

food  
ethics

# Banking biodiversity

Valuing or  
devaluing  
nature?

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Early environmental ethicist Aldo Leopold says “we abuse land because we see it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect.”

A common answer to the question, ‘what is biodiversity?’ posed by Defra in a public survey was... washing powder.<sup>1</sup> Raising awareness of what biodiversity is and why we need it seems crucial if we are to inspire support for its protection.

From this perspective, the various moves to bring the importance of ‘nature’ – of natural systems and other living beings – into mainstream consciousness and mainstream economics by assigning them economic and other instrumental values can appear to be a giant step in the right direction.

Even the less biologically-challenged tend to equate biodiversity loss with the tragic demise of the polar bear and other charismatic megafauna, rather than with the degradation of ecosystems and hence of ecosystem services. These services include pollination, soil fertility, clean water, carbon cycles; all critical to food and farming and our survival more generally.<sup>2</sup>

Marine biodiversity is key and often overlooked. Seven tenths of planet earth is ocean and 99% of the space available for life is in the sea. If all life on earth were wiped out, marine life would continue: but not vice versa. And all is far from well in the sea. Over-fishing is well understood. But how many people realise we’ve altered the pH of the entire ocean, rendering it more acidic as it absorbs anthropogenic CO<sub>2</sub>? Or that diverse species of plankton, the very basis of marine food webs, are at risk from the warming, acidifying seas they now inhabit?<sup>3</sup>

Biodiversity took such hard hits during the recent International Year of

Biodiversity that it’s been turned into a decade. Viewed globally, the indicators are still going the wrong way and fast. Biodiversity is falling, CO<sub>2</sub> emissions and other impacts are rising. Why?

One analysis is that industrialised societies are built on profoundly flawed systems and worldviews. Firstly, our economic systems are utterly committed to growth on a planet with biophysical limits. Second, our worldviews implicitly sanction the ongoing impacts of unchecked growth on nature. Mainstream ‘modern’ worldviews position people as somehow outside nature; the detached managers of natural systems that we are not really part of and can degrade with impunity.

Moreover, the entire suite of life forms we share the planet with, from earthworms to starfish, from goldfinches to flying foxes is, according to this astonishingly anthropocentric outlook, reduced to its role in providing goods and services for our own species, as if this were the only importance it has. Leopold and others argue that the key to resolving our environmental crises lies in this analysis: until we see ourselves as part of the ecological community on much the same terms as every other living being, we’ll deal at best with symptoms, not causes. As fast as we deal with one symptom – climate change, say – another will spring up, like cheat grass in a degraded ecosystem.

Here’s the dilemma. Assigning economic and other instrumental values to ‘ecosystem services’ seems critical in our economics-dominated ‘real’ world. But equally, this reduction of life to a set of sinks and services for people perpetuates a dangerously distorted myth of our own place in the bigger scheme of things. For all our technological brilliance we are still utterly earthbound, animals in habitats. And other life-forms are not only to be valued insofar as humans need or want them. This is the values-equivalence of

the claim that the sun revolves around the earth. It calls for a Copernican revolution in our value system; one that dislodges homo-sapiens from the centre of the universe.

This doesn’t mean not using other forms of life. We can’t simply extract ourselves from ecology. But it does mean ceasing to regard other life forms only as a means to our ends; acknowledging the intrinsic as well as the ‘usefulness’ value of nature.

The difference this ethical shift makes in practice is profound. It’s the difference between intensive husbandry systems that treat sentient, social creatures as cogs in a food machine and husbandry systems that allow more or less full expression of a given animal’s behavioural repertoire. Or between industrial monocultures that completely displace existing local ecosystems and farming systems that work with the grain of local ecology; supporting diversity, not catastrophically reducing it.

So where does this leave us? Nature is not just nice to have. It’s a necessity. The Economics of Ecosystems and Biodiversity (TEEB) report and other instrumental approaches offer much needed help in making this clear. We need biodiversity like we need water and food – but that’s not the only reason to protect it. The language of ecosystem services is at best a ladder to a wiser worldview. We need to step up fast. And then we need to kick the ladder away. ■

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# Valuing nature

## UK and international policy developments



**MATT RAYMENT** and  
**MAVOURNEEN PIETERSE**  
of GHK Consulting Ltd assess  
the policy challenges faced in  
the battle to halt the loss of nature.

Biodiversity is being lost at unprecedented levels globally. It is under stress from continuing pressures such as land use change caused by urbanisation and agricultural conversion, and new ones such as climate change. Extinction rates continue to advance at anything from 100 to 1,000 times the natural rate, and more than a third of species that we know of are facing extinction.<sup>1</sup> This decline in biodiversity is not only continuing, but is likely to accelerate unless something changes.<sup>2</sup>

As well as being important in its own right, biodiversity underpins the ecosystem services upon which our economy and social well-being depend, providing vital goods and services such as food, carbon sequestration, and water regulation. Healthy and resilient ecosystems provide a form of natural 'insurance' against shocks and risks. Worryingly, it is estimated that 60% of the Earth's ecosystems have been degraded in the last 50 years alone.<sup>3</sup> Commenting on species extinctions in England, Dr. Helen Phillips of Natural England noted that "every species has a role and, like rivets in an aeroplane, the overall structure of our environment is weakened each time a single species is lost."<sup>4</sup>

Ongoing efforts to halt the loss of biodiversity continue at the national and international levels. The Convention on Biological Diversity, meeting in Nagoya, Japan, in October 2010, agreed a new set of global biodiversity targets for the period 2011 to 2020, which aim for a slowdown rather than a cessation of global biodiversity loss, as well as new targets for protected areas and restoration of degraded habitats.<sup>5</sup>

The EU has also set a new target to halt the loss of its biodiversity by 2020, and has established the Natura 2000 network of protected areas as the centrepiece of its nature policy.<sup>6</sup> The UK has a detailed Biodiversity Action Plan<sup>7</sup> and is active in efforts to conserve biodiversity and ecosystems internationally. A new White Paper on the natural environment is due imminently, with the government promising a bold and ambitious statement outlining its vision for the natural environment, backed up with practical action to deliver that ambition.<sup>8</sup>

### Should we put a value on nature?

There are many reasons why biodiversity continues to be lost and ecosystems continue to be degraded. These include the incomplete implementation of existing legislation, insufficient funding and poor integration of biodiversity concerns into sectoral policies.<sup>9</sup> Until recently, one of the key barriers to effective conservation has been the lack of compelling evidence of the benefits of biodiversity, and the costs resulting from its loss. Efforts to halt the loss of biodiversity at the UK, EU and global levels have been accompanied by increasing attempts to place a value on nature and the services that it provides to society.

The idea of valuing nature has stimulated a lively debate among ecologists and economists. Some argue that it is either impossible, or downright wrong, to value nature in money terms. On the other hand, it is argued that failure to recognise and assess the value of nature explains many of the current decisions that result in its destruction, and that, without attempts to value its benefits, nature is often regarded as having little or no value.<sup>10</sup>

The recent interest in the concept of ecosystem services has to some extent helped to defuse this controversy. The ecosystems approach does not require us to value nature itself, but recognises that ecosystems provide a range of goods and services to society that can themselves be valued. The Millennium Ecosystem Assessment,<sup>11</sup> which provided a global analysis of the benefits that ecosystems provide to humans, recognised that nature provides a range of provisioning, regulating and cultural services to people. It also recognised that nature has intrinsic values, which are beyond the understanding of humans, and which we should seek to preserve without attempting to value.

In the UK, assessing the value of the services delivered by ecosystems forms an important part of the National Ecosystem Assessment, due to report in 2011. The NEA forms the first analysis of the benefits that the natural environment provides to society and the economy, and aims to ensure that the value of ecosystem services is fully reflected in decisions.<sup>12</sup>

Recent examples show that putting a value on the services that nature provides has an important role to play in conserving it. For example, it helps us in three ways:

*Making the economic case for halting biodiversity loss and ecosystem degradation.* The Economics of Ecosystems and



By Denvilles Duo

Biodiversity (TEEB) study provides a detailed assessment of the economics of nature conservation globally. It gives numerous examples where assessments of the overall value of the services provided by natural ecosystems to society make the case for their conservation. However, these ecosystems are often converted or damaged by the activities of private individuals or companies acting in self interest. Conserving nature depends on reconciling these private and wider social interests, and TEEB makes recommendations about how this can be achieved. Globally, it has been estimated that, without further action, biodiversity loss will result in a loss of services worth €275 billion annually by 2050, equivalent to 7% of global GDP.<sup>13</sup>

*Demonstrating the benefits of investing in nature conservation programmes.* Effective conservation of nature costs money, as resources need to be allocated to protection, restoration and management activities. A recent RSPB publication, *Financing Nature in an Age of Austerity*,<sup>14</sup> highlights the current challenge of securing the resources necessary. GHK has estimated that the costs of meeting targets set by the UK Biodiversity Action Plan amount to more than £800 million per year,<sup>15</sup> while implementing Natura 2000, the EU's network of special sites, will cost at least €5.8 billion annually.<sup>16</sup> In both cases there is currently a significant funding gap, and evidence of the value of the benefits of the UKBAP and Natura 2000 is being used to make the case for sufficient funding. The Government has also committed to achieving further improvement in the condition of Sites of Special Scientific Interest in England, which currently receive public expenditure

of £100 million annually. Research by GHK for Defra, soon to be published, demonstrates that SSSIs deliver a wide range of benefits to society and that the value of these significantly outweighs the costs.

*Increasing the transparency of decision making.* Environmental economists often argue that society constantly makes tacit assessments of the value of nature by making decisions to protect or destroy it. In doing so we regularly trade off nature and the services it provides with other goods and services in the economy. For example, when a decision is made to build a road or some houses on an area of heathland, an implicit judgement is made about the relative benefits of the natural asset and the built development that replaces it. By assessing the costs and benefits of conserving nature, we are making these valuations more explicit.

Such a debate has been provoked by the Government's consultation on the proposed introduction of biodiversity offsets in England. Offsets would require any development that caused a loss of biodiversity to be accompanied by actions to enhance biodiversity elsewhere through habitat creation or restoration. Some have expressed concern that this may legitimise damage to nature and encourage trading of valuable habitats and species, with uncertain effects for the natural environment. However, offsets are a response to the continuing damage that development causes to nature – an average 12,700 hectares of land were developed in England annually in the last decade, including 5,500 hectares of greenfield sites.<sup>17</sup> Offsets would aim to ensure that this





By UGArdener.

development causes no net loss of biodiversity. Recent work by GHK and Eftec for Defra shows that introducing offsets across England would deliver substantial additional resources for nature conservation.

### Will economics solve the problem?

The examples above help to demonstrate the role that assessments of the value of nature's services can play in national and international nature conservation efforts. However, we must also recognise that they have limitations.

Firstly, we currently lack the knowledge needed to value all of nature's services reliably and comprehensively, so assessments often need to be made on the basis of incomplete evidence. Some of nature's services are notoriously difficult to value, while in many cases gaps in scientific evidence make it impossible to quantify the service to be valued, .

Secondly, valuing nature's services is often not sufficient to protect them – our understanding of the value of nature and its services has increased substantially in recent years – but we continue to lose biodiversity at an alarming rate.

And finally, we need to recognise the intrinsic value of nature (which we are unable to estimate), as well as the services it provides to people (which we can attempt to value). For these reasons efforts to value nature's services should be seen as a tool that can help to guide, inform and strengthen nature conservation strategies rather than a means of dictating policy.

Halting the loss of nature globally is one of the greatest environmental challenges we face today. Assessments of the value of the services that nature provides to the economy and society can help us to address this challenge.

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# A call to action

## Biodiversity and the food and drink sector



**ANNELISA GRIGG** and **PIPPA HOWARD** ask how long, in the midst of a global crisis in which biodiversity is being lost at an unprecedented rate, we can continue to undervalue biodiversity and under-price food?

The food and beverage sectors have an intimate relationship with biodiversity. Almost all products sold on supermarket shelves have natural beginnings. From fresh fruit and vegetables to tea, bread, wine or even toilet roll, all depend – or impact – in some way on biodiversity and ecosystem services. Yet frequently the costs of the services used or impacted on in producing the food and drink that we consume are not factored into their price.

### An emerging issue

Loss of biodiversity and associated ecosystem services is an increasingly significant issue for business. Comprehensive reviews of the status of biodiversity have shown that the situation is reaching a crucial 'tipping point' where the impacts of this loss will become more severe and widespread than those experienced to date.<sup>1</sup> In 2010, the Economics of Ecosystems and Biodiversity<sup>2</sup> (TEEB) concluded that the economic implication of this was in the region of US\$2 - \$4.5 trillion each year (based on 2008 figures).

In 2010, management consulting firm, McKinsey<sup>3</sup> found that biodiversity occupied a similar position in the public debate as climate change did in 2007. In 2009 a review of global risks conducted by the World Economic Forum<sup>4</sup> classed biodiversity as an issue with minimal financial implications. By 2011, the same study showed that loss of biodiversity was perceived as having a financial implication greater than terrorism and on a par with flooding and food security.

Our natural capital is becoming depleted. At the same time, demand

for food and consumer products is surging, driven by the need to accelerate global development. To date, product substitution or switching of suppliers have lessened the impact of increasing resource scarcity. However, looking to the future, a number of trends will raise the issue's profile in the industry.

Flooding made worse by deforestation is responsible for US\$23 billion crop losses in Asia. A global decline in pollinators is causing farmers worldwide serious concern as the cost of commercial pollination goes up and yields fall. Poor soil management practices have led to the abandonment of 1.5 billion hectares of cropland in Europe alone.<sup>5</sup> Many of these trends will impact directly on primary producers/ farmers through reduction of crop yields. The impact on retailers may be magnified through their greater vulnerability to consumer pressure and NGO campaigns.

### The link to risk and opportunity

Retailers impact on biodiversity and ecosystem services through the construction and operation of new stores, but the bulk of their impact sits within the supply chain where issues such as overexploitation (fish), or deforestation/ habitat conversion (palm oil, soya, meat, timber and paper products) may give rise to a range of risks and opportunities. These are discussed below.

**Reputational risk** Over the last few years we have seen a plethora of campaigns by NGOs on biodiversity-related issues ranging from unsustainable fishing practices, to palm oil. The campaign run against palm oil company Sinar

Mas by Greenpeace last targeted Nestlé in a highly emotive and high profile campaign which linked orangutan habitat destruction with a key branded product (KitKat). This campaign led to Nestlé – and a number of other high profile brands including Unilever – withdrawing from sourcing palm oil from Sinar Mas. Over the period that this campaign was run, Nestlé's share price dipped.

**Operational risk** Declining ecosystem services can impact on operating margins. The loss of commercial and natural pollinators that result in declining yields have led to narrowing profit margins as more is paid to import pollinators from other parts of the world. Increased flooding as a result of the loss of the soil's ability to retain water has similarly resulted in declining yields.

**Regulatory risk** Increasing legislation, shifts in policy and the introduction of market-based mechanisms or quotas may impact on a company's ability to access resources. Commercial fishing operations in the European Union have been impacted by tightening quotas on cod, hake, plaice and other species in an effort to curb depletion of wild caught fish stocks. We now see very different fish on supermarket shelves than we did twenty years ago.

**Financing risk** Of 27 financial institutions surveyed by UNEP Finance Initiative, 59% stated that they had integrated consideration of biodiversity ecosystem services (BES) into their products and services. Rabobank, for example, has a number of positions



stated on issues such as soya, palm oil or fisheries. Initiatives such as the Natural Value Initiative are working with investors to understand risk exposure within the food and beverage sector on this issue.

*Business opportunities* are also arising. Markets are emerging for 'biodiversity friendly' products with 'lite' footprints. Companies can access new revenue streams and markets through the growing demand for certified sustainable foods, a rapidly growing market. Sales of Marine Stewardship Council-labelled products worldwide grew by 67% from April 2008 to March 2009 and certified agricultural products now total US\$40 billion.<sup>6</sup>

### Responses are reactive rather than proactive

The Natural Value Initiative is a collaboration led by international environmental NGO Fauna & Flora International in conjunction with the United Nations Environment Programme Finance Initiative, two business schools and Dutch socially responsible investor, VBDO. We work with a range of investors to build understanding amongst the investment community and the companies in which they invest of the potential and existing links between shareholder value, biodiversity and ecosystem services. In 2009 we conducted a review of the food, beverage and tobacco sectors, evaluating biodiversity and ecosystem services management in 31 companies. By asking a series of targeted questions, we are able to create a risk profile for a company and assess how well those risks were managed.

We discovered that, although a number of companies were actively managing the issue, they were doing so in a fragmented, reactive way. Activities were often underway on timber, fish and palm oil, but few were in place for other commodities that could be considered to have a high impact or high dependence on BES such as soya, sugar and coffee. Very few companies could demonstrate a strategic approach, exposing them to potential risk and missed opportunities. A notable exception was Marks and

Spencer, which was unique in that it placed its activities on the issue in the context of a broader strategic plan. Rather than simply focusing on fish and palm oil, M&S are developing sourcing standards for soya, beef, leather and coffee. They had also undertaken a review of their supply chain, identifying areas of risk associated with use and dependence on water and are working with high risk suppliers to encourage good water stewardship in water 'hotspots'.

### Where to start?

Business – and particularly this sector – needs to better understand and manage its relationship with the natural world, from a commercial, rather than philanthropic perspective. Companies starting out in understanding this issue need to understand how they are impacting and depending on biodiversity and ecosystem services. They should ask what areas of the supply chain are vulnerable to declining natural resources for example pollination, water, raw materials? Which commodities/ ingredients/ products are known causes of environmental degradation for example habitat loss/ deforestation? Where are new stores being sited and where are the materials being sourced from to do this (cement, timber)?

Then they need to understand what this means to them in terms of business risk. Questions they ought to be asking include how their stakeholders view the issue, whether their customers are aware of it, and if NGOs are targeting it. Other questions include whether products considered to be high risk can be ethically substituted and to what extent can the supply chain be influenced?

Tools such as the World Resources Institute's Corporate Ecosystem Services Review or UNEP World Conservation Monitoring Centre's Integrated Biodiversity Assessment Tool can offer useful input into these processes. UNEP's report "Are you a green leader?" offers a comprehensive list of initiatives and approaches that can assist a company starting out on this issue. Initiatives such as the European Business and Biodiversity Campaign

or 'Biodiversity in Good Company' offer guidance and tools for a company starting out on this issue.

However, many companies are recognising that they lack the skills and networks to effectively deal with this issue and partner with groups such as WWF, Fauna & Flora International or Conservation International to help them think through policy, strategy and actions on the ground.

Biodiversity is an emerging but increasingly significant issue. A number of leading companies have recognised this and are responding accordingly – they see competitive advantage in doing so. Studies such as TEEB have clearly shown that we are not paying the full cost of the goods and services we receive from the natural world. Policy makers are responding by experimenting with mechanisms to redress this balance, which will fundamentally impact on the ability of the private sector to do business.

The food and beverage sector needs to respond to this challenge, examining and managing impacts and dependencies through the supply chain, at the supermarket and with consumer education. This means acknowledging the true value of biodiversity and the role it plays in delivering food and drink to our table. ■

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# Business and biodiversity

## Following the leaders



Last week, while camping at Fforest Farm on the river Teifi in Pembrokeshire,<sup>1</sup> **JAMES TAPLIN** of Forum for the Future mused on the value of the natural environment, how businesses value the world around them, and whether it's only leisure operations like Fforest that can really see the value in nature.

Fforest Farm is a fantastic business based entirely on an appreciation of the natural environment and how best to enjoy it. It's also very successful. But, of course, it's not only businesses like Fforest Farm that value nature, although they have been the ones with a business model most explicitly built upon it, in the sense that quality of environment is indistinguishable from business success, and doing good to one does good to the other.

Other businesses less reliant on nature as a whole entity (at a definable place and time), and more reliant on indirect aspects of the environment across wider times and spaces have struggled to simplify their complex interactions with the natural world. Their inability to translate those interactions into hard cash, to compare alongside other strategic business decisions, means they've been ignored and – effectively – assigned a zero business value to the environment, even whilst those doing the valuing know that's wrong.

Many would argue that not putting a price on nature is the right thing to do – it transcends grubby economics and should be valued intrinsically in and of itself. I think that is a wonderful idea, and I'm excited to see how this might be given the power it needs to work effectively in the new Law of Mother Earth which Bolivia is implementing that gives nature the same rights as humans.

But I'm also an environmental economist by training and so I know, through bitter experience, that if business decisions are based on economics, then giving nature an economic value is still the easiest way to give it a voice that can be heard in boardrooms.

Two years ago I worked with the Bulmer Foundation to try and put a total economic value on orchards – a resource being



By 1010uk.org



grubbed-up at a rate of knots<sup>2</sup> to make way for alternative land uses assumed to yield greater business returns. We wanted to challenge the validity of this assumption by looking beyond the simplistic market economics that is most often used to make these assessments and see how orchard values would differ if social and environmental values were considered as well. The sample was small, the methodology experimental, and the assumptions large – so I’m not claiming that this is a rigorously scientific study. But the results are nevertheless revealing. First and foremost they showed that direct profits (the only measure that the orchard owners have traditionally used to value natural resources) were never more than 40% of the estimated total value.

Secondly we found that of the additional value, most was felt by the local community in positive social attitudes towards the orchard and what it meant to their identity – that is, supportive emotional intangibles invisible to the farmer whilst they’re there, but which can lead to business difficulties once they’re gone.<sup>3</sup> Since this study, a number of the orchards have looked to ‘capture’ some of these additional values, by involving their communities more in their operations, so the cider industry as a whole can properly demonstrate that the nation’s orchards are worth so much more than their value to farmers alone.

At a rather grander global scale, TEEB has attempted to put hard figures on the different ecosystem services provided by nature. These are classified as provisioning services (for example drinking water, food, medicine), regulating services (such as climate regulation or water purification), cultural services (those that give recreation or emotional inspiration) and supporting services (including maintaining soil fertility and water cycles that underpin the other three services), and the figures are astounding. The contribution of insect pollinators to agricultural output is estimated to be US\$190 billion per year alone.<sup>4</sup>

TEEB presents the opportunity provided by nature to business, but there is growing awareness of the threat to business from nature – especially from losing what has been taken for granted. The 2005 Millennium Ecosystem Assessment published a document focussing on the opportunities and challenges for business and industry. The message it gave was stark. It found that two thirds of the ecosystem services examined were being degraded or used; services and materials historically available to business at no cost would cease to be available in the near future; and enormous investment would be required to compensate for this.

The wealth of evidence around the threats of business not valuing nature properly is growing, but the tools available

to businesses to do something about them are still too complicated for most to use. Smaller organisations can find them costly and time-consuming. Larger organisations say the confusing range of interactions, products and geographies obscures understanding of their full impacts, and hinders them from being able to prioritise action.

Thankfully, in the last couple of years, we have started to see a growing group of businesses beginning to think and operate outside their traditional confines. These leading businesses (and Forum for the Future are in the fortunate position of being able to work with many of them) see the risk avoidance, competitive advantage, brand enhancements, and financial wins to be made from valuing nature.

The Co-operative Group and Häagen Dazs have launched campaigns to highlight the importance of bees, with both companies making explicit links between pollination services and their ongoing ability to source the agricultural products they rely on. As Häagen Dazs put it: “Honey bees are responsible for pollinating one third of all the foods we eat, including many of the ingredients that define our all-natural ice-creams.”<sup>5</sup>

We see change at all scales. Farming Futures<sup>6</sup> helps farmers in the UK understand and prepare for the impacts of climate change. Many of the potential changes may fundamentally alter land uses, and the flow of ecosystem services that farmers rely on to produce their crops and support their livelihoods. Better understanding the values of nature is prompting UK farmers like Edward Thompson<sup>7</sup> to change crop varieties and farming methods in order to better use and support the existing ecosystem services provided by the land, and be better prepared for when they change.

Big multinationals like GlaxoSmithKline (GSK) are also increasingly aware of the value and threats to the ecosystem services they’ve previously ignored in the UK. GSK use about 95% of all Britain’s blackcurrants to make Ribena – marketed as a “taste of the British countryside”. But the blackcurrant plant requires a cold snap to encourage fruiting and the company fears that yields will drop as a result of climate change. Sourcing blackcurrants from abroad would increase costs and require a change in marketing strategy. As a result they are working with scientists to source varieties from New Zealand that can cope with milder weather.

Unilever is taking an even more progressive approach by developing their Sustainable Living Plan, which looks at every category of their products from social and environmental perspectives, as well as economic ones. By considering health and hygiene, nutrition, greenhouse gases, water, waste,

## There is growing awareness of the threat to business from nature



By Fras1977

sustainable sourcing, and enhancing livelihoods they can look not only at how to maximise the positive business impacts on those factors but also, eventually, how those factors can impact on the business.

So, business is getting progressively better at valuing nature. The opportunities are clear, and the risks of not doing so are even clearer. There is a growing desire for positive change, but the ability to act on that has been lacking – since the complexity of the challenge has tended to put it beyond all but those with the greatest passion or deepest pockets.

Things are about to get easier, though, with the recent publication of the ‘Guide to Corporate Ecosystem Valuation’ by the World Business Council for Sustainable Development (WBCSD).<sup>8</sup> It turns the work of TEEB into something all businesses can use to “make better-informed business decisions by explicitly valuing both ecosystem degradation and the benefits provided by ecosystem services”.

Over the next three years, Forum for the Future will be working intensively with key players in the global food system to address the failings that we see there – many of which are to do with under-valuing. We want to rebalance fairness and equity in food value chains; help connect people with food and to allow producers to raise standards and increase the food system’s resilience to make resource use more effective. To

meet these goals, we need mainstream business to understand its full impacts on the world, and put better valuation of the environment at the heart of its decision making.

With the wealth of compelling evidence available, and the development of a new guide for acting on it, our task seems to be getting that much easier. We’ve seen that the brightest businesses are already moving from a position of thinking about how to reduce the impacts of business, to considering how to optimise the potential impacts on business. Maybe it’s time for those who still want to be in business in a few years to follow the leader. ■

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# Environmental and ecological economics

## Commonalities and differences



Humankind's management of its resources is more important now than ever before, writes **RUPERT CRILLY** of nef, because of one simple fact: we are running out of planet.

Globalisation of the marketplace has had the far-reaching effect of bypassing local scarcity issues. Without a doubt this has brought enormous benefits to civilisation, particularly in developed countries, enjoying massive rises in consumption, longer lives and better health and education. Simultaneously, however, the environmental bill for this has been adding up.

The New Economics Foundation (nef) recently estimated various countries' 'ecological debt', finding a bill of 3.1 planet Earths if the global population consumed as much as the average UK citizen and five if everyone consumed at the level of the average US citizen.<sup>1</sup> In fact, these estimates are generous in assuming that humans can consume all of the planet's resources.

More conservative estimates would recognise the existence of thresholds: marginal rates of environmental resource use can lead to sudden changes in the ecosystem. By looking at a safe operating space for humanity, and the biocapacity of the planet, researchers can study the limits of our long term growth. Given that we have only one planet Earth to inhabit, we should seek to avoid developing, burning, or eating our way through these 'planetary boundaries'.

Recent research by Rockström et al. at the Stockholm Resilience Centre shows that humanity has already breached three of nine such boundaries: biodiversity loss, climate change, and the human modification of the nitrogen cycle.<sup>2</sup> Their message is clear: we have fundamentally changed the planetary conditions that nurtured the growth of our civilisation.

Of course, ideas of living within one's means are not new. Their treatment and development in economics, however, is particularly important. Mainstream neoclassical economics,

the dominant paradigm since the 1950s, posits that there are no limits to growth. Scarcity is still the central issue, yet growth can be maintained by a combination of human adaptation and technological progress raising human utility at a lower and lower resource cost. The hope is that this decoupling of resource use and growth will allow humanity to continue to enjoy the outcomes the developed world has enjoyed for decades.

Unfortunately, economic activity is far from achieving the kind of resource efficiency needed in the time we have. Indeed, a more prominent decoupling has been the Easterlin paradox – a set of observations that wellbeing has barely increased with economic growth since the 1960's – which challenges the use of wellbeing as a justification for pursuing economic growth in advanced economies, and the high cost to the environment it entails.<sup>3</sup>

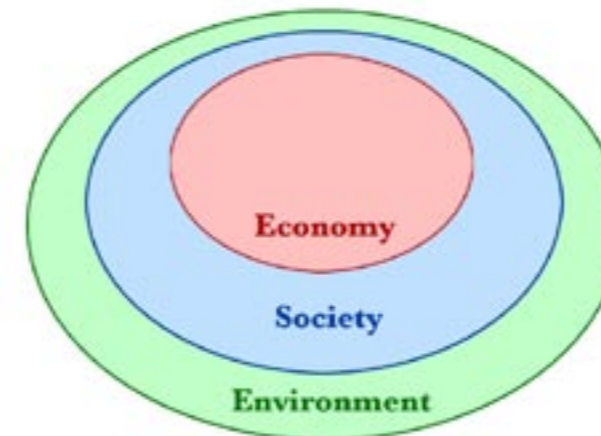
The impact of economic activity on the environment, alongside emerging awareness in the 1960s of environmental problems, has led mainstream economics to develop the subfield of environmental economics. This field conceptualises environmental problems as 'market failures', a socially inefficient allocation of resources.

For example, Lord Stern, in his report to the UK Government, called climate change "the greatest and widest-ranging market failure ever seen" because the greenhouse gas emissions associated with many economic activities are not taken account of by those involved in the activity.<sup>4</sup> That is, the fact that they are an external consideration but impacting on people globally, and one that is more costly to adapt to than mitigate against, make climate change a major market failure. In many cases, environmental economics has been able to prescribe policies (with mixed success) to redress these failures, which are particularly useful in a price system such as the market.

Ecological economics, on the other hand, takes the very different conceptual view that the economy is embedded in the environment, rather than blind to it. While the breadth of the field cannot be captured here, there are some commonalities worth highlighting.

Environmental problems are approached more pluralistically and trans-disciplinarily to help better understand environmental problems, and to mitigate against any ignorance

of them. The degree of substitution possible is limited between the environment (natural capital) and other forms, such as physical man-made capital. Ecological economists are more likely to reject weak sustainability – that the environment can be 'converted' into other forms of capital (think replacing forests with a factory) – in favour of strong sustainability, where the environment must remain constant or increasing.



Ecological economics: the economy is a subset of the environment. Source: Wikimedia Commons

A common thread through these fields is one of equity and intergenerational value. Environmental economics does not recognise equity per se: its preferred concept of efficiency stresses only efficiency of resource use, not distribution. A completely efficient economy could, in these terms, be totally unfair. Even if people's preferences for an equitable society are captured, the problem does not go away when faced with intergenerational issues. In these cases, valuing goods today more highly than tomorrow (having a 'positive time discount') diminishes any future benefits or costs, making the current generation more important and justifying the unsustainable exploitation of the environment.

Ecological economics, by taking the position that sustainability is paramount, challenges mainstream thinking, such as the priority given to efficiency over other considerations; the near infinite substitutability of capital; and the unchanging nature of consumer preferences. For example, the field might advocate the use of a long-term contract forcing the management of resources to value this and future generations equally.

Intragenerational equity is also an issue, where sustainable development is advocated as a substitute to economic growth. There are other points of contention too: how much can we depend on technology to stave off environmental problems? Is the price mechanism, even when corrected for market failures, sufficient to value the environment? Does nature have intrinsic value? If the economy is constrained by Earth's biophysical limits then how compatible are economic growth and trade with environmental conservation?<sup>5</sup>

In practical terms, however, these two fields have much more in common because, in part, their separation is constrained by the dearth of scientific knowledge. For example, what substitution limits and possibilities exist that maintain a safe operating space for humans? Policy prescriptions of environmental economics will depend on individuals' preferences, and have no reason to be sustainable. Ecological economics may ensure the policy is strongly sustainable, but in doing so may preclude any need for valuation or markets, which is at odds with the political and economic reality. How would an economy work where valuation is not based on preferences but on some interaction of the economy and biophysical processes such as thermodynamics as espoused by Georgescu-Roegen?<sup>6</sup>

Just as important as emphasising their differences is to stress their positive influence on policy. Ecological economics has contributed a more sophisticated approach to the value of biodiversity, studying material and energy flows and more. Environmental economics has expanded the economist's toolkit to environmental cost-benefit analysis, informing regulation on social 'bads', like pollution, and expanding valuation techniques, such as contingent valuation. Their shared purpose – the better conservation of the environment – should serve to strengthen their arguments, which is greatly needed in a world that values their role only as much (or as little) as the environment itself.

Encouragingly, several high-profile initiatives give hope that environmental valuation will be getting the weight it deserves, with projects such as the UK and UN-led National Ecosystem Assessment<sup>7</sup>, which is a bold attempt to put a value (including such difficult to capture factors as cultural value) on the environment, and the UN-led TEEB study.<sup>8</sup>

In applied economics, ecological economics has been more difficult to use for policy-orientated work, possibly because of the reality of the situation: the current economy and price mechanism are more conducive to the tools of environmental economics. At the New Economics Foundation (nef) we therefore view the development of ecological economics as having a positive role for a bigger-picture and longer-term approach which can then be combined with socio-cultural outcomes in order to demonstrate real wellbeing for the people and planet.

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Rupert Crilly is researcher on natural economies at the New Economics Foundation (nef).

## How should we value nature?



**Dr. Vandana Shiva** is a world-renowned environmental thinker, activist, physicist, feminist, philosopher of science, writer and science policy advocate

Nature is the basis of life on earth, and the foundation of all economic activity.

Nature and all beings of the earth have intrinsic values that are not reducible to market values. There are three important reasons why:

Firstly, nature's economy existed prior to commerce. It is holistic, multi-dimensional and diverse. Sustainability requires that commerce obeys Gaia's laws. Trying to force Gaia to obey market laws is unethical, arrogant, and the worst display of anthropomorphism. Ignorant of most of nature's processes, and many of her species, we grant a license to destroy and push biodiversity to extinction. Further reducing nature's economy to market values selects one ecological service at the cost of others.

Nature's value and the value of her contributions is priceless. Our petty and crude market calculus cannot capture the richness and diversity, complexity and multi-dimensionality, beauty and harmony of nature's web of life. Nor can the market calculus be a management tool for the integrity of creation. At best putting a market valuation on particular ecosystem services can act as a heuristic guide to avoid destruction. Knowing what contribution bees and pollinators make to the food economy should act as an imperative to stop killing them with pesticides and pesticide producing GM crops.

Secondly, nature is the basis of the sustenance economy and the economy of the poor. Ignoring this use value, and putting only an exchange value to nature leads to injustice, and deepens poverty and inequality.

Thirdly, market instruments and market valuations have proven to be unreliable even for managing the financial market as the subprime housing crisis, the collapse of Wall Street in 2008, and the massive bail out of banks has shown. To apply these failed and flawed tools to nature is foolhardy.

We need to value nature for her intrinsic worth. As Navdanya's recent report "Health Per Acre : Organic Solutions to Hunger and Malnutrition" shows, conserving biodiversity and building the soil through organic matter recycling will increase health and nutrition output per acre. Producing food by working according to nature's ecological laws also increases human welfare. Working against nature's laws undermines both nature's economy and the sustenance economy. It is at the root of the ecological and poverty crises.

Market fundamentalism leads to ecological and social disintegration. It cannot be the basis of repairing violated ecosystems and communities.



**James Griffiths** is managing director for Ecosystems at the World Business Council for Sustainable Development

The world's food and agriculture systems are

experiencing stress as we find ourselves feeding more people with a finite supply of water and arable land. Also under stress are the natural ecosystems that support these food systems. It's crucial that we get a better understanding of the full benefits – and value – of key ecosystem services, and manage them accordingly, as they directly relate to core operations, supply chains and the financial bottom line. This is true for small farmers to large corporations.

That's why the World Business Council for Sustainable Development (WBCSD) released the Guide to Corporate Ecosystem Valuation (CEV), an innovative framework designed to enhance the business understanding of the benefits and value of ecosystem services. This first-of-its-kind framework enables companies to consider the actual ecosystem services they depend on and impact, giving them new information and insights to include in business planning and financial analysis. This will support improved business decision-making by creating more alignment between the financial, ecological and societal objectives for businesses.

For instance, Syngenta used the guide to assess the value of natural pollination, a vital aspect to the agriculture process and a \$190 billion a year contribution to agricultural output in general.

The guide allowed Syngenta to facilitate better grower decision-making and enhance their business model. The information may also serve to educate consumers, university researchers, policy makers and other governmental agencies to strengthen policy development relating to conservation buffers for pollinators on agricultural lands.

Recognising the value of protecting the land, soil and other natural resources for food production will be key for business success in the future.

For more information on the Guide to Corporate Ecosystem Valuation (CEV), please visit [www.wbcscd.org/web/cev.htm](http://www.wbcscd.org/web/cev.htm).



**Howard Minigh** is President and CE of CropLife International

Agriculture and natural ecosystems have a symbiotic relationship – agriculture

is both reliant on a rich ecosystem, and essential for protecting biodiversity. Biological diversity is critical for the development of new plant varieties, especially through breeding programmes and plant biotechnology methods. Plant breeders have long relied on diverse plant genetic resources to facilitate the exchange of desirable traits to improve crop yields, increase pest- and virus-resistance and to enhance nutritional content.

Over the centuries, farmers have struck a balance between the preservation of the natural environment and the need to feed the world. They've maintained this balance by utilising a myriad of "green" agricultural practices, tools, and innovations that not only maintain and increase productivity, but do so in a way that benefits their individual and unique environmental needs.

Agricultural policy must maintain this farmer choice by being science, farmer, and knowledge-based. No single agricultural practice can deliver sustainability and productivity uniformly across the world – choice is essential for maintaining our shared value for nature and our world population. In order to enjoy the benefits innovative agricultural technologies can bring, it is essential to commit to and develop the policy and infrastructure needed to support their acceptance. Infrastructure – from a predictable regulatory framework and human resource development to modern systems for transportation, irrigation and education – is integral to the broader goals of development, learning, and economic growth.

Agricultural and environmental policies must be coordinated to balance the need to enhance food stability and support agricultural and economic development, while conserving natural resources and preserving the environment. No single need or cause is more important than another, and policies must recognise this and balance them by supporting a myriad of solutions that bring different and unique advantages to each farming situation.



**Kerry ten Kate** is Director, Business and Biodiversity Offsets Programme, Forest Trends

Nature should be valued

in a manner that allows any activities that damage it to be avoided and minimized to the extent possible, and the residual impacts quantified and offset through suitable conservation activities, resulting in no net loss or a net gain of biodiversity.

There have been great strides forward recently in learning how to tell which impacts on nature are so severe that they cannot be remediated or offset. This should help decision-makers ensure such impacts are avoided. We're also getting better at quantifying 'loss and gain' of biodiversity to plan for no net loss. Given the current pace of development and rate of loss of biodiversity, such rigour in quantifying losses and gains and the political will to implement offsets is vital.

Without it, we will certainly see significant cumulative losses of species, habitats and ecosystems, as the services provided by nature are treated as 'free', and eroded over time. Tools that support good land use planning are already available, and improving fast. These help governments, companies and communities establish which natural areas to conserve, which are appropriate for development, and – when development takes place – how to invest in balancing conservation.

The Business and Biodiversity Offsets Programme has developed tools that value the ecological, socioeconomic and cultural values of biodiversity so there is no net loss in the context of mining, energy, agriculture, infrastructure and tourism projects. We're working with companies, banks, governments, conservation experts and local people to do our best to ensure nature is valued and conserved.



**Caroline Drummond** is Chief Executive at Linking Environment And Farming (LEAF)

As increasing pressure is placed on addressing food

security, there are growing fears that the environment will lose out.

Although they may not realise it, biodiversity underpins a wide range of services that people rely on in their daily lives. Bacteria and microbes transform waste, insects pollinate our crops, and our biologically rich landscapes provide enjoyment.

Fifty percent of all species in Europe rely on agricultural habitats to survive. That is why it is important that farming systems account for the independence of a thriving nature alongside food production.

LEAF farmers adopt Integrated Farming delivering sustainable agriculture across the whole farm. For instance, encouraging valuable habitats such as beetle banks provides healthy populations of beneficial insects to help farmers naturally control pests

Reducing the rate of biodiversity loss, and ensuring that consumer and political decision-making incorporates the full values of goods and services provided by biodiversity will contribute substantially towards achieving sustainable development.

But the real challenge is internalising the value of the environment and other ecosystem services that farmers deliver in the price we pay for our food. That's not something we currently have a true 'currency' for. We've got to start accounting not only for economic, but social, environmental and cultural values, too.

At LEAF, we believe in a step-by-step approach to valuing nature: ensuring that farming systems are robust and integrated; that consumers are engaged, through the market place, such as with LEAF Marque and opportunities to reach out and touch nature, such as LEAF demonstration farms and events like Open Farm Sunday.

As we grow to understand more about the real value of nature then we will learn to respect her more in our everyday lives.





**Paul Moring** is head of economics at the RSPB

To value nature properly we need to understand the full range of

benefits the natural world helps to deliver. The ecosystem services approach helps us understand this vast range of benefits, from the complex biological processes that create soil and clean water, to providing inspiring landscapes or amazing wildlife spectacles. Some of the benefits, like apples or fish, are valued in monetary terms because we buy and sell them. Other benefits, like the flood prevention value of a coastal wetland, can be estimated by looking at the costs of flooding, or the cost of sea defences we can avoid when we work with nature. Others benefits though, like the value many of us place on the sheer existence of difference species, is far harder to gauge in monetary terms yet are just as significant.

Nature is both life supporting and life enhancing, and demonstrating these benefits in monetary terms can help us make much better decisions. However, we will never be able to express the full range of nature's value in pounds and pence. For this reason, the idea of ecosystem services must complement, not replace, ethical and scientific justifications for protecting nature.

A successful Natural Environment White Paper is essential if we are to meet our commitments within the 2020 Nagoya global agreement, and if the Coalition Government is to realise its own stated aim to halt biodiversity loss.

We have identified six key tests which the white paper will need to meet to be successful, including recognising the non-monetary value of a healthy environment. We are also calling for clear leadership towards measurable outcomes, making the most of existing legislation, using local partnership, robust funding for the natural environment and shared responsibility across government.



**Chris Knight** has been a member of the PwC UK Sustainability and Climate Change team since 2004, and leads their work on forestry (including REDD), ecosystems and biodiversity

Whether viewing dolphins or tigers in the wild, visiting the Grand Canyon, getting out of the city for fresh air or buying food to eat, we already pay – and will need to pay more – as resources become scarcer. But can we place a monetary value on nature's less visible services, the ones we don't already pay for?

Agricultural production is massively dependent on ecosystem services including the water retaining features of the landscape, soil nutrient cycling by micro-organisms, local and global climatic stability, genetic variability in crops and pollination and pest control services provided by insects and other animals.

As these services decline we can value the economic consequences. In 2008, the economic cost of biodiversity loss and ecosystem degradation was estimated to be between US\$2 and US\$4.5 trillion (3.3 – 7.5% of global GDP).

Food companies need to examine how reliant they are on ecosystem services. Where are the biggest dependencies, and are critical services such as water, secured? Major food businesses need to actively manage their 'natural' capital – the stock and provision of these ecosystem services – in the same way we prioritise our human or financial capital. Experience tells us this is not currently the case. Simple processes exist whereby all companies can identify their key dependencies, and opportunities that natural capital presents. To realise the value means taking simple and sensible steps now.

Download key briefings from PwC and the World Economic Forum at [www.pwc.co.uk/eng/publications/forestry\\_and\\_ecosystems\\_publications.html](http://www.pwc.co.uk/eng/publications/forestry_and_ecosystems_publications.html).



**Mohammed Rafiq** is Senior Vice President of Programmes at the Rainforest Alliance

Much discussion has focused recently on

placing an economic value on nature and biodiversity. There has been some very useful work done on this theme, in particular the TEEB study and the World Bank's Global Partnership to "Green" National Accounts. Both are part of a move to try and place value or cost on nature in an attempt to better encourage its protection.

It's clear that biodiversity generates immense economic value, and scientists are increasingly working to quantify those values through what is becoming a discipline of ecosystems services valuation. The more we can assign economic value to nature and biodiversity and the services they provide, the more likely society is to conserve them then under the open access free for all regimes. However, not everything can be valued in economic terms. And even if it could it wouldn't satisfactorily define true value.

What it wouldn't capture is value that simply can't be converted into a cost. It can't cover the much greater intrinsic and even spiritual values we also place in nature, whether that is the value we might place upon a beautiful view or a landscape.

How do we value the sight of an English woodland carpeted in bluebells in springtime or that wonderful feeling of a garden robin following us around as we work? And how do we value true wilderness? Even if it is far away from us it still reaches right into the human soul and helps define what makes us human. These things cannot easily fit into an economic definition of value, yet that doesn't make them any less valuable. To many it makes them more so. And so in answering this important question no decision maker, politician or business can ignore them.

## Ecosystem services markets A cash cow for the financial sector?



Instead of protecting our natural environment, developing the means to value biodiversity creates a market in staking out and taking control of property rights, says **LARRY LOHMANN**.

"Let's put a value on Britain's ecosystem services" – the slogan has a nice ring to it. Perhaps we don't fully understand the value of the wild plants, animals, and natural cycles around us, and if we did, we could appreciate and protect them better.

But what is it that we don't know exactly? We know that groundwater cycles are important because of the droughts and floods that strike periodically. We know that the weather is crucial to crops, because it affects yields every year. We know the environmental value of woodlands, as the government learned to its cost when its proposal to privatise Forestry Commission lands was shouted down by the public earlier this year.

Yes, yes, the answer comes, but what we don't know yet is the price or economic value of all these things. For example, what would business have to pay for them as commodities or inputs to production? If we knew – via ecosystems markets or some other means – that might give us an additional incentive for holding on to the good things that we have.

If the reasoning sounds suspicious, it should. Environmental service markets are less a response to environmental crisis than a response to business crisis – in particular the prolonged profitability crisis that set in during the 1970s.

That was when returns on many traditional sorts of investment went into seemingly permanent decline. With the help of governments and international agencies, business reacted not only by trying to take back some of the post-war gains made by workers (see Thatcherism and all that came after), but also by seeking alternative assets to put money into. Investors branched out into dotcoms, biotech and financial services or plunged into real estate speculation and infrastructure. Private firms stalked new acquisitions in the public sector or in the commons of the global South.

Environmental and financial regulation was rolled back and new business-friendly legislation rolled out. Trade

treaties giving Northern companies special protection and privileges proliferated, together with new markets in financial derivatives, helping profit-challenged business expand in an uncertain global environment. The financial sector took over as the profit leader in both Britain and the US. The expanded credit it offered helped keep demand high while offering workers in the North whose wages had been suppressed the consolation of the temporary means of buying goods produced by cheap labour in China and elsewhere.

Ecosystem services markets are deeply rooted in this history. For one thing, like many of the new trade treaties, they loosen regulatory constraints on business while opening up new profit opportunities. Take wetlands banking, which was developed in the US during the 1990s as a way of making it easier for builders to comply with restrictions on dredging or dumping in swampy areas. Instead of having to move to another site, or fashion "compensatory wetlands" on the same parcel of land they were building on, developers could buy pre-packaged "wetlands credits" from distant locations – credits that had been verified through specially-developed valuation techniques to provide "equivalent" ecosystem services.

More recently, the United Nations Development Programme (UNDP) has urged that environmental impact assessments (EIAs) be carried out in Latin America in a way that would allow impacts to be compensated for by "habitat credits" or "biodiversity offsets" bought in from elsewhere. Through techniques for valuing ecosystem services, environmental impacts would be redefined in a way that ensured that EIA requirements, instead of being a shackle for business, would create a demand for "habitat banking" that could help transform Latin America into what the UNDP calls a "biodiversity superpower". Defra appears to have been bitten by a similar bug, judging by statements it issued last year enthusing over the economic potential of a "market in conservation projects" populated by a "network of biodiversity offset providers".

Ecosystems services markets... loosen regulatory constraints on business





By Roy Stead

The emphasis on “banking” isn’t coincidental. Ecosystem commodities, with their notional, electronic nature, are a potential bonanza for a thrusting financial sector whose annexation of enormous slices of public treasuries post-crisis has only increased its dominance over today’s economies. Unsurprisingly, one of the earliest types of ecosystem service markets, pollution trading, was developed largely by derivatives traders from Chicago and New York, and among the most avid promoters of markets in forest carbon services are firms such as McKinsey and Merrill Lynch Bank of America. Today’s top buyers of carbon credits (one of the commodities traded on climate services markets) are headquartered in the City of London and on Wall Street.

Techniques used to establish the economic value of ecosystem services, in other words, aim not so much at providing new incentives for protection of the environment as at redefining that environment in a way that creates new assets and economic sectors. Like many other responses to business crisis, economic valuation of ecosystem services is, at bottom, a struggle to create and take control of property rights.

The clearest illustration of this process to date is the cluster of climate services markets established under the Kyoto Protocol and the EU Emissions Trading Scheme (EU ETS) – today’s biggest ecosystem services markets. Early on, the economic valuation of climate stability was advertised as a step toward harnessing the economic system to environmental goals. Instead, “giving an economic value to the climate” turned

out to involve a process for handing over a large range of public goods to the private sector that left the global warming problem behind entirely.

As with all ecosystem services markets, the first step was to simplify and quantify the ecological functions in question, so that standardised increments of “environmental improvement” could be traded for standardised bits of “environmental destruction”. In order to facilitate this exchange, wetlands markets reduced habitat provision, plant diversity, peak flow attenuation and so forth to a series of numerical scores (and sometimes simply to an indication of acreage), obscuring what makes different wetlands valuable in different ways. So, too, the new climate markets measured climate benefits and harms simply by quantifying flows of molecules, especially carbon dioxide molecules, ignoring the fact that a cut of 100 million tonnes of CO2 through routine efficiency improvements may be much less climatically effective in the long term than an equal cut that comes from investment in non-fossil-fuelled technologies.

But if the economic valuation of ecosystems gave short shrift to many environmental realities, it was very good at setting off a scramble to acquire, produce and trade lucrative assets. Just as “wetlands credits” were valuable because they conferred a right (that would otherwise be curtailed) to bulldoze unique sites in Illinois, so CO2 pollution rights were valuable because they allowed their holders to go on burning fossil fuels at a time of incipient emissions caps.

So it was no surprise when, under the EU ETS, the biggest polluting corporations successfully demanded that governments give them enough free pollution rights to cover virtually all, and in some cases more than all, their current pollution output. Many of them later sold, or charged their customers for, the surplus rights they had received gratis, ploughing the proceeds back into business as usual. The windfall profits still being made in this way by only ten of Europe’s intensive industrial users of fossil fuels exceed the total EU budget for environment.

Demand for carbon dioxide pollution rights at a price companies were willing to pay, meanwhile, touched off a commercial arms race among entrepreneurial spirits to devise ever stranger environmental valuation techniques for manufacturing cheap “equivalents” for CO2 reductions. Today it is possible for European companies to buy CO2 pollution rights from factories in Korea that reduce an “equivalent” amount of nitrous oxide, or coal mines in China that burn off methane (a more potent greenhouse gas than carbon dioxide), or tree plantation firms in Brazil that claim their trees can “compensate” for the carbon dioxide emitted through the burning of oil. In addition to entailing further brutal simplifications of natural realities, these equations license enclosures of land, air, water and labour in the global South to serve the “carbon needs” of the North. That is one reason why the Kyoto Protocol and EU ETS carbon markets are strongly opposed by the international farmers network Via Campesina.

Today, the significant political debates over the EU ETS are not about whether the scheme has any benefits for the climate (it doesn’t), but about who owns which goodies. For example, when millions of tonnes of EU pollution rights stolen by computer hackers earlier this year were found to be in circulation, the buzz in the carbon trading community was largely confined to the labyrinthine legal question of who had ownership of the purloined assets, particularly as all of them had been traded many times over.

More than a decade ago, many environmentalists who were vaguely uneasy about the new climate services markets nevertheless took comfort from the idea that “at least now carbon has a price”, and gave their reluctant stamp of approval to the Kyoto Protocol and the EU ETS. Today, such environmentalists have cause to regret their earlier naïveté.

Will the same be true ten years hence of environmentalists who are today tempted to support biodiversity and other environmental services markets? The answer, of course, depends on many things, including the special characteristics of each particular market. But the disastrous history of climate services markets suggests that there is reason to be afraid. Very afraid.

Larry Lohmann works with the Corner House and is a co-founder of the Durban Group for Climate Justice

## Analysis on a plate

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# Natural values

## A European policy perspective



**DAVID BALDOCK** and **PATRICK TEN BRINK** discuss the importance of the economic case for nature when it comes to influencing European policy making.



In principle, efforts to value nature in the policy world are intended to increase awareness of the many ways we benefit from and are dependent on the natural world. They also highlight the negative impacts of certain activities and inform (and ultimately change) policy decisions. If value is appreciated at a political level this can be translated into policies and legislation, market prices, investment and consumption decisions – the real litmus test of our beliefs.

Historically, European policy has principally responded by means of environmental legislation and incentives for land management. The EU Birds and Habitats Directives are primary examples of trying to set standards and establish coherent networks at a European level. However, progress has been slow; a majority of sites and species were thought to have had an unfavourable conservation status in 2008 (EEA 2010).

Fisheries policy, which formally pursues a balance between the exploitation and conservation of commercial species, includes a raft of policy mechanisms reflecting value, such as quotas for individual stocks. However, 21% of commercial fish stocks in the Baltic Sea are outside safe biological limits, rising to about 60% in the Mediterranean Sea (EEA 2010). The total societal value of stocks and the ecosystems supporting them is not reflected in policies and practice.

The payment of incentives to farmers and others to manage their resources for the benefit of biodiversity is a second strategy. A not insignificant sum within the €20.5 billion allocated to agri-environment payments for the period 2007-13 will be spent for the benefit of nature. Such agreements will have reduced the pressures on biodiversity on a large number of farms. However this is only a start: much more needs to be done, exemplified by the 50% decline in grassland butterflies since 1990.

In this context there are at least three different levels at which European policy needs to value nature:

- By recognising its importance in the EU's principal strategies and plans, such as the Europe 2020 economic strategy, the forthcoming budget for 2014-2020 and new formulations of the CAP, and Common Fisheries Policies;
- By strengthening the formulation, implementation and enforcement of the policies that bear most heavily on nature including intensified efforts to green the supply chain from production to consumption.
- By further work to take nature into account in the design and assessment of policy by building up the currently inadequate database, monitoring the real world and relevant policy impacts using monetary valuations where helpful and investing in the capacity to be sensitive to nature.

Given these challenges, is it important to try to capture the value of nature in quantitative or monetary terms?

The temptation may be not to, either because it's too difficult or nature is too removed from market transactions, or because it is ethically questionable to do so. But if we abstain from valuation, then the risk is nature can disappear from the appraisal of costs and benefits

generally associated with policy formation in Europe, effectively treating its value as close to zero.

Instrumentalist, quantitative ways of valuing nature can take many forms. Monetary values can be estimated to present the value of nature in a "language" familiar to economists, accountants and politicians. Values can be expressed in avoided costs, such as water provision and purification; in avoided loss of outputs like agricultural crop losses from reduced wild pollination; or as a contribution to sources of economic activity and employment such as tourism.

Welfare benefits, for human health and recreation also can be explored quantitatively. The scale of the benefits from nature – such as how much carbon and water are stored in soils – can be estimated. So can the benefits of natural forms of risk reduction, including the insurance value of genetic diversity of seeds/crops or farm animals. These approaches stand alongside the more qualitative appreciation of nature for its own sake.

Policy making remains a highly political exercise, permeated by varying assumptions about the role of the State, a spectrum of social preferences and a parade of competing interests. The economic case for nature needs to be kept visible in this matrix. Given the strategic role of the EU in the management of nature domestically and in the wider world, the European Commission has been one of the leading supporters of the initiative on TEEB. This communicates an evidence base on the value of nature and shows how economic valuation can be applied to its benefit. ■

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# Consuming natural value

## Ecology in food production systems



Agriculture's relationship to 'Nature' has long been complicated, says **HENRY BULLER**. Here he argues for a more equal marriage between the two.

Farming represents perhaps the most quintessential means by which Nature is given value through the harvesting of natural processes and natural matter for use, exchange and consumption. As such, in many regions, the farmed landscape has become central to the iconic representation of beneficial 'Nature' and naturality.

Yet on the other hand, agriculture is also seen by many as being fundamentally antithetic to both 'Nature' and environment.

Intensification and modernisation, coupled with the growing substitution of artificial processes and materials for their natural counterparts, has made contemporary agriculture "fundamentally anti-environment" in the recent words of the departing conservation Director of the Royal Society for the Protection of Birds.

One of the consequences of this polarisation has been to externalise 'Nature' and natural value from the process of agriculture. Nature (in the form of the natural environment, biodiversity, clean rivers and other cherished public goods) can thus be a 'positive externality' of agriculture, where agricultural management practices have actively created or sustained environmental benefits, or a 'negative externality' where farming activities have led to pollution, species loss and so on. In both cases, 'Nature' (or at least some culturally defined notion of it) has seemingly become 'external' to farming, a product or outcome – either positive or negative - of agricultural enterprise.

Seeing 'Nature' as something external to farming, whether negative or positive, is problematic because it has generated not only separate policy communities and economic mechanisms but also distinct rationales (and arguably spaces)

of intervention. Positive externalities are largely achieved through a combination of designation, incentivisation and non-intensification. Negative externalities are more commonly addressed through control, regulation and de-intensification. For both though, the generation of agricultural value for the producer and ultimately product value for the consumer, remains almost entirely distinct from the generation (and appreciation) of natural value (as a public or even non-human good).

We have seen an increased interest in natural pasture as a major source of biological diversity

Recently, there have been a number of initiatives seeking to challenge or inverse this conventional understanding of natural value as a largely separate outcome of various agricultural practices, and thereby advancing the idea of using natural value as an input into farm systems that effectively link natural quality to product quality and economic viability.

In a number of upland regions of France, such linkages are well established and understood. The biodiverse natural pastures of the Beaufort, Comté and Cantal regions, for example, are considered integral to the gustative and

nutritional quality of the cheeses that bear the same names, not an externality resulting from their production. As a result, maintaining floristic and faunistic diversity and the open meadow landscape are as much to do with agricultural management as 'nature' management. Indeed the two become almost indistinguishable.

In the UK, though far less extensive, there is a growing attentiveness to these relationships, particularly in areas of natural and semi-natural grassland. Traditionally 'less favoured' in terms of their capacity for more intensive production methods, such areas have become less and less



# Valuing productive nature

## Food versus the environment

valuable and useful to conventional farming. As a result, over the last forty years a wide range of grazing habitats have been ploughed up and converted to arable use, over-intensively grazed, or withdrawn from farming altogether.

At the same time, however, we have seen an increased interest in natural pasture as a major source of biological diversity, ecological richness and now carbon retention. There currently exists a wide range of policies and mechanisms, established over the last fifteen or so years, at the European Union level as well as at the national and sub-national levels, to promote the protection and active management of grassland pasture.

In a growing number of these areas, consumer interest in local food and the development of alternative food networks has promoted place-based food marketing where representational and semiotic strategies of rural landscape, heritage and lifestyle are deployed to create additional product value. What is often missing in such connectivities though, is the mobilisation of natural value (in ecological and nutritive terms) as a material input (or 'internality') to food production capable of yielding distinctive (and hence marketable) ecologically embedded qualities. Yet this too is now emerging.

Recent research, undertaken under the UK Research Councils RELU Programme<sup>1</sup> investigated the growth of ecologically embedded food production systems, where the biodiversity of natural pasture is a critical input into distinctive animal feed regimes. Here the objectives were to assess the ecological impacts of the system as well as the nutritive and gustative characteristics of the food produced, and evaluate their potential as viable mechanisms for more sustainable rural development and grassland protection.

That interdisciplinary research, along with parallel work undertaken in France and elsewhere, demonstrated the potential for viable synergies to be created between the intrinsic value of species-rich natural pasture, upland management practices, meat quality, positive consumer choice and product value, particularly where specialist supply chains can be mobilised to secure market access. Individual natural grazing environments, such as salt marshes and heather moorland have been shown to contribute to distinctive and positive product qualities and tastes, notably in the case of sheep and lamb meat. Moreover, the growing use of unpasturised milk in artisanal cheese production in the UK is also often associated with recognition of the particular ecological and nutritive qualities of natural grasslands.

But in an increasingly globalised agro-food sector, natural value must shout to be heard. The farm enterprises involved rarely operate within the conventional food chain but independently via direct sales, through farmers' markets or via specialist outlets such as restaurants and delicatessens. These are short, individualistic food chains.

For some, this is because their products don't necessarily conform to the carcass weight or volume requirements of the major retailers. For others, there is an issue of seasonality, production rates being more constrained than within more intensive husbandry systems. Selling is often more of a challenge than producing. Such systems can benefit from collective responses, such as that of the Dartmoor Farmers' Association, created in 2007 to produce and market meat products derived from the unique pasture ecology of Dartmoor.

They also require different strategies of investment than more conventional models and there is an argument to suggest that support mechanisms would be better targeted at collective initial investment, start-up and conversion rather than simply annual individual payments for public goods. In the UK, we have also been notably slower than some of our neighbours to use labelling and certification schemes to link natural value with product value despite the evident variability of our agricultural ecologies. This is something we need to actively re-invent, but it demands a collective effort on the part of producers. It also means acknowledging that place is more than just location. It is the point where ecologies and practices come together.

There are clearly many opportunities for a closer integration of natural value into other components of food value. Indeed, the very concept of embodied 'natural value' within the food chain is expanding today to include not only such traditional parameters as the floristic and faunistic diversity of feed inputs but also 'natural behaviour' amongst livestock and the natural seasonality of product availability.

Yet this re-emphasis upon the natural processes and materials of food production comes at a time when 'naturalness' itself seems less sure. Anthropogenically induced climate change threatens to challenge our inexorable sense of fixity in nature and its 'naturalness'; in the repetitive vitality of natural growth and seasonal change, the indigenosity of wildlife, the seeming immutability of landforms or the weight of more-than-human time. ■

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Henry Buller is Professor of Rural Geography at Exeter University. He is Editor of the international rural social science journal *Sociologia Ruralis*, and is a member of the Executive Committee of the European Society for Rural Sociology.



**ROBERT LILLYWHITE** explains how he and his colleagues assess the costs and benefits of agricultural production using an ecosystem approach.

The recent European Nitrogen Assessment reported that 'cost-benefit analysis highlights how the overall environmental costs of all nitrogen losses in Europe outweigh the direct economic benefits of nitrogen in agriculture. The highest societal costs are associated with loss of air quality and water quality, linked to impacts on ecosystems and especially on human health'. This conclusion illustrates the paradox that to feed an increasing population may result in environmental damage whilst at the same time recognising that only an undamaged environment may be capable of feeding an increasing population.

The traditional role of agriculture is food production. No argument there. As a consequence the detrimental aspects of food production, namely soil erosion, greenhouse gas emissions, pollution of water by fertiliser and pesticide residues have until recently been accepted as unavoidable side-effects of a necessary course of action. However, land, the basis of the majority of food production, is not just the interface between humans and their food but also supplies other environmental benefits: pollination, water regulation, water and air purification and biodiversity. These benefits, ecosystem services as they are now defined, are also recognised as valuable. The question that then arises, is how valuable? Can we compare the value of ecosystem services to outputs such as food, fibre and fuel and reach a meaningful conclusion?

Food is more important than the environment. This unequivocal statement must be accepted because without food, society cannot exist. That the same society should seek to reduce the environmental impact of food production is also a fact. Given this position, you may ask why we should wish to value ecosystem services at all. The answer is that it is difficult to assess impacts across different sectors and systems without a common accounting unit and an economic value is the best understood unit available to us at the moment.

As highlighted in the opening paragraph, the impact of nitrogen fertiliser on water quality is considerable. Farmers apply fertilisers to increase crop quality and yield, but any surplus can easily be lost to surface waters where subsequently water companies have to pay to remove them before supplying the water to domestic and commercial customers. The irony is immense but the actions necessary. The fact that the cost of removing soluble nutrients may be higher than the value of the food produced is revealing, and an important step in understanding how land delivers different ecosystem services.

Pollination is critical to crop production. The University of Reading calculated the value of pollination to UK agriculture at £440m. To hand pollinate the same crops would cost £1,510m (if anyone could be found to undertake the task). Given its critical nature and economic advantage, any action that is detrimental to pollination should be viewed as short-sighted and foolish.

So, why do farmers and growers apply insecticides to many crops and kill non-target insects? The answer is economic and not environmental. The main cereal crops do not require pollination and are valued at £2,350m. So the death of non-target species is considered an acceptable price of production; acceptable to cereal growers that is. We do not know if it is acceptable to other growers and stakeholders since a lack of pollinating insects is not built into any economic model; if it was would we view the use of insecticides differently? This dilemma, ensuring sufficient pollinators whilst

protecting valuable crops from insect attack, is just another example of the fine balance required to produce (quality) food and still maintain the essential ecosystem services that will ensure sustainable food production.

However, in the grand scheme of things, the impacts of fertiliser and pesticide use are just the tip of the iceberg. They play a minor role in the bigger picture of the conflict between producing food and protecting the environment – a picture dominated by water. Both fertiliser and pesticides can improve crop yield and quality but are only effective on a growing crop – that requires an adequate supply of water.

Water is the most valuable input in food production but its value is rarely recognised in rain-fed agriculture. Its importance only becomes obvious when it runs out or farmers have to

**Economic value is the best understood unit available to us at the moment**



pay for it. Globally, 60% of our food is produced by rain-fed agriculture but the price we pay for our food doesn't reflect the value, or impact, of that water – be it the water to grow our crops or water to maintain our environment. However, new ideas and research are helping to illustrate how we use, and undervalue, water. The concept of virtual water and its quantitative cousin the water footprint allow us to estimate the water required in production. For example, to produce a litre of milk takes a 1,000 litres of water. The cost for 1,000 litres of potable water in the UK is £1.00 while the ex-farm cost of a litre of milk is £0.28. The sums do not add up. Even if the value of rain water was half that of potable the sums would still not add up.

What else can you do with a 1,000 litres of water? Drink it? Obviously; but you could also produce 5 kg of strawberries or leave it in surface waters to support biodiversity and river flows. Would its value be greater than £0.28? Currently 5 kg of strawberries costs £16.00 so that is certainly a better return on the investment but what about biodiversity or river flows? This is where the problems start. At the current time there are no agreed values for biodiversity or river flow – but we know that they are valuable and that the cost of losing them would be incalculable.

Globally, researchers are working on providing answers to these types of questions and at some point in the future, we will be able to value all the ecosystems services that agricultural lands provide. However, we haven't reached that position yet so in the interim we should find another approach to identify those farming systems that are capable of supplying food without putting unreasonable demands on the environment. If we cannot yet use monetary values to identify these systems, is there an alternative while we wait?

One solution is to establish a framework and use expert opinion to provide the 'valuations'. This multi-disciplinary approach utilises the knowledge and expertise of a range of stakeholders to represent the agricultural, environmental, economic and social disciplines. The first task is to identify the relevant ecosystem services. Our approach follows that established by the Millennium Assessment and divides the services into four categories: provisioning, supporting, regulating and cultural.

Provisioning services are the direct benefits that society derives from our environment and include food, fibre, fuel and water. Regulating services are nature's cleaning services and include purification of air and water, water retention and degradation of pollutants (fertilisers and pesticides). Supporting services are the invisible support provided by nature and include pollination, soil formation, habitat provision and biodiversity. Cultural services can include landscape and amenity potential.

Valuation is a two part process. Firstly, demand for the service is assessed. The demand for food from agricultural land is high so this is normally set to the maximum. If the crop relied completely on insect pollination, this would also score the maximum. Pesticide residues are undesirable so would be set to a minimum. In this fashion, relative demand scores are set for all ecosystem services, both beneficial and detrimental. Secondly the supply of the service is assessed; this will vary with farming system and location. For example, high quality agricultural land would return a high score for food output but a poor score for fertiliser and pesticide residues. In contrast, poor quality upland pasture may return a poor score for food but a higher score for water regulation and quality and cultural significance. The demand and supply scores are multiplied together to produce a score per ecosystem service and then all the ecosystem service scores are summed to provide a score per agricultural system (scenario). All scores are relative to one another and not absolute values.

One advantage of this approach is that it provides a holistic assessment of land and management strategies rather than focusing on either food production or environmental management alone. Users, be they farmers or policymakers, can compare different scenarios and change the demand and supply scores to investigate what-if type problems and their solutions. However, this flexibility can also be a disadvantage so users have to be sufficiently disciplined not to use unrealistic scenarios or scores. If and when the agreed economic costs of individual

ecosystem services become available they can be slotted into the same framework and used to assess the true monetary values of services – although whether in the long term this is a better approach compared to expert opinion is still to be determined.

This is a first step in developing a framework to encompass, and 'value' the ecosystem services provided by agricultural land, and therefore to answer the question as to whether the use of agricultural land for food production should be maximised or if land should be farmed to provide a balanced set of all ecosystem services. The process of identifying and scoring different agricultural scenarios builds an understanding of the ecosystem services provided by different farming systems and illustrates where the true value may lie and the trade-offs that may be required to deliver a balanced output across all ecosystem services. ■

This article is partly based on the following paper: Lillywhite R, Collier R and Pole J (2009) Assessing the costs and benefits of agricultural production using an ecosystem approach. *Aspects of Applied Biology* 95: 39-44.

Rob Lillywhite is a Senior Research Fellow in the School of Life Sciences at The University of Warwick. His research interests include understanding and quantifying the environmental burdens that arise from resource use within agricultural production and how sustainable intensification meets the challenge of food security for an increasing global population

## We cannot yet use monetary values to identify these systems

# The bioregional economy Falling in love with your native soil



While we are all very concerned not to compromise our values, we may not be so careful about preserving the meaning of the word itself, writes **MOLLY SCOTT-CATO**. Does putting a price on the wealth of the natural world help us to preserve it, or should this be considered devaluing rather than valuing?

The invention of the concept of 'ecosystem services' is one step on the road to commodifying nature, to opening up the global marketplace to corporate speculation in aspects of the natural world that can be turned into artificial products to be sold in imagined markets.<sup>1</sup>

The proposal of the bioregional economy seeks to challenge this progress towards the marketisation of nature. It offers a vision of a form of 'prosperity without growth',<sup>2</sup> a way of living within nature's limits and learning to change our way of measuring and maintaining what we value. To begin this process we need to have some idea of the limits we are working with. To put an exact number on the reduction in energy that we are looking for is a fairly unscientific process, but we need to reduce our current demand by something between 70% and 90%.<sup>3</sup> A bioregional approach to provisioning can help us make this journey.

A bioregion is a local area defined by natural rather than political boundaries: these might include riversheds and landforms, as well as typical species and the human cultures that they have given rise to.<sup>4</sup> The proposal is that we should make the bioregion our basic provisioning unit, seeking to meet the vast majority of our needs from within its boundaries, only seeking resources further afield if we cannot meet the need locally. This begins to flesh out the

proposal to strengthen local economies, which has been popular in green circles for a decade and more, but has never been much more than a slogan.

At a global scale it is frequently difficult, if not impossible, to decide which action to take, leaving us as global consumers to read the labels and check the small print, with a lingering sense of guilt and doubt. Taking a bioregional approach – focusing on what is in essence our backyard, or the area of the globe for which we are responsible – enables us to be responsible for and accountable to the values that allow us to lead sustainable

lives. It is an antidote to the global supermarket, the lengthy supply chains that leave us vulnerable, and the complex ownership systems which undermine accountability.

Take the example of biofuels. If we decided on our community farm to turn some of our land over to the production of oil-seed rape for fuel rather than using it as grazing land for our cattle we would be able to drive but not eat meat. This sort of trade-off is popular amongst economists in theory, but in reality it's a trade-off they rarely have to make. An investor's decisions to put money into



By Grievous Angel



jatropa plantations in India only incurs a financial cost, so s/he can still fly to the Bahamas for a holiday and eat steak.

The power of the bioregional approach to economics is to force these decisions down to a local level where genuine accountability is possible, but within globally imposed energy limits.

With that in mind, how might we move towards a bioregional approach to provisioning? How can we challenge the sacred cow of consumerism and persuade people that less can really be more? The UK's recent 'budget for growth' reminds us that politicians cannot conceive of people voting for less, and would rather

risk ecological destruction than question consumer society. The transition to a life of greater quality but less quantity will require a more engaged, more involved form of democracy than electing representatives who betray our interests and whom we subsequently despise.

One possible model is the participatory planning process used by the citizens of Porto Alegre in Brazil to identify the spending priorities for the \$200 million annual budget for infrastructure and services, in which 50,000 of the city's 1.5 million citizens are involved. Could we imagine a similar process within bioregions, where local people debate how to spend their energy budget?

Where choices to import coffee, with its high-energy price-tag, would mean fewer car trips?

Since I have made it part of my life's work to share the idea of the bioregional economy I have spent some time with fellow learners and designers of the sustainable future rethinking our local spaces – those parts of the wider world that we know best – in terms of a provisioning economy. What has genuinely surprised me is how good we all are at doing this. It is as though we are hard-wired to see our environment in terms of meeting our basic needs. But in reality, we shouldn't be surprised to find ourselves naturally skilled in this task, since it has obviously been essential to our survival as a species.

Way back in 1997 Bob Costanza put a price on the value of everything nature provides for us for free.<sup>5</sup> This sort of valuation receives wide publicity, while the debates about what it means to commodify nature, the fuzzy moral debates that can never be as clear-cut as a single number, are sidelined. The bioregional economy proposal challenges precisely this ideological move, reclaiming the right, indeed the spiritual and political necessity, of focusing our policy attention on what is priceless. ■

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**Who Needs Migrant Workers? Labour Shortages, Immigration and Public Policy**

Martin Ruhs and Bridget Anderson (Eds) | 2010 | Oxford University Press | ISBN 978-0-19-958059-0

Examining the demand for migrant labour across a range of sectors within the UK economy, this valuable book draws out common themes – such as the ambiguity of the term 'skills' in discussions of so-called 'skills shortages' – as well as highlighting factors distinctive to particular sectors. The chapter on food production raises several challenging and policy-relevant considerations, including the fundamental observation that the sector's historical dependence upon migrant workers is the result of specific policy decisions and employment practices – not some kind of structural necessity. SR

**Food Sovereignty: Reconnecting Food, Nature and Community**

Annette Aurélie Desmarais, Nettie Wiebe, Hannah Wittman (Eds) | 2010 | Pambazuka | ISBN 978-1-5526-6374-5

A much-needed book that brings together leading thinkers in an alternative vision for food sovereignty, including Raj Patel, Eric Holt-Giménez and Annie Shattuck. The essays paint a picture of how food sovereignty should be the means to achieving a system that provides for the food needs of people around the globe. Its practical case studies and theoretical essays show how agricultural practices that respect environmental sustainability and local farming practices can deliver food that is safe, abundant and respectful of the earth. EB

**The Economics of Managing Crop Diversity On-Farm**

Edilegnaw Wale, Adam G. Drucker and Kerstin K. Zander (Eds) | 2010 | Earthscan | ISBN 978-1-8497-1221-7

Essential reading for policy makers, scientists, and environmental and development NGOs, this book assesses a variety of economic issues as they relate to agro-biodiversity. Taking an in-depth look at Ethiopia, Nepal and Zambia, the authors show how genetic resources issues can be integrated into rural development interventions, and assist in agro-biodiversity policy-making in developing countries. EB

**The Economics of Ecosystems and Biodiversity in National and International Policy Making**

Patrick ten Brink (Ed) | 2011 | Earthscan | ISBN 978-1-84971-2507

This book, the major output of the Economics of Ecosystems and Biodiversity (TEEB) study, tells a compelling tale of the true costs of squandering the earth's precious resources. Drawing on a team of over one hundred authors and reviewers, it reveals the local, national and global economic benefits of biodiversity, the importance of investing in natural capital, and underlines the urgency of strategic policy making and action at national and international levels. Ultimately it makes an inarguable link between protecting our environment, a sustainable economy and the wellbeing of societies. EB

**The Global Forest: 40 Ways Trees Can Save Us**

Diana Beresford-Kroeger | 2011 | Penguin | ISBN 978-1846-1-44097

Achieving a difficult balance between scientific understanding and a real passion for trees, the author takes us on a journey through her 'global forest'. Drawing on ecology, myth, horticulture, spirituality and medicine this book is both a poem to and a practical treatise on trees' role in human development. EB

**The No-Nonsense Guide to Climate Change The Science, The Solutions, The Way Forward**

Danny Chivers | 2011 | New Internationalist Books | ISBN 978-1859-8-43352

For anyone who want to get to grips with the science behind climate change. A little book packed full of facts and figures, written in an accessible tone, and tackling the politics, history and potential solutions. Danny Chivers is obviously dedicated to persuading people of the imminent dangers of climate change, but I fear he will only be preaching to the converted in this book. EB



By Scott Roberts



# Forthcoming events

- 5th Jun '11 World environment day | United Nations Environment Programme  
<http://www.unep.org> | Worldwide
- 8th Jun '11 Plunkett Rural Social Enterprise Conference 2011 | Plunkett Foundation  
<http://www.plunkett.co.uk/index.cfm> | London, UK
- 12th Jun '11 Open Farm Sunday | <http://www.farmsunday.org> | Around the UK
- 16th Jun '11 Innovation in the food chain | Westminster Forum Projects  
<http://www.westminsterforumprojects.co.uk/forums/event.php?eid=222> | London, UK
- 14th - 15th Jun '11 The New Politics of Water | Chatham House  
<http://www.chathamhouse.org.uk/water2011> | London, UK
- 16th - 17th Jun '11 8th Annual Global Commodities Finance Conference | Euromoney Seminars  
<http://euromoneyseminars.com> | Geneva, Switzerland
- 25th Jun - 2nd Jul '11 FAO Conference (37th Session) | UN Food and Agriculture Organization  
<http://www.fao.org/events/index.asp> | Rome, Italy
- 30th Jun '11 Westminster Food & Nutrition Forum keynote seminar: Biodiversity | Westminster Forum Projects | <http://www.westminsterforumprojects.co.uk> | London, UK
- 4th - 8th Jul '11 Water Convention 2011 | International Water Association  
<http://www.iwahq.org/home> | Singapore
- 16th - 22nd Jul '11 Regular Session of the Commission on Genetic Resources for Food and Agriculture UN Food and Agriculture Organization | <http://www.fao.org/events/index.asp> | Rome, Italy
- 19th - 20th Jul '11 BSSS Annual Meeting 2011- soils and ecosystem services | British Soil Science Society | <http://www.soils.org.uk> | London, UK
- 16th - 21st Aug '11 Nyeleni 2011 European Food Sovereignty Forum | Nyeleni  
<http://www.nyeleni2011.net> | Krems, Austria
- 29 Aug - 2nd Sep '11 62nd Annual Meeting of the EAAP | European Federation of Animal Science  
<http://www.eaap2011.com/> Stavanger | Norway
- 3rd - 4th Sep '11 Soil Association Organic Food Festival | Soil Association | <http://soilassociation.org> Bristol, UK
- 6th - 7th Sep '11 2011 Dairy Event & Livestock Show The Royal Association of British Dairy Farmers (RABDF) | <http://www.dairyevent.co.uk/exhibitors> | Birmingham, UK
- 6th - 9th Sep '11 Eighth International Symposium on the Nutrition of Herbivores British Society of Animal Science | <http://www.isnh8.org> | Aberystwyth
- 6th - 9th Sep '11 Agricultural and Biotechnology International Conference Foundation for professional development | <http://www.abic2011.co.za> | Johannesburg, South Africa
- 12th - 13th Sep '11 International Conference on Veterinary and Animal Ethics | Royal Veterinary College  
<http://www.icvae.com> | London, UK
- 17th Sep - 2nd Oct '11 British Food Fortnight | [www.lovebritishfood.co.uk](http://www.lovebritishfood.co.uk) | UK wide