemented by any finance ministry anywhere.

Natarajan wants progress in at least the international part of this concept – which means she wants developed countries to pay much more to developing countries that preserve their plants and animals. The minister held a recent meeting with her counterparts in southeast Asian countries to push this demand. A resolution passed at the meeting "emphasised that developed country parties bear primary responsibility for providing adequate resources for implementation" of biodiversity targets.

During the Hyderabad summit the same demand is likely to come strongly from all developing countries. But given the current state of the economy in almost all developed countries, there is little chance of any significant financial commitment. Some recent semi-official estimates of the money required to meet the 20 Aichi targets came up with a range of between US$2 trillion and US$4,8 trillion.

The governments of India and the UK have set up a joint working group to make an official estimate, which will submit its report during the Hyderabad summit. Whatever the figure, it is likely to give nightmares to governments in developed countries.

US boycott holds back progress

One major problem with UNCBD negotiations is that the US only participates as an observer, since it has refused to ratify the convention. Lamenting this on chinadialogue, William J Snape III, senior counsel for the Center for Biological Diversity in Arizona, wrote: "The irony for the United States is that its robust public civil legal tradition could and should fit very well within a functioning CBD. The US certainly would help bring further focus to the CBD."

But the cricitisms extend to the countries who have signed up too. On the eve of the summit, there have been calls for governments to make good promises made in Japan two years ago to take action to stem species loss and protect the world's most valuable nature. "What was agreed in Nagoya really has the power to halt the dramatic loss of biodiversity across the globe and address the main drivers of the destruction. But now governments must prove that Nagoya was not just a platform for empty promises," said Lasse Gustavsson, WWF International's executive director for conservation

Braulio Ferreir de Souza Dias, executive secretary of UNCBD, also said his agenda is "Implementation, implementation, implementation". For that he needs to impress upon the delegates that, while the money requirements may seem large, the loss due to deforestation alone is estimated at two trillion dollars a year. "We need biodiversity to be discussed not as aproblem but as a solution to the challenges facing the world," de Souza Dias said. The question is, will anybody be listening?

Joydeep Gupta is project director (south Asia) of chinadialogue's third pole project.

Another attempt to save the planet

Barbara Unmüßig

This month's Earth Summit in Rio must prove the doubters wrong: the Green Economy can mean more than profits for business. Farming is a good place to start, argues Barbara Unmüßig.

[This article was published on 1 June, 2012.]

The Rio+20 conference, which begins on June 20, will discuss strategies for building a "Green Economy". One objective is to design ways of escaping the climate and food crisis. But green technologies themselves will not bring about the change we need. Growth at any price must no longer be the paramount goal. Agriculture is one of the sectors in which reform is most urgent and, at the same time, most difficult.

The UN Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992 – also known as the Earth Summit – was supposed to be a milestone in environmental policy. But global

Image by P. Casier (CGIAR)

ecological problems have only worsened since. Neither governments nor industries really accept the fact that the earth's resources are limited and that climate change is happening fast. Nor do they challenge unabated growth as the foremost economic objective. The race for resources of all kinds, in every part of the world, is increasingly leaving its mark on international affairs. Exploration and production of fossil fuels and large-scale commercial agriculture are expanding.

One dynamic, however, has changed since 1992. Investment in more efficient technologies and renewable energies is growing. This has become a multibillion dollar industry, and emerging markets are getting heavily involved. Eco-friendly innovations, investments and products are together known as the Green Economy. This is one of the topics for Rio+20, the follow-up to the 1992 conference, taking place once again in Rio.

Rio+20 is supposed to draft a roadmap for greener development. However, as anyone observing the preparations for the new Earth Summit will know, even the definition of Green Economy is a matter of controversy. Large sectors of global civil society see it only as an extremely profitable business sector which is failing to shift the global policy emphasis away from free trade and growth.

Among developing countries and emerging markets, approaches to the topic diverge. Some are interested in new investments and business opportunities. Others remain sceptical, fearing the Green Economy could lead, for example, to protectionism disguised as environmental policy.

It is interesting to see who is currently promoting what kind of idea on how to design the Green Economy. With its Green Economy Initiative, the UN Environment Programme (UNEP) published the most important proposal. A report, released in February 2011, forecasts positive effects that green investments would have on employment, resources, emissions and the environment. The message to the main addressees of the report, the governments of the "global south", is that the Green Economy is viable.

The OECD presented a strategy called "Towards green growth" in May 2011. Its target group was industrialised nations. The document called for new drivers of growth in order to reduce the depletion of natural capital. The impetus is to make production more efficient by promoting innovation and to stimulate demand for eco-friendly products. The OECD points out that such investments boost growth.

The good news is that both documents accept the realities of climate change and dwindling resources. Both demand immediate action and emphasise carbon-free business and resource efficiency in general. In view of strapped public budgets, the private sector would have to drive change, so they call for designing policy environments in ways that favour eco-friendly business.

The snag, however, is that neither UNEP nor the OECD fundamentally challenge the growth paradigm. Nor do they say what form of growth might be necessary to achieve the dual objectives of sparing resources and reducing poverty. They hardly mention social issues including rights to food, water, education or access to land.

From this perspective, the Green Economy is only about business parameters like efficiency and productivity. The ideas are not put into a context of social and environmental norms, laws and standards. The issues of power and distributive justice are not addressed.

But the transformation humankind urgently needs will only happen with strong political will. Priorities must be decarbonisation and reduction of resource-intensive consumption, as well as the rejection of high-risk technologies such as nuclear power and genetic engineering.

What should the future of agriculture be? Today, large-scale commercial farms account for about 12% of global greenhouse-gas emissions. When all emissions that relate to changes of land use are factored in, the share rises to 32%. Agriculture is an important cause of biodiversity loss and over-consumption of water resources. It is a reason for the acidification of waters and the logging of forests. Moreover, huge areas of farmland are deteriorating because they are not used in a sustainable way. According to theGerman Advisory Council on Global Change (WBGU), degradation affects about one third of the world's arable land today.

At the same time, the global demand for crops and animal products is steadily rising because the world's middle class is growing. Accordingly, consumer habits are changing, especially with regard to food. By 2050, nine billion people will have to be fed in spite of climate change and fast depleting resources.

Agriculture, for good reason, will be high on the Rio+20 agenda. It would be welcome if the conference managed to make the global shift to environmentally sustainable farming to prevent resource depletion and damage to the environment. There is not only scope for reducing agricultural emissions: this sector could even offset some of its own emissions through sustainable land use. If, in addition, gender-specific and other social issues are tackled, agriculture could also help to reduce poverty.

In order to strengthen small farmers, any meaningful strategy will have to tackle issues of access to land, water, seeds, extension services, credit and marketing opportunities. It is becoming evident that the growth of agriculture is constrained by the finite resources of water and arable land. The debate on the Green Economy must look beyond technology in this particular sector. Questions arise concerning the equitable distribution of resources, elite interests and multinational corporations. Power relations must change, and institutional and social innovations must serve distributive justice in this sector. A fundamental re-think of trade and investment policy is inevitable.

It would thus be a real step towards a truly global Green Economy if governments agreed on several principles at Rio+20:

Do no harm:

All damaging farm subsidies must be eliminated, including subsidies for exports, fuel, fertilisers and intensive livestock production.

Countries have an obligation to protect human rights, and not only within their own national borders. They must not put human rights in other countries at risk either. Trade agreements must be reviewed with this in mind. The WTO's Agreement on Agriculture and many bilateral trade agreements still fall short of this requirement.

Governments must protect ecologically and socially important farming sectors.

Private and public investments in agriculture must take human rights and sustainability into account. Investments and land leases should be subject to transparent rules, and all groups concerned must be empowered to participate in decision making.

Speculation in agricultural commodities must be controlled.

Guidelines must be defined for a just and sustainable agricultural policy. For example, it would make sense to define standards for the protection of animals, water and environmental reserves and to raise taxes on the use of nitrates.

Food first:

The foremost objective of any land use and agriculture policy the world over must be food security for all. Policy measures, such as the European Union requirement to blend petrol with agri-fuels, must be reviewed in this regard.

Coherence:

Climate protection and various agricultural purposes are intricately linked, so they have to be considered holistically. Today, too many programmes and policies do not add up. For example, rich nations fund programmes to help developing countries adapt to climate change. At the same time, the trade in animal feed, meat, food and cotton is expanding without concern for the reality of climate change and its impacts. This must change. Climate-awareness must become mainstream and all investments climate-compatible.

Productivity:

To boost productivity, chemical fertilisers and genetic engineering should not be prioritised. The focus must be on improving soil quality by using organic fertilisers and reliance on natural pest control.

Efficiency:

Agriculture has huge savings potential. Wastage – particularly of water, but also of other resources – must be avoided. Consumers in rich nations throw away 30% to 40% of the food they buy. In developing countries, there are unacceptably high post-harvest losses due to poor storage and marketing facilities. Well targeted and smart agricultural extension and advisory services could make a difference.

Lifestyles:

Dietary habits must change. The WBGU recommends that fewer animal products be consumed. People should eat less meat, particularly those in industrialised nations. This, according to the WBGU, is an important way to reduce competition for land.

Institutional innovation:

Responsibilities for food in the UN system must be concentrated in one agency.

In 2009, the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) set out guidelines for sustainable and social agriculture in its World Agricultural Report. This work must go on.

Institutional reforms within the United Nations should allow for risk assessments for major technological innovations. It is important to understand social, cultural and ecological effects as well as impacts on human rights early on.

Redesign research:

So far, investments in agricultural research are negligible. Moreover, most funding for research still focuses on boosting productivity, and only 5% is spent on reducing post-harvest losses. Advisory and knowledge systems must improve.

These are the demands governments heading to Rio need to hear.

Barbara Unmüßig is president of the Heinrich Böll Foundation.

US water diversion plan draws comparisons with China's south-north project

Jan McGirk

Plans for a major water diversion plan in California have been criticised as a political gamble that benefits agribusiness and farmers at the expense of the environment.

[This article was published on 25 September, 2012.]

California's governor Jerry Brown is facing mounting obstacles to his 50-year plan for revolutionising water provision in the US's richest state.

The controversial plans include the construction of two enormous tunnels which will divert water around a sinking river delta located east of San Francisco Bay.

Roughly two-thirds of Californians get a portion of their tap water from the Delta. Twin tunnels, each 37 miles long and gravity-fed, would be capable of moving 9,000 cubic feet of water per second, while eliminating two of the five intake facilities in a previous proposal to which environmentalists objected.

Their purpose is to irrigate farms in California's Central Valley on a reliable schedule while reducing harm to fisheries in the vulnerable delta ecosystem. Supplying water to the residents of semi-arid Southern California cities is another aspect of the plan, which infuriates many northern Californians who regard this as an old-fashioned water grab.

Unsurprisingly, this US$14 billion water scheme has already stirred up old regional rivalries that have bedeviled the state for 150 years. With climate change looming, there is a lot at stake.

A history of mounting opposition

Native American tribes, environmentalists, anglers and commercial fishermen have spouted off against agri-business interests, local water districts and bureaucrats at rancorous public

meetings. Politicians and farmers find themselves on both sides of this water fight, depending on where their fields or constituents are located, and many cynics question whether such a mighty project can prove sustainable, ecologically sound and financially viable.

After all, 30 years ago Californian voters blocked a peripheral tunnel, championed by a young Governor Brown and designed to convey water from the same region, because of its prohibitive cost.

What's different this time? "Current efforts to establish a reliable water supply for 25 million Californians and farmers who grow an affordable and healthy food supply and at the same time restore the Delta ecosystem is not the same proposal from 1982," said Mike Wade, who heads the California Farm Water Coalition.

"Since that time, next to nothing has been done to resolve the water supply issue and the Delta's ecosystem other than redirect water from farms, homes and businesses for environmental purposes that, by all measures, have failed. Years of scientific study and US$150 million provided by public water agencies have brought us to the current proposal by Governor Jerry Brown and US interior secretary Ken Salazar. If California does not move forward and fix its water supply problems with improved conveyance and protections in the Delta, then we will be inviting disaster."

Others remain cautious. "If 'getting it done' means cutting corners, leaving out details and getting ahead of the science, we're not actually getting anything done – we're just getting into a trap. Keep in mind what is at stake here," said George Miller, a congressman from Martinez.

"A badly designed plan can harm drinking water supplies, further endanger California's

Image by U.S. Geological Survey

salmon runs and ruin the economic livelihood of tens of thousands in the fishing and related industries up and down our coast."

The Bay Delta Conservation Plan centres on 1,800 square kilometres of backwaters where the San Francisco Bay meets the confluence of California's principle rivers, the Sacramento and San Joaquin. Currently, intensive pumping of water from the southern end of the Delta sometimes causes flows into San Francisco Bay to reverse, sucking saltwater and invasive species upstream.

Mercury contamination, caused by reckless mining practices from the boom days of the California Gold Rush, also gets spread through tidal surges and pollutes the spawning grounds for delta shrimp and Chinook salmon. Green sturgeon, smelt and steelhead are also at risk.

This delta was painstakingly reclaimed from swampland in the 1850s when Chinese laborers built more than 2,000 kilometres of levees in the tule marshes. Nearly all the original wetlands have vanished, replaced by islands and tracts that form a patchwork of farms and orchards interlaced by aqueducts, channels, oxbows and dams.

A risky political legacy?

Many fertile fields, growing everything from alfalfa to zucchini, now lie 25 feet below sea level due to soil subsidence. Climate change is increasing the severity of storms; snowmelt in the Sierras, which feeds California's rivers, is less predictable. Relying on these antique levees to protect urban developments in and around the Delta, as well as to prevent incursions of San Francisco Bay's saltwater, may end in catastrophe.

"This proposal balances the concerns of those who live and work in the Delta, those who rely on it for water and those who appreciate its beauty, fish, waterfowl and wildlife," Governor Brown told reporters when he unveiled the twin tunnel scheme.

Barbara Barrigan-Parrilla, executive director of Restore the Delta, is not convinced. "Powerful forces are using fear of flooding and earthquakes to make a case for transforming a unique, beautiful, productive region into a permanent way station for water going somewhere else," she pointed out. "They are trying to shore up an outdated water system with a massive, multi-billion dollar water transfer project that Californians will be paying for decades."

Brown's critics worry that the governor's goal is to insure his political legacy with a big public works endeavor, risking California's environment with a pricey water project aimed primarily at farmers growing surplus crops for export. Conservationists despair that greening the desert with dollars is apt to wreak havoc on the habitat. They often bring up a line from Cadillac Desert Marc Resiner's seminal book on the watering of the American West: "In the Western United States, water flows uphill to money."

Caleen Sisk, chief of the Winnemem Wintu tribe, put it simply: “Let’s stop big agri-business from polluting and taking water." Demands for better flood control, water recycling, access to extra water for use in droughts and new funds for the restoration of floodplain and tidal marsh habitat are under consideration.

Jay Lund, professor of environmental engineering at the University of California Davis’s Center for Watershed Sciences, is a leading expert on the Delta.

“Special interest groups use the public meetings as a chance to ramp up the rhetoric. What we need is a more civil and productive discussion,” he told chinadialogue.

“The BDCP is not too specific-and that’s a good thing. We will need adaptive management because large parts of the Delta are likely to change, due to flooding, subsiding islands, sea-level rise, lots of major factors. It’s fragile. It will take some time – several years of intensive planning. Construction might not begin for five years.”

China and California: comparisons

Comparisons to the challenges of China’s South North Water Transfer Project are complicated because California’s surface water has not yet been rendered useless by severe industrial pollution. What’s more, the 44.8 billion cubic metres of water per year that China plans to divert from the Yangtze River to the Yellow River Basin in the north is immense – nearly half the annual water consumption by all Californians. That’s a lot of water.

“The big difference between us and China is that the California water system is so decentralised,” Lund observed. “That provides the ability for incremental change. In California, we have some very smart people with authority for action and accountability, even enabling them to work deals with other agencies. But there can be difficulty for major strategic changes. There are so many legitimate concerns, it can bog down the system. Big things are controversial. They require big decisions. Most of California’s infrastructure was built during an era where we had more centralised government.

"If the Bay Delta Conservation Plan is put in place, it won’t be a panacea. It will be expensive, and negative outcomes will be blamed on tunnels.”

Governor Brown is determined to get a consensus and start digging. “We’re going to take into account the opposition, but we’re not going to sit here and twiddle our thumbs... we’re going to make decisions and get it done. If we have to fight initiatives or referendums, we’ll fight those too,” Brown said. “I expect to get some very important things done, and this is one of them.”

Jan McGirk is a former correspondent for The Independent (London) who has reported on environmental issues and disasters in Asia, Latin America and the Middle East.

Japan's eco renewal

Warren Karlenzig

From rolling blackouts to radioactive soil, post-tsunami reconstruction faces many challenges. But the path to recovery is looking distinctly green, Warren Karlenzig found on a tour of the stricken area.

[This article was published on 27 April, 2012.]

I've returned from a sobering United Nations-led tour of six tsunami-damaged communities and two radiation-impacted cities in northern Japan. The obvious conclusion: the Fukushima Daiichi nuclear accident is forcing Japan to go green.

Steps include the launch of a new renewable energy national feed-in tariff, which starts in July. Meanwhile, the governor of Fukushima, Yuhei Sato, told us that renewables will be the "key factor" in the revival of his devastated prefecture.

Though little planning for integrating this economic and energy transformation is in evidence yet, we did witness fragmented signs that Japan can provide a developed-nation role model for resilience in the face of cultural, energy system and environmental devastation.

Organised by the Nagoya, Japan-based UN Center for Regional Development (UNCRD), we travelled for a week as part of a fact-finding mission with UNCRD director Chikako Takase and her staff. The mission was called "Reconstruction Towards Sustainable Communities" and my role was to advise Japanese community leaders on green economic development recovery strategies and opportunities. I had met with a range of clean tech energy companies and urban planning and design firms in preparation, as well as the US Department of Commerce.

I was joined by experts from five countries: Japan, Australia, Bangladesh, Thailand and the United States. One fellow American represented the Federal Emergency Management Agency (FEMA). It seems our contingent was somewhat of a novelty. I was told by the UN and the US Embassy in Tokyo

that we were one of the first (if not the first) from outside the three affected prefectures to meet with local leaders on reconstruction and post-disaster management planning.

The tsunami-scoured coastal cities where some 20,000 died – even now, bodies are being discovered by white ships trolling the coast and on land by locals – are focused on the future of survivors. We visited temporary housing and retail developments, modular constructed units complete with such personal flourishes as lanterns, public benches and landscaping. They house locally owned businesses, from bars to barbers to fishmongers, which were wiped out by the tsunami.

Three hundred thousand people in this region were driven from their homes by the "tsunami attack". Communities have submitted reconstruction plans to the national government and these proposals are in the process of being approved for funding. But actual rebuilding will not begin for years. The ground is still unstable or sinking in the coastal cities due to the 9.0 subduction earthquake (meaning one tectonic plate went under another, causing one plate to sink).

Meanwhile, waste-management issues, including removal of radiation and salt-contaminated soil and debris from the tsunami, bedevil everyone from small farmers to civil authorities. In one city, 106 years worth of waste was piled around what used to be the town centre. The rest of Japan is disinclined to accept much of it, because of potential radioactivity.

When and if they are able to build, the plans of two tsunami-ravaged cities stand out for being smart growth models. Ishinomaki was a pre-tsunami city of about 160,000: 4000 were killed by the tsunami, the most deaths of any city in Japan. Its entire port and low-lying downtown areas were virtually annihilated, with the odd building and remnant inexplicably standing, such as a domed

Image by CoCreatr

cartoon art museum and, most bizarrely, a Statue of Liberty replica formerly housed in a pachinko parlour.

Ishinomaki has a plan to virtually wipe clean its remaining "ghost" downtown to create a mixed-use residential and commercial zone that will be two to three times denser than before, according to city leaders we met. The city hopes to be better protected from the coast through site elevation, barriers and other features. The more vexing question is how to keep its young people from leaving the area for Tokyo and other big cities to the south: transit-oriented redesign will be one factor making younger citizens less likely to flee.

Another critical planning issue is how male-dominated Japan intends to ensure that all its citizens, including women, the elderly and handicapped in disaster-struck communities are part of the process of designing their future.

Rikuzentakata, a city of 22,000 (2,000 died in the tsunami), has plans to make "new energy" a key part of its redevelopment. This city which was reported to have been "wiped off the map" by 19.2 metre-high waves, is today pursuing national government subsidies and private investments to create large-scale distributed generation of renewables, including solar PV, land and marine biomass and offshore wind.

Together with other nearby communities, Rikuzentakata is studying how to trade domestic carbon credits for reduced emissions. The city's quest for zero waste and zero carbon-dioxide emissions also has it exploring industrial ecology strategies: using fish bones, tsunami debris wastes or other byproducts such as waste heat as inputs for new processes.

We also toured a small community-supported organic farm in southern Fukushima Prefecture, outside the town of Iwaki. A volunteer group had recruited helpers the previous summer to remove radiated soil, and the farmers showed us how recent radiation tests had come up negative. Meanwhile, the "hot" soil they had dug out and scraped away was still heaped in a pile, because the national government would not remove or receive it, as the farmers had been led to believe they would.

Lunch found us back in Iwaki, eating at a small take-out place in someone's home. Although every item served was organic and local, including mushrooms, for once in my life this type of fare made me lose my appetite.

Prior to the Fukushima disaster, Japan relied on nuclear energy for 25% to 33% of its needs. In summer of 2012, the last two remaining nuclear plants operating in Japan (out of 54) will be shut down, at least temporarily, and there are many signs throughout the nation that electric power is already in short supply. Although outdoor temperatures were hovering between zero and four degrees Celsius, we attended multiple meetings circled around one or two kerosene heaters, in buildings using almost no

electric light, without the use of central indoor heating. Is this a glimpse into what a business-as-usual energy future looks like in other industrial countries?

One meeting in a luxury high-rise hotel in Minami Sanriku had a planned blackout for two hours while we met with business and community volunteer leaders, along with the hotel's owner, who had sheltered and fed 400 community members after the tsunami (the bottom two stories were damaged, but the rest of the building was habitable). Staff handed out heavy winter parkas so we could continue our discussions in relative warmth.

Besides jackets, Japan has been using technology to cope with its new dilemma. Utility sponsored websites and mobile apps let people know exactly when to conserve the most, which they have been doing by hanging wet clothes to dry in south-facing windows or balconies, and by curtailing use of light, heat or appliances. So far, Japanese society has reduced its energy use to meet a 30% power deficit, but the margin between rolling or planned blackouts and power is paper thin, even in Tokyo.

Our delegation will now work with UNCRD to develop recommendations based on our visit to Tohoku's three stricken prefectures. My prediction is that Iwate, Miyagi and Fukushima will remain in the global consciousness long into the future, not just for their triple disaster, but also for the lessons they underscore for all of us as we venture into an uncertain future for energy, water, food, and shelter in the wake of disasters, natural or not.

Warren Karlenzig is president of Common Current. He is a fellow at the Post-Carbon Institute and co-author of the United Nations Shanghai Manual on global sustainable city planning and management.

India's growth at cost of nature

Joydeep Gupta

India's gross domestic product (GDP) per capita rose 120% between 1990 and 2008. But in the same period, the country's natural capital, the sum of its assets from forests to fossil fuels and minerals, declined 31%, says a leading scholar from the UN University.

Anantha Duraiappah, executive director of the United Nations University'sInternational Human Dimensions Programme (UNU-IHDP), has led a team of scholars to develop an "Inclusive Wealth Indicator" designed to augment GDP as a measure of economic progress. Few countries do well when seen through this lens.

In fact, the decline in natural resources in India during this period has been higher than 31%, but it is compensated to some extent by increase in spread of education. On an annual basis during this period, India's GDP growth per capita has been 4.52%, while its rate of decline in natural capital has been 2.04%.

Brazil, another emerging economy, fares worse than India. Between 1990 and 2008, its GDP per capita rose 34%, but its natural capital declined 46%. When measures of natural, human and manufactured capital are considered together to obtain a more comprehensive value, Brazil's "Inclusive Wealth" rose just 3% and India's rose 9% over these 18 years.

"The work on Brazil and India illustrates why Gross Domestic Product is inadequate and misleading as an index of economic progress from a long-term perspective," Duraiappah said at the March 26-29 Planet Under Pressure conference that has brought around 3,000 natural and social scientists together in London.

"A country could completely exhaust all its natural resources while posting positive GDP growth. We need an indicator that estimates the wealth of nations – natural, human and manufactured and ideally even the social and ecological constituents of human well-being."

The Inclusive Wealth Report is scheduled for release this June, at the UN "Rio+20" summit. It will describe the "inclusive wealth" of 20 nations: Australia, Brazil, Canada, Chile, China, Colombia, Ecuador, France, Germany, India, Japan, Kenya, Nigeria, Norway, Russia, Saudi Arabia, South Africa, USA, United Kingdom and Venezuela. The 20 nations featured in the report represent 72% of world GDP and 56% of global population.

Authored by 17 specialists from the UK, USA, Chile, Malaysia, India, Germany and Australia, the Inclusive Wealth Indicator is undertaken by UNU-IHDP with UNEP support and in collaboration with the UN-Water Decade Programme on Capacity Development (UNW-DPC) and the Natural Capital

Project of Stanford University.

"Our goal is to provide national governments with a bi-annual report to assess transition to the so-called green economy, to create productive and sustainable economic bases for the future," says Duraiappah. "Just GDP per capita will get us nowhere. The new macroeconomic indicators must be economic plus social plus ecological."

While experts are repeatedly urging a move beyond GDP, governments are not ready. This, and the near total failure of climate negotiations in the 20 years since the Earth Summit was held in Rio de Janeiro, has led to calls at this conference for a system of governance that is more equitable and therefore more sustainable.

Laurence Tubiana, director of the Paris-based Institute of Sustainable Development and International Relations, said countries "are trying to solve 21st century governance problems with 1948-style institutions, which is not going to work".

Frank Biermann of VU University, Amsterdam, director of the Earth System Governance research alliance and IHDP's Earth System Governance Project, called for

* Creation of a UN sustainable development council to better integrate sustainable development concerns across the UN system, with a strong role for the world's 20 largest economies (G20).

* Upgrading the UN Environment Programme to a full-fledged UN agency – a step that would give it greater authority, more secure funding, and facilitate the creation and enforcement of international regulations and standards.

* Stronger reliance on qualified majority-voting to speed decision-making in international negotiations;

* Increased financial support for poorer nations, including through novel financial mechanisms such as air transportation levies.

Biermann said, "Incremental change is no longer sufficient to bring about societal change at the level and with the speed needed to stop earth system transformation. Structural change in global governance is needed, both inside and outside the UN system and involving both public and private actors."

At the London conference, 3,000 experts spanning the spectrum of interconnected scientific interests, policymakers and business representatives are examining the planet's vital signs, potential solutions, hurdles and ways to break down the barriers to progress. The conference is the largest gathering of experts in global sustainability in advance of "Rio+20" and the largest gathering ever of such a group of experts. It has been co-organised by the International Geosphere Biosphere Programme,Diversitas, International Human Dimensions Programme on Global Environmental Change, World Climate Research Programme, Earth System Science Partnership and the International Council for Science.

Joydeep Gupta is project director (south Asia) of chinadialogue's third pole project.

Green growth stalling in India and China, sending world towards 6C of warming

Joydeep Gupta

World is on a path towards six degrees celsius of warming by end of the century, with emissions in China and India continuing to rise, according to a report from PriceWaterhouseCoopers (PwC).

Barbara Unmüßig is co-president of the Heinrich Böll Foundation and co-author of the pamphlet "Critique of the Green Economy". She spoke to German website Schattenblick about the state of the green agenda. Here are translated excerpts from the interview.

[This article was published on 11 July, 2012.]

China and India have been reducing their carbon intensity per unit of production for over a decade, but this move towards green growth "appears to have stalled" in 2011, according to a new report by PriceWaterhouseCoopers (PwC). Current rates of decarbonisation point to a six-degree global temperature rise, warns the consulting firm.

The analysis in the PwC Low Carbon Economy Index, measuring developed and emerging economies progress towards reducing emissions linked to economic output, demonstrates that at current rates of

emissions growth at least 6 degrees Celsius of warming could be possible by the end of the century.

PwC says that in both China and India strong GDP growth was closely coupled with rapid emissions growth last year, despite commitments to the international community to significantly reduce carbon intensity by 2020: 40-45% for China and 20-25% for India respectively, relative to 2005 levels.

The challenge to decouple emissions from economic growth is not easy for these emerging economies. The report points out that China and India are expected to nearly double the size of their economies by the end of the decade, but emissions must level off soon for them to meet their targets. This means the majority of any new energy demand will have to be met from renewable energy and not fossil fuel generation (unless this can be fitted with carbon capture and storage).

Talking about the other BRIC countries, the report adds that Russia and Brazil expect slower economic growth, but their emissions pledges imply a more drastic cut in carbon intensity than both China and India. Brazil, of course, has great scope to reduce emissions by reducing deforestation, an aspect that has not been taken into account in the PWC study.

Emissions of greenhouse gases, mainly carbon dioxide, are causing global warming, which in turn is affecting agriculture worldwide, and making droughts, floods and storms more severe and more frequent, according to scientists at the Intergovernmental Panel on Climate Change. Power generation through coal and oil is the biggest source of carbon emissions.

Compared to China's commitment to reduce carbon intensity per unit of production by 40-45% by 2020 compared to 2005, in 2011 this figure stood at 17% below, says the report. In India, it was only 3% below, compared to the promise of a 20-25% reduction. This means that to meet its commitment, China will now require an emissions change of 12% by 2020, which translates to an annual decarbonisation rate of 4.5% for the rest of this decade. India will need an emissions change of 31%, which means a 2.8% annual decarbonisation rate till 2020. China is now the world's largest greenhouse gas emitter, followed by the US and India.

Of the other BRIC countries, Russia has a commitment of reducing its emissions by 15-25% below 1990 levels, but its emissions in 2011 were only 5% below, says the report. It goes on to add that Russia will now require an emissions reduction of 19% by 2020, which translates to an annual decarbonisation rate of 5.8%. Brazil had committed to reduce its emissions by 36-39% below business as usual levels. Its progress in 2011 against that pledge was not available, but PWC calculates it will need an emissions reduction of 25% by 2020 to meet the pledge, which means an annual decarbonisation rate of 6.8%, not counting what it can do by reducing deforestation.

Major developed economies have done just as badly. The US has pledged that by 2020, it will reduce its emissions by 17% compared to 2005, but the progress so far is only 7%. To meet the pledge, the world's biggest economy will have to replace all its coal-fired power generation by gas, PWC calculates. The 15 biggest countries of the European Union had pledged to cut their emissions by 20% from 1990 levels, but have cut only 5.5% by now, says the report. It adds that to meet the pledge, Britain will have to remove all its

current emissions. Japan had promised to reduce emissions by 25% from 1990 levels, and is now at 12%. The report says it will have to remove all emissions from its industrial sector to meet the pledge.

The Low Carbon Economy Index league table below shows all G20 countries and the required annual decarbonisation rate needed between 2012 and 2050.

Country	Change in energy emissions 2010-2011	GDP growth 2010-2011	Change in carbon intensity 2010-2011	Annual average change 2000-2011	Required annual decarbonisation rate 2012-2050
France	−6.1%	1.7%	−7.7%	−2.4%	−4.4%
UK	−6.4%	0.7%	−7.0%	−2.8%	−5.2%
Germany	−3.6%	3%	−6.4%	−2.2%	−5.2%
Indonesia	0.9%	6.5%	−5.2%	−1.0%	−4.9%
EU	−3.6%	1.5%	−5.1%	−2.3%	−5.2%
USA	−1.9%	1.7%	−3.5%	−2.1%	−5.2%
Italy	−2.5%	0.4%	−2.9%	−1.2%	−4.3%
Mexico	1.7%	3.9%	−2.1%	−0.2%	−4.6%
South Africa	1.5%	3.1%	−1.6%	−1.4%	−5.6%
Russia	2.9%	4.3%	−1.6%	−3.9%	−6.0%
Brazil	1.7%	2.7%	−1.0%	−0.7%	−4.1%
Argentina	7.9%	8.9%	−0.9%	−1.6%	−5.0%
South Korea	2.9%	3.6%	−0.7%	−1.0%	−6.5%
Canada	2.0%	2.5%	−0.4%	−1.4%	−5.3%
Saudi Arabia	6.7%	6.8%	0.0%	−1.9%	−7.0%
India	6.9%	6.9%	0.0%	−1.4%	−4.4%
Turkey	8.6%	8.5%	0.1%	−0.5%	−5.0%
China	9.4%	9.1%	0.2%	−1.4%	−6.1%
Japan	0.1%	−0.7%	0.8%	−0.8%	−4.8%
Spain	2.2%	0.7%	1.5%	−1.9%	−3.6%
Australia	8.7%	1.8%	6.7%	−1.7%	−5.3%
World	3.0%	3.7%	−0.7%	−0.8%	−5.1%

Source: PwC's analysis, data from World Bank (2012) and BP Statistical Review (2012)

Scientists have been warning that a global temperature rise of over 2 degrees Celsius will have unforeseen and potentially catastrophic effects. All governments have agreed to keep the rise within 2 degrees, but their collective commitments fall short of that goal by as much as 40%. The report says, "Even more worryingly, with eight years to go, it is questionable whether several of these pledges can be met." It adds, "In some respects the economic downturn may make these absolute pledges less challenging; but at the same time economic pressures may make it much harder to finance the necessary transition towards a low carbon economy."

Analysing the report, PwC also pointed out, "The rate of reduction now required has never been achieved before."

With less than three weeks to the next summit of the UN climate summit, the analysis illustrates the scale of the challenge facing negotiations, PwC points out.

Joydeep Gupta is project director (south Asia) of chinadialogue's third pole project.

China losing 1.4% of GDP to climate change and reliance on carbon

Aashima Dogra

Scale of losses in China due to climate change and carbon-based economy is "almost unparrallelled" in the rest of the world, says new report.

A massive 1.2 trillion dollars were lost in 2010 due to climate change, according to a worrying report from DARA, a spanish-based environmental group.

Perhaps more worrying for China is that it was identified as a global hotspot for most of the "doom" indicators that were used in the study.

"The scale of losses [in China] is almost unparallelled in the world. A one, two or three percent loss of GDP in China is an enormous loss to the world economy, much more so that than the 7% loss of GDP in least developed countries, for instance," Matthew McKinnon, head of the Climate Vulnerability Initiative at DARA, told chinadialogue.

China was losing an equivalent of 1.4% of its GDP in 2010 to climate change and its dependency on its fast-growing carbon-based economy, the report says. And by failing to move towards cleaner sources of energy, the government was putting millions of Chinese at risk from droughts, landslides and storms.

Economic losses from these climate-change related impacts are set to worsen. For example, the report says: "China suffers the largest impact [from sea-level rise] today at $15 billion a year. That is set to grow to almost $150 billion a year in losses by 2030 or 0.3% of China's projected GDP."

Sweaty workers and polluted air

Other threats pointed out in the report are less visible. Bad air quality, especially indoors, poor working conditions and skin cancer associated with use of carbon-based fuels killed 1.3 million Chinese in 2010 and affected another 55 million, it says.

The report also estimates the impact of climate change on labour productivity. It says that around one-third of Chinese workers were affected by environmental changes in 2010: "Labour productivity is a concern, particularly in southern China, where you have a high proportion of outdoor labour," says McKinnon.

"Temperature is going up and the number of hot days is increasing with every decade. That is putting one of the largest work forces in the world in a situation of being able to produce less in a given hour of its time and that is translating into an economic loss because it holds back productivity in labour."

Chinese fishing industry faces a potential crisis too. "It has one of the largest fisheries industries in the world. The oceans are warming and that's causing fish to migrate to different areas away from hot tropical waters," says Mckinnon.

"Furthermore, the oceans pump up CO2 and that is changing the acidity content of the water and so you can imagine [the dwindling supplies of] all of the shellfish, the krill - which is very lucrative business and is also the core part of the Chinese diet."

How China can benefit from climate change

However, it is not all doom and gloom. If China can reduce its dependency on carbon, then climate change could still bring net economic benefits to the country, according to McKinnon.

"What is interesting is when we did the net benefit analysis tackling climate change in investing in emission reductions; it brings net benefits to China. In doing that there are economic monetary benefits for China progressively because it will reduce the health and economic burden on its economy," McKinnon told chinadialogue.

Others have been less optimistic about the moves towards a cleaner economy. Tim Worstall at Forbes says the report fails to detail the benefits of fossil fuels and the large costs of moving to a non-fossil fuelled economy.

"The problem with the report is that it only counts the costs," writes Worstall. "Leave aside whether it's actually correct about the costs (some look a little overdone, others about right) and consider what it is that we really need to know about climate change and the use of fossil fuels. Which is, are we going to be better off without climate change or without fossil fuels?"

Aashima Dogra is an intern at chinadialogue

What are the ecological costs of China's future food imports?

Tom Levitt

China's growing agribusinesses and demand for soybeans and meat is bringing intensive farming and the risk of further deforestation in Brazil and beyond. Tom Levitt reports.

Image by Greenpeace. Soybean production has been linked to deforestation in the Amazon region in Brazil.

The dynamics of Chinese agriculture are changing. While it may still be largely self-sufficient in food, the country is expected to enter an era of rising food imports and in particular, animal feed. But how ready is China to take responsibility for the environmental impact of this growing overseas food footprint?

Over the past two decades, China has seen a monumental surge in soybean imports. By 2030, China is expected to consume 72 million tonnes of soybeans from overseas – more than one-quarter of the world's total soybean production today.

The impact, environmentalists fear, is greater pressure on uncultivated forested land in Brazil, the world's second largest soybean producer after the United States and a major exporter to China. In 2011, more than 67% of Brazil's soybean exports were sent to China. By no coincidence, the South American country is now emerging as a major focus of investment for China's expanding agribusinesses.

Inside China, the country is fast approaching the limit of its own available farmland resources – the so-called "red line" for food security of 120 million hectares of arable land, set by the government. China's solution, according to Deborah Brautigam, a professor at American University and senior research fellow at the International Food Policy Research Institute, has been to import cheaper agriculture commodities like soybeans and maize while saving its farmland for higher-value exports like fish and vegetables.

The other force driving the rise in soybean and maize imports is a corresponding rise in meat consumption in China. Increasingly that meat is coming from large-scale commercial farms -– not small-scale or household farmers -– and dependent on animal feed rather than food waste.

In a detailed assessment of likely trends for Chinese agriculture in 2030, Laixiang Sun, professor at the School of Oriental and African Studies in London, says he expects to see pig and poultry numbers in intensive farms increase by "at least 2.5 times between 2000 and 2030". This type of intensive livestock farming relies on cheap agricultural crops.

What this means, says Sun, is that while China will still be able to feed itself with domestic supplies of grain, overall self-sufficiency in food in China was likely to fall. He expects imports of maize to reach 16 million tonnes by 2030 and imports of soybean to rise to around 72 million tonnes by 2030.

China's overseas food footprint: a new threat to the Amazon?

The rapid expansion of soybean cultivation in Brazil over the past two decades has contributed to huge increases in the rate of deforestation in the Amazon – one of the world's most biodiverse regions and home to 10% of all species known to scientists.

Soy production accounted for about 10% of total deforestation in the Amazon between 2000 and 2005, according to estimates fromColumbia University. In the next five years, that figure dropped to 2% as new production moved to previously cleared cattle pasture.

While it may not always be a direct cause of deforestation, soybean production can still be an indirect driver, suggest observers, by raising land prices, pushing land users into forested areas and creating impetus for infrastructure improvements like roads which, then promote further forest clearance.

"The agribusiness sector wants more. The hunger for development made Brazil the third largest exporter of agricultural products...but the economic model chosen for the region ignores the Amazon environment and its people," says Greenpeace Brazil, which is campaigning for zero deforestation in the Amazon by 2015.

Tragically, the competition for lucrative farmland and resources in the Amazon region is also linked to violence and death. The Brazilian land rights group Catholic Land Pastoral estimate 1,600 activists have been murdered in the Amazon state of Para over the past 25 years. It says the killings

– mostly targeted at small subsistence farmers and indigenous peoples - are usually carried out by gunman hired by loggers, ranchers and farmers, just 1% of murder cases have led to convictions.

"A battle has been declared that is expressed in the violence against those considered obstacles to development and progress," say the Catholic Land Pastoral.

Deforestation has another globally significant impact. As well as being home to critically endangered and unique wildlife and other biodiversity, the Amazon rainforest is also a major carbon sink, absorbing carbon dioxide and helping to stem global warming. Further deforestation could reverse that, with forest clearance resulting in the release of carbon held in the soil and trees.

China's agribusiness boom

China's link to deforestation in the Amazon may not end with imports of Brazilian soybeans, thanks to the growing expansion of Chinese agribusiness companies at home and abroad. Although still relatively small in comparison to US commodity giants like Cargill, the companies have the support of the Chinese government as they seek to buy agricultural assets.

One of China's largest state-owned feed importers, the Chongqing Grain Group, announced last year it was spending US$500 million (3.2 billion yuan) to build a soybean plant in Brazil, which reportedly, could be followed by a further multi-million-dollar investment in soybean plantations.

Another, Sanhe Hopefull Grain & Oil, is reported to be putting US$7.5 billion (48 billion yuan) into soybean processing facilities in Brazil in a deal that also includes constructing a railroad.

Greenpeace's Amazon spokesperson Marcio Astrini toldchinadialogue he still hoped China's growing influence in Brazil would not lead to a fall in environmental standards in the country. "We believe that Chinese investments shouldn't be too different and should respect the environment."

As they expand their global reach, Chinese agribusinesses are also changing the landscape of farming back home. The new face of agriculture in China is no longer the household farmer but people like Liu Yonghao, president of the US$8.8 billion agribusiness New Hope Group and China's fourth richest person. His company claims to process 750 million fowl and 8.5 million pigs a year and already owns 16 feed factories outside of the country.

Professor Sun still expects small-scale livestock farms to persist, taking advantage of support for their use of local labour in rural areas, where intensive farms have comparatively less need for workers. But others suggest the incentives for such types of farming are fast disappearing.

"I anticipate that large-scale corporations will soon take over the vast majority of China's household pork production (probably in a decade or two)," says professor Li Jian, from the University of Northern Iowa, who has studied the decline of rural pig farming in China.

"Major traditional values of pig farming are vanishing, for example, few farmers now depend

on pig manure for farming and fewer and fewer families depend on raising pigs for holiday feasts etc. Under such new socioeconomic conditions, fewer and fewer farmers will find pig farming a profitable and attractive production."

The accelerated exodus of rural livestock farmers will not only see more large-scale intensive farms - with associated problems of pollution and reliance on imported animal feed - but also bring more people into urban areas, worsening existing urban environmental problems such as air pollution and congestion. The World Bank estimates agriculture's share of employment will continue to fall, from around 30% today to 12% by 2030.

"Smallholder farmers are capable of producing the food necessary to feed their country, but face increasingly difficult barriers" concludes a recent report, from the international NGO Grain, which campaigns for farmers' rights.

"Government decisions to rely on agricultural commodity imports serve the interests of agribusiness and its need for cheap sources of feed but threaten the land, livelihoods and local food systems of communities across the globe," it adds.

Amazon now, Africa next?

After the Brazilian Amazon, Chinese agribusiness is expected to join other international speculators in exploiting forested and biodiversity-rich land across Africa. But, despite a glut of media coverage about "land-grabbing" deals, (some of which has been reported in chinadialogue) Chinese involvement in land deals in Africa is, so far at least, minimal.

"I had an expectation to see much more Chinese involvement in African agriculture. Basically it hasn't happened. They have been going to Asia and South America instead," says professor Brautigam. She says high-profile land deals involving sugar plantations in Ethiopia and biofuels in the Democratic Republic of Congo have not progressed, with China sticking to smaller deals, driven by commercial interests rather than food security.

While Chinese interest in agriculture in Africa remains unfulfilled in the eyes of some observers, its investments elsewhere, particularly in Brazil, are growing. It must now decide whether feeding its citizens at home can be achieved without leading to environmental damage overseas.

Tom Levitt is managing editor at chinadialogue.

China's low-impact traditional fish farms

Tom Levitt

The world's biggest producer of aquaculture is not just focusing on the big-scale but also sustainable low impact fish farms

Would you be surprised to learn that China is a world leader in sustainable seafood? This video shows how fish farmers in China use some ingenious and low-impact traditional methods to produce more fish than any other country.

It's Slow Food on a massive scale, it's permaculture, and it tastes great. Along with fish, the farms produce lovely Chinese silk. If this was being done by hyper-educated urban refugees, it would be on the front cover of fancy magazines.

China produces more fish through aquaculture than any other country. Most of China's farmed fish are carp and other species low in the food chain that thrive on a mostly vegetarian diet. This success allows China to provide people with a protein-rich, low-cost seafood diet that has a low marine footprint.

Modernisation is creating some challenges that China's aquaculture scientists are working hard to solve. For example, competition for labor is driving up costs and undermining traditional low footprint production systems. Ongoing research is modernising fish farming methods that date back more than a thousand years and utilise ingenious and sustainable methods for recycling nutrients.

One fascinating method for farming carp is to grow several species together with mulberry plants and silkworms. In this farming system, rich pond mud fertilises mulberry plants, mulberry leaves are fed to silkworms, and silkworm pupae and waste feeds fish directly and fertilises a rich pond ecosystem that includes pond plants and animals that carp can eat. Use of several species of

carp with different food preferences increases fish production from the pond with minimal need to artificially feed the fish.

Scientists in China are now actively developing new fish farming methods that retain some of the sustainability values of traditional systems while also increasing the productivity per hectare of fish ponds. One important goal is to maintain or increase fish production without relying on feeding fishmeal and fish oil, containing wild caught fish many of which are in limited supply, expensive and can come from unsustainable fisheries.

China`s approach to using modernised yet traditional approaches for low marine footprint fish farming are also benefitting other countries. Chinese scientists are training fish farmers from all over the world with the aim of reducing stress on marine ecosystems.

Can China succeed where most of the West has failed, retaining traditional food production systems that could lead to a truly "green" economy?

Tom Levitt is managing editor at chinadialogue.

Indonesia's investor boom "paid for" by the indigenous peoples and environment

Tom Johnson

Forests Campaigner Tom Johnson looks at the recent boastings of Indonesian president and how the real price is being paid by the country's indigenous peoples and environment.

Indonesia has the third highest greenhouse gas emissions in the world after China and the US, driven by deforestation (David Gilbert/Rainforest Action Network)

[This article was published on 12 October, 2012.]

Last month, the President of Indonesia did the international investment equivalent of, shall we say, showing a bit of leg in the US.

At an event specially organised at the New York Stock Exchange, in Wall Street, Susilo Bambang Yudhoyono boasted to the assembled businessmen of the abundant natural resources on offer to potential investors.

"You can find almost everything in Indonesia: oil and gas, coal, geothermal energy, tin,

copper, nickel, aluminum, bauxite, iron, cacao, coffee," SBY said. "When it comes to oil, we have oil underground, under the sea and even above the ground: palm oil."

Indonesia's ambassador to the US, Dino Patti Djalal, opened the event by quipping that "today, Indonesia occupies Wall Street". While the comment earned a laugh, outside the building real Occupy activists staged protests to mark the one-year anniversary of the grassroots movement.

Maybe the irony was lost on Dino. The Occupy movement's loose manifesto, railing against the corporatisation of democracy and the inequitable distribution of wealth, has a certain resonance in an Indonesian context. In Indonesia, money politics is the norm and big business routinely prioritises profit over equity.

A demonstration of that principle was abundantly clear 10,000 miles away, in Indonesian Borneo, while SBY made his speech. In the regency of West Kutai, two oil palm companies were in the middle of bulldozing forestsbelonging to the indigenous Dayak Benuaq community of Muara Tae.

The activities of logging, mining and plantation companies in Muara Tae are a vision of unfettered capitalism writ large.It's a neoliberal dream. The theory behind the development paradigm rolled out in rural Indonesia is that allowing big firms to take over vast areas of land will have a trickle-down effect on local communities. It will fund infrastructure, create local jobs, pick communities up by their bootstraps and set them on the way to prosperity.

But as with unregulated investment banking, unregulated plantation development in Indonesia has been a disaster. In Muara Tae, the companies are, right now, destroying the forests and farmlands the Dayak Benuaq depend on, depriving them of the land that has sustained them for generations. It's a situation that has occurred in villages across the archipelago over the past two decades, repeating itself like a bad dream, casting thousands into landlessness and deeper into poverty.

The global economic crisis was something of a Road to Damascus moment for many in the West. It gave birth to a new generation of activists driven by the realisation that the system was fundamentally corrupted, and epitomised by the Occupy movement.

The Dayak Benuaq in Muara Tae have exercised their own form of non-violent direct action to oppose the expropriation of their forests. With support, they may yet win and retain their rights, livelihoods and culture. In the longer term, the challenge is for politicians like SBY to change the system that gave rise to this problem and to ensure that the exploitation of Indonesia's natural resources benefit its poorest people.

That statement is not as revolutionary as it might seem. Huge progress could be made simply

by the legal recognition of the customary land rights of Indonesia's indigenous communities, such as the Dayak Benuaq, and ensuring that they're respected by companies. In July 2012, a UN report recommended that Indonesia do exactly this. It also suggested that it ratifyInternational Labour Organisation Convention 169, a legally binding international instrument protecting the rights of indigenous peoples.

Three weeks before SBY's sojourn in New York, Indonesia submitted its response to the recommendations. While it "supports the promotion and protection of indigenous people worldwide", Indonesia "does not recognise the application of the indigenous people concept as defined in the UN Declaration on the Rights of Indigenous Peoples in the country".

In sum? Indonesia's open for business: come and get it (and don't worry about the pesky natives).

Tom Johnson is a forest campaigner at the Environmental Investigation Agency (EIA).

Nestlé leading new pack of "market revolutionaries"

John Elkington

With projects like weaning its milk factories off water, Nestlé has joined a small but growing group of business leaders pushing new climate-friendly ideas.

Nestlé has plans to wean all its milk factories off water. (Image by Marie Hippenmeyer Nestlé)

Business people talk of issues being on or off the corporate radar, but it's amazing how often CEOs and other leaders miss important signals in the midst of all the background noise. Part of the explanation is that their radar screens, or market intelligence systems, are so swamped with detail that it is almost impossible to detect weak signals before they go exponential and seriously impact the business.

Companies have long needed help retuning their radar, with a view to spotting signs of impending big changes sooner. And the task will become even more important as globalisation

evolves, shaped by the rapidly growing power of social media to uncover and punish real or perceived corporate wrongdoing.

Command centres are essential if you want to manage a complex, global empire, as thousands of companies now must. That reality was underscored when I visited Nestlé's Vevey headquarters in Switzerland last month. We were taken around a monitoring centre where a dozen talented young people from different parts of "Planet Nestlé" track worldwide online commentary, in real-time, on the giant food company's brands. As visual representations of online conversations swelled and faded on the screens, a young Argentinian woman explained which online conversations were going viral, and why.

Over time, growing numbers of companies will have little option but to gain access to similar market monitoring systems.

There is another, lower tech way to tap into market trends – to bring in people closely involved in monitoring and shaping the emerging agenda. Someone who had flown in earlier in the day to help us stretch Nestlé's thinking was Peter Bakker, the new president of the World Business Council for Sustainable Development (WBCSD).

WBCSD published its ambitious Vision 2050 a few years back, suggesting a clear set of stretch goals for business leadership, and envisioning a world in which 9-plus billion people by mid-century are all living well, within planetary boundaries. But short-term pressures, aggravated by the economic downturn, are stalling progress. To turn up the heat, Bakker has decided to stress test the Vision 2050 trajectories against the nine planetary boundaries identified by the Stockholm Resilience Centre.

Business the only force "able to crack" climate change

The world, Bakker warns, is "on fire" – and the lack of real progress to date "scary". So far, he says, it has been more a matter of nice words than real-world action. He notes that the International Energy Agency (IEA) predicts that the additional coal-fired power plants due for construction by 2017 will lock us into an inconceivable five-degree global warming trajectory.

On current evidence, governments won't sort this out for us. "Business," Bakker insists, "is now the only force with the ability to crack this." But business must act now, developing solutions at scale; it must work even harder to switch on governments to the challenges and opportunities; and – above all – it must work on changing the rules of the market game. So instead of trying to work with all countries at the same time, WBCSD plans to prioritise initiatives with leading edge countries and, a particular priority, cities.

To help business leaders get a better sense of what will be required of them, my organisation Volans has started to suggest the use of zero targets to stretch their horizons and ambitions. When

I originally suggested a "zero workshop" to Nestlé, I worried it would be too much of a stretch for the world's largest food company. Instead, I discovered that their chief operating officer, José Lopez, had spent years working in Japan, and had emerged totally persuaded by the "power of zero" – which sits at the heart of Japanese approaches to total quality and lean production. He promptly offered to co-host the first workshop.

The session proved to be quite an eye-opener, with participants presenting a series of "towards zero", "net zero", "zero" or "beyond zero" targeted projects from across the company. Nestlé's York factory, for example, has achieved zero waste to landfill. Then there is the "excellence diamond", a management tool with five facets – safety, environment, quality and delivery – each clearly linked with zero targets. This approach was actually inspired by airlines, which have very successfully targeted zero accidents. Piloted in a number of plants, the diamond approach is now being rolled out to all 400-plus Nestlé sites.

Zero water for milk factories

Another initiative was "ZerEau", designed to wean milk factories off water completely, by exploiting the water contained in the raw milk delivered to the Nestlé sites. "Why the hell do we need water in a milk factory?" the lead engineer had wondered after his Eureka moment: "88% of milk is water!" Now the aim is to achieve a positive water impact, not simply to reduce groundwater demand to zero.

While the weight of evidence on climate change and impending natural resource constraints continues to build, it is great to see a small but growing band of leading chief executives speaking up about the need for radical change – and calling on governments to play their part.

Expect to hear more of the term "market revolutionaries". To achieve WBCSD's mid-century goals, we must revolutionise economics, revolutionise accounting and revolutionise our legal and international governance systems. Like it or not, this is going to be hard, demanding work.

John Elkington is executive chairman at Volans and non-executive director at SustainAbility.

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HEINRICH
BÖLL
STIFTUNG

Heinrich Böll Stiftung (HBS) is one of six political foundations in Germany. It is associated with the German Green Party, but is legally independent and works in the spirit of intellectual openness.

The organisation has its headquarters in Berlin and receives public funding to carry out civic education in Germany and promote mutual understanding between people and countries. Through 28 offices across the globe, Heinrich Böll Stiftung provides a platform for international dialogue on questions around globalisation and security, environment and social justice, democracy and the role of gender in society.

The organisation is named after the German writer and Nobel Prize winner Heinrich Böll, whose promotion of citizens' participation in politics is the model for the foundation's work.

In China, Heinrich Böll Stiftung works in cooperation with the Chinese Association for NGO Cooperation (CANGO). We jointly carry out projects to strengthen civil society development in China and internationally. We also work with other civil society organisations, governmental departments and academic institutions to provide positive motivations for development and reform in China and for a better understanding between China and Germany.

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