Big ideas in development

Banking on biodiversity

a natural way out of poverty

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BirdLife INTERNATIONAL

Big ideas in development series

As a policy research organisation, the International Institute for Environment and Development has evolved key concepts, theories and ways of working in sustainable development since 1973. The big idea we explore here is **banking on biodiversity**. This approach rests on the fact that much rural poverty is concentrated in the world's biodiversity hotspots. By supporting these communities' long-term stewardship of land and sea, we can tackle two urgent global issues – extreme poverty and biodiversity loss – together.

Others in this series:

Fair Miles: Recharting the food miles map

Forthcoming in this series:

- New green economy
- Community-based adaptation
- Learning groups
- New business models

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Bankrupting the biosphere

Introd

It seethes deep under concrete and tarmac, teems in drains, and makes Australia's Great Barrier Reef a wonder of the world. Biodiversity is the variety and abundance of all life, from genes to lemurs – the vast and intricate living fabric of our planet.

That fabric is now frayed: as a barrage of media reports tells us, abundance is waning in many species and extinctions are 1000 times the 'background' rate. Yet this is a crisis that seems to have few tangible impacts on our day-to-day lives. So what if that richness unravels?

The answer is that biodiversity, in all its extravagance, is also utterly functional. It stocks our supermarkets, helps medicine keep pace with disease, ensures ecosystems replenish the natural 'goods and services' we all rely on. So while iconic animals such as tigers may be the visible 'face' of biodiversity, the recent population crash in honeybees, a top pollinator, reminded us that life on the small and microscopic scale is as vital.

More, the interconnectedness of global systems means that dwindling biodiversity in Africa, Asia or Latin America has international social and political implications. Supplies of commodities based on natural resources may dry up, and unrest and conflict erupt as the rural poor lose their livelihoods – affecting trade, international relations and tourism.

We're relatively lucky in the North: our access to technological fixes and global market systems help us dodge some effects of this loss, at least for now. It's a different story in the South. We may travel through biodiversity 'hotspots', but millions of people live in them, directly and completely dependent on their forests, oceans and watercourses. Biodiversity is their natural safety net, and keeping it viable is one of the surest ways of helping them stay the right side of poverty.

Yet many – development professionals included – fail to make this crucial connection or see its implications. This booklet explores what they're missing: how biodiversity supports local livelihoods, contributes to economies of poor countries, helps combat climate change.

This is some of the most important joined-up thinking we've ever had to do. Biodiversity loss impoverishes all of us, but for the hundreds of millions face to face with it, the consequences can be unimaginably bleak.

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Hotspots and hunger: where biodiversity meets poverty

To understand the overlaps between biodiversity and poverty, we first need to think a moment about what wealth means. Our economies in the North are based on money, finance, funds – the stuff of New York's Wall Street or the City of London.

Go South, and you enter a different reality. Financial assets may be limited, but in many of the world's poorest nations, natural wealth abounds in reefs, mangroves, deserts, rainforests and savannahs. Millions of people in developing countries effectively 'bank on nature' through fishing, subsistence farming or small-scale forestry.

In this chapter we take a close look at biodiversity, explore what we mean by poverty, and examine the many direct and indirect connections between them.

Untangling the web of life

'Biodiversity' is a word that carries a lot of weight. As we've seen, it's no less than the sum total of Earth's living resources – a kind of shorthand for the mindboggling richness, in variability and quantity, of genes, species, ecosystems, and the communities of ecosystems known as biomes. With species alone numbering anything from 5 million to 30 million, that's complex.

It's largely the quality of *variety* that makes biodiversity so much more than 'just nature'. An ecosystem rich in biodiversity is more resilient and productive. Variety also means choice – in medicines or foods or products to sell. And it serves as effective risk management. So if one crop is wiped out, there are others to fill its place; when new diseases emerge, we have more chance of finding a cure. »

2010: a big year for biodiversity

Since 1959, the UN has devoted particular years to global issues ranging from peace to potatoes. It designated 2010 the International Year of Biodiversity to raise awareness about the issue's importance and to galvanise action to curb biodiversity loss. The year was chosen to coincide with a global target set by the UN Convention on Biological Diversity, an international treaty intended to promote the conservation and sustainable use of biodiversity, as well as the equitable sharing of benefits arising from its use. That target – to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on earth – is also part of the globally agreed Millennium Development Goals that aim to alleviate extreme poverty. It has yet to be met.

ter 1

Life support: natural 'services'

Biodiversity 'level'	Ecosystem services (some examples)
Ecosystems	Recreation Water regulation Carbon storage
Species	Food, fibre, fuelwood Design inspiration Pollination
Genes	Medicine Disease resistance Adaptive capacity

Source: TEEB. 2009. Integrating the ecological and economic dimensions in biodiversity and ecosystem service valuation. In TEEB Report D0.

Beyond these immediate benefits, our survival depends on a range of biodiversity-driven 'ecosystem services': say, restructuring and enriching soils, breaking down pollutants, filtering freshwater (see 'Life support: natural "services"', above). To generate these, a wide range of ecosystems, and an even wider variety of species within each of them, are needed. When species die out or are depleted, or genetic diversity declines, ecosystems become less stable and less able to withstand shocks and pressures, and their delivery of key services declines.

Some might argue that extinction is a natural biological process – so why worry? The problem is that species are disappearing at an unprecedented rate, prompting some to call it the Earth's 'sixth mass extinction'. The usual suspects are driving it: changes in land use such as forest clearances to make way for crops, the spread of monocultures, overexploitation of natural resources like fish stocks, and pollution – from fertilisers, industrial discharges and oil spills, for example.

Ecosystems are dynamic systems and so are pretty resilient, but only up to the 'tipping point'. Beyond that they are unable to recover to their former state (see 'Jellyfish and chips?', opposite). Decades ago, American biologist Paul Ehrlich likened this to aircraft design. His 'rivet hypothesis' holds that you can lose some rivets in a plane's wing and it will continue to fly, but you will reach a point where the loss of just one more rivet becomes catastrophic. »

1/3 of genetic resources for food and agriculture has been lost over 100 years*

40% of bird species & 42% of amphibian species are declining in population**

23% of plant species are threatened**

*Food and Agriculture Organization of the UN.
**Global Biodiversity Outlook 3 (GBO3). http://gbo3.cbd.int/home.aspx.

Jellyfish and chips?

Many populations of fish will crash in a few decades if overfishing persists, according to researchers interviewed by the UK-based *Sunday Times*. Daniel Pauly, professor of fisheries science at the University of British Columbia in Canada, puts the current total wild catch at 150 million tonnes a year – some 60 million tonnes more than estimates by the Food and Agriculture Organization of the UN (FAO). The FAO itself, however, has estimated that over 70 per cent of fisheries are at or over the sustainable limit. Overfishing is an urgent problem, as a billion people, mostly in poorer countries, rely on fish as their main source of animal protein. For that to be sustainable, we need an overhaul of fishing practice. In the same article, University of York marine scientist Callum Roberts says that if we go on 'fishing down the food web' – moving to smaller and smaller species as we wipe out the larger ones – we will soon be left with just jellyfish and algae. This isn't mere theory. A 2007 report by UK broadcasting body the BBC on a study by scientist Georgi Daskalov of the UK Centre for Environment, Fisheries & Aquaculture Science (Cefas) showed just such a 'regime shift' rolling out in Europe's Black Sea.

Sources: Leake, J. 11 July 2010. Fish stocks eaten to extinction by 2050. *Sunday Times*; FAO. 2008. *The State of World Fisheries and Aquaculture*. FAO, Rome; Fishing 'destabilises Black Sea'. 5 June 2007. BBC News. http://news.bbc.co.uk/1/hi/sci/tech/6719965.stm.

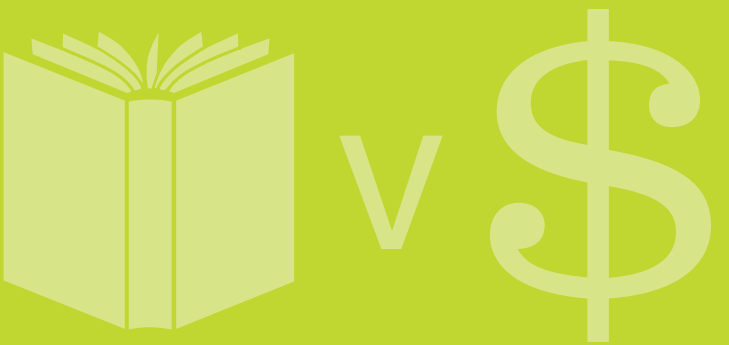
Poverty pinned down

The biodiversity drain is only one of the global challenges that face us today. Another is persistent poverty in developing countries. Just as there is an international target to reduce biodiversity loss, so there is a target in the Millennium Development Goals to halve the number of people living in extreme poverty by 2015. In the MDGs, poverty is defined as living on less than a dollar a day, but this emphasis on money is a very Northern view – many of the poor define themselves quite differently (see 'The poverty spectrum', opposite).

Bridging a big divide

Many view biodiversity and poverty as completely separate issues. This isn't really surprising. Historically, economic development – including tackling poverty – has been linked to industrialisation and the conversion of natural wealth into capital, not nature conservation. But as we've begun to see, the two issues are in fact intricately linked.

First, they share the same geography. Some of the world's most biodiverse countries are also some of the poorest (see 'Mapping a crucial overlap', page 12). The majority of the poor in these countries live in rural areas, which are obviously more biodiverse than cities. The overlap also holds true if you break the world down into biomes. The majority of the poorest live in the most biodiverse of these: tropical forests, grasslands and deserts. »



The poverty spectrum

'Poverty' is a relative term, defined differently in different countries; but it usually relates to some level of material wealth. International development agencies broadly agree, however, that the state of poverty also encompasses other deprivations including the lack of opportunity, of power and voice, and of access to education and healthcare.

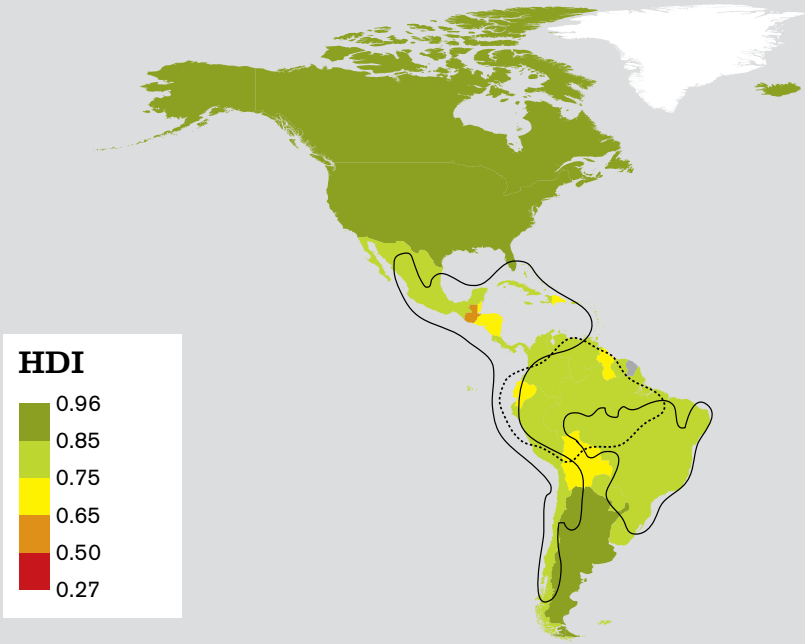
In the developing world, the poor don't usually define themselves in terms of cash income. And the concept of cash itself is meaningless in some indigenous communities, who live outside the cash economy and consider us to be the impoverished ones because of our separation from nature and our highly stressed lives. Many of them view a healthy environment or a chance to learn as more valuable than money. The environmental charity Friends of the Earth found that for the Bagyeli people of Cameroon, one of the most important indicators of wealth was level of access to forest resources.

The growing recognition that poverty is multidimensional has had little effect on the way it's measured: still predominantly by income. Yet going by that alone, the scale of poverty is staggering. The MDG target group – the 1.2 billion in cities and rural areas living on less than a dollar a day – are just the tip of a monumental iceberg. Almost half the world live on less than US$2.50 a day. That's the price of a coffee in London or New York.

Source: Friends of the Earth International. 2005. *Nature: Poor people's wealth*. Poverty Issue 108. FOE, Amsterdam. www.foei.org/en/resources/link/poverty/04.html.

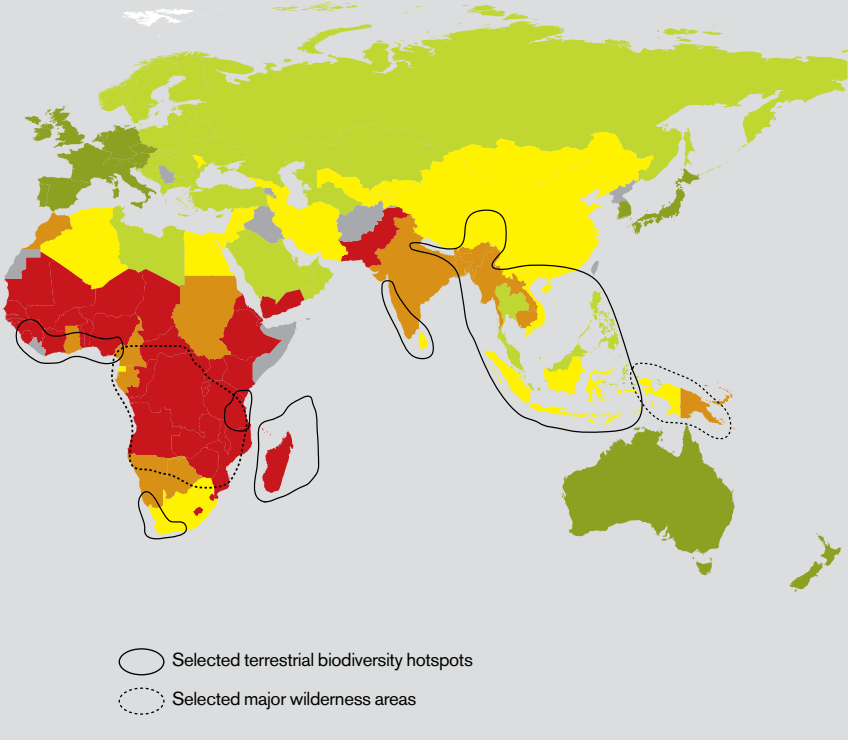
Mapping a crucial overlap

The biodiversity-rich countries with a low Human Development Index



Source: Hugo Ahlenius, UNEP/GRID-Arendal/Conservation International. 2004. Global development and biodiversity. In *UNEP/GRID-Arendal Maps and Graphics Library*. http://maps.grida.no/go/graphic/global-development-and-biodiversity.

Some of the world's least developed countries are located in biodiversity hotspots. This map displays the Human Development Index (a composite statistic used by the UN Development Programme to rank countries according to life expectancy, literacy and standard of living) for each country, overlaid by hotspot regions. Red indicates a relatively low HDI.



Secondly, as we've mentioned, we all depend on biodiversity and ecosystem services, but the day-to-day survival of millions of the poor rests on them, as we'll see in Chapter 2.

Thirdly, current rates of biodiversity loss are most severe in the tropics, where many poor countries cluster – so the impacts are most likely to hit the poor hardest. Unfortunately, efforts to stem the destruction can also backfire on the poor if conservation measures such as designating national parks mean they are excluded from ancestral land and the services and resources it offers.

Because of all this, biodiversity can mean very different things to the rural poor and to us. Our urbanised, high-tech lives are many steps removed from biodiversity in the raw. So we might travel halfway round the world to see a wild elephant, but in many parts of Africa it's common for rural people to live in fear of elephants destroying their crops – or worse, injuring or killing their children. We tend to forage in supermarkets and get a prescription when we're ill, but in many countries villagers trek for long distances to harvest what they and their families need.

Value is in the eye of the beholder. Tourists might thrill to see this Southern African springbok, but to poor local farmers it could be a crop-destroying nuisance – or dinner.

For us, biodiversity is an environmental issue. For many poor people, it is also an issue of culture and identity, politics and power.

Power of two

We've now seen that biodiversity is everywhere, and that it is central to the maintenance of all the natural systems that most of us in the North are only dimly aware of, but without which humanity would be unable to survive. We've seen that it's concentrated in poor countries, where the poor rely on its bounty directly. We're back, in short, at the beginning: biodiversity is a banking system for the poor.

This is not a fresh insight. We've already noted that the UN biodiversity convention and the MDGs both recognise the link. The problem is that it's rarely acted on. In practice, the connection between social and ecological wellbeing is usually overlooked in favour of quick fixes and high-tech solutions that can backfire badly and accelerate the biodiversity drain.

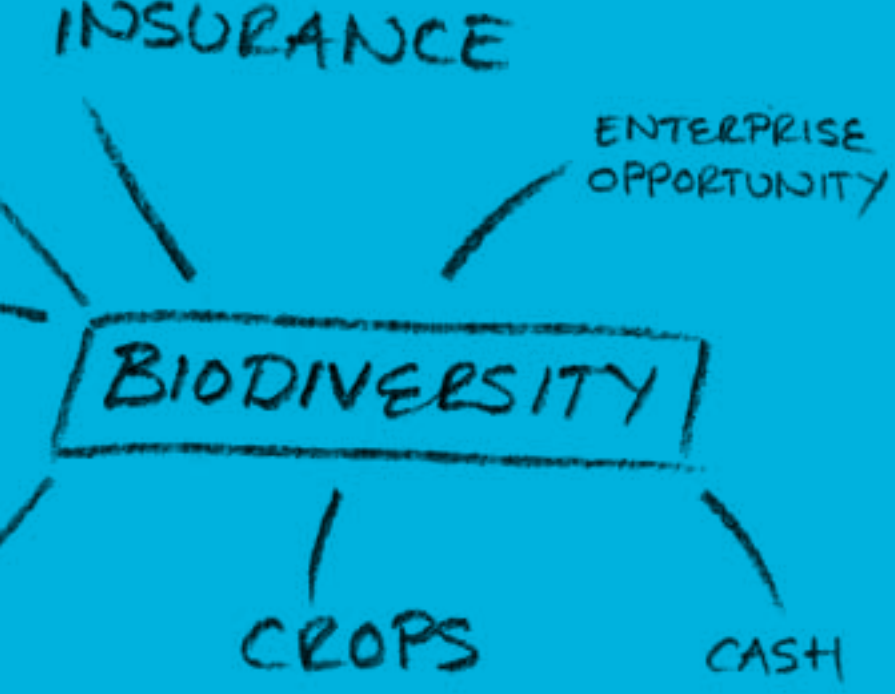
Let's look at some real alternatives, starting with how biodiversity can help in poor communities.

Bottom line: a village-eye view of biodiversity

For the rural poor – in particular, the 900 million who make up the bulk of people living on under a dollar a day – biodiversity is a lifeline: freely available, and harvested and used with little processing and low-cost technologies. This is natural capital with massive value for people with little of what we'd think of as capital – money or property.

The contribution that biodiversity makes to reducing poverty at the individual or household level varies hugely, however. For many, biodiversity simply means food and fuel for immediate consumption. For others, biodiversity acts as a form of insurance – a safety net preventing them from falling into, or further into, poverty. Biodiversity can also provide opportunities for income that actually lift people out of poverty. We explore these different scenarios below. »

Chap


INSURANCE
ENTERPRISE OPPORTUNITY
BIODIVERSITY
CROPS
CASH

ter2

Subsisting on nature

Collecting wild plants, animals and fungi for food, fuel, fodder, fibre or cash is a daily necessity for millions across swathes of Africa, Asia and Latin America. Medicinal plants stock many village markets (see 'Wild for health', right). Species variety is crucial to this task, but so is long-term abundance of key staples. Meanwhile, farmers on tiny plots use genetic diversity to improve and adapt crops that can survive difficult conditions.

For some, wild harvests are everything; for others, their value lies in the way they can fill seasonal gaps in the crop cycle or shortfalls at times of major hardship. The income potential of wild resources is limited, and when a real chance to earn cash arises, it tends to be the richer, more powerful and better connected who are able to reap the benefits while the poorest of the poor lose out.

Nevertheless, even a small income can be significant for households with little else. Overall, the World Bank estimates that forest products provide roughly a fifth of poor rural families' 'income' – of which half is cash and half is in the form of goods for immediate consumption. »

Wild for health

For poor people with no access to clinics or doctors and no cash to pay for commercial drugs, traditional medicine based on skilled use of wild plants and fungi can fill the roles of pharmacy and medic. Up to 80 per cent of people in a number of African and Asian countries use traditional medicine for primary healthcare, according to the UN World Health Organization. Globally, wild plants, or compounds extracted from them, are the basis not just for traditional medicines but also for modern pharmaceuticals: an estimated 35,000 to 70,000 species of plant have been used in medical systems round the world.

Sources: WHO. *Traditional Medicine*. Factsheet. www.who.int/mediacentre/factsheets/fs134/en/; Farnsworth, N.R. and Soejarto, D.C. 1991. Global importance of medicinal plants. In Akerele, O., Heywood, V. and Synge, H. (eds) *The Conservation of Medical Plants*. Cambridge University Press, Cambridge, UK.

Nature's insurance portfolio

Beyond wild harvests, some see an even more profound benefit for the poor in the unseen 'supporting role' biodiversity plays in keeping ecosystems healthy and maintaining their delivery of critical services. An ecosystem in tiptop condition is in essence a portfolio of insurance policies protecting against natural hazards, illness, an unstable environment and food insecurity. Here we look at both natural ecosystems and 'agroecosystems'– where small-scale, sustainable farming becomes part of the rural mosaic.

Hazards and disasters

It might seem odd to say that biodiversity can insure against floods and fires, but in fact 'natural infrastructure' – forests, wetlands and mangroves – can form an effective first line of defence against mudslides and flash floods, cyclones, tsunamis and other potentially disastrous extreme weather events. It's no accident that, after the catastrophic Indian Ocean tsunami of 2004, regional governments launched intensive mangrove replanting schemes as a coastal 'bioshield'.

Flood prevention is dependent on the ability of soil to absorb and hold water. Earthworms and other soil-dwelling animals and microbes help here by regulating soil structure as well as plant cover. Plant diversity also helps grasslands weather drought, by making it likelier that drought-resistant species are part of the mix.

Health

Beyond medicinal plants, biodiversity plays a hidden but crucial role in reducing the risk of catching infectious diseases. A functional ecosystem can balance the abundance of disease vectors such as mosquitoes, parasites and parasitic hosts and so control the spread of the diseases. But if, say, natural predators of the vectors decline, their populations can boom and diseases spread. Many diseases associated with shifts in biodiversity are common among poor people: malaria, dengue fever, encephalitis, cholera and rabies.

Food security

The 500 million small farms in developing countries are lightyears away from agroindustry and its giant monoculture fields soaked in fertilizer and pesticides. The men and women who plough and hoe these small plots are adept at innovations that keep crops viable through tough times, such as careful selective breeding that works with biodiversity. Science has backed their findings.

There's a strong body of evidence showing that crop plants with high genetic diversity – that is, a broad range of genes within the crop species – yield higher and more consistent harvests than those without by using soil and water nutrients more effectively over a range of environmental conditions. This genetic advantage has also been shown to improve crops' resilience to impacts from pests or diseases, droughts or floods. Those are hugely important factors for people who could starve if harvests shrink disastrously (see 'Old crop, new tricks', page 22). Healthy agroecosystems depend in turn on healthy ecosystem services – 'maintenance' of soil by the organisms living in it, groundwater regulation by trees, pollination by insects and bats, and more. »

Old crop, new tricks

Modern crop varieties may have been bred for productivity and efficiency, but cultivating them demands fertilizers and pesticides that poor farmers can ill afford. Traditional varieties of crops such as millet are more genetically diverse and robust, and less reliant on pricy and potentially hazardous chemical inputs. In Ethiopia – one of Africa's poorest and most populous nations – traditional 'landrace' sorghum (cultivated varieties that have 'bred' naturally in response to local conditions) have outperformed modern varieties in drought conditions – an effect that is even more obvious on the marginal lands of the poorest farmers. This suggests that biodiversity can be effective insurance against climate impacts for small farmers – an issue we explore in more detail in Chapter 4.

Source: Vira, B. and Kontoleon, A. 2010. Dependence of the poor on biodiversity: which poor, what biodiversity? In Roe, D. (ed) *Linking Biodiversity Conservation and Poverty Reduction: A state of knowledge review.* CBD Technical Series No 54, Secretariat of the CBD, Montreal.

A natural way out of poverty

Biodiversity can effectively become a stepping stone out of poverty, given the right circumstances. Far-seeing national government policy in the Southern African nation of Namibia has empowered rural communities to take control of the wildlife resources on their land and capture significant financial benefits from tourism, hunting and other biodiversity-based enterprise that would otherwise have accrued to government or private tourism companies. Meanwhile in Kenya, understanding biodiversity has enabled forest communities to tap into a major export industry (see 'Butterfly effect', page 25).

Poor policy, broken law

But biodiversity-based efforts to earn income often fail. This is often not so much down to a lack of potential in the biodiversity available, but to poor policy and legal frameworks that govern how it is used and by whom. Security of tenure over land and resource rights are key in this context – as our Namibian example shows. The rural poor generally have free access to wild resources – a right that coexists with the fact that many villages have their own ways of controlling resource access and management. But if traditional governance breaks down, or is taken over by regional or national governments, a village no longer 'owns' the forests or rivers round it and is no longer responsible for them in the same way. So locals may have less incentive to invest in the long-term sustainability of their wild heritage. They may just exploit it while it's there before others do.

And others will want to. For starters, biodiversity is big business for pharmaceuticals corporations in the North. But there is no effective international agreement on sharing the benefits from biodiversity or the products and technologies derived from it with the countries or communities from which they originated. It's all too easy for a company or agency eager to develop, patent and sell new medicines, seeds, foods and industrial products to simply move in and access wild plants and animals – along with centuries' worth of the traditional knowledge surrounding them.

The poor, who have managed and conserved these riches, can end up unrewarded or, in the case of patents, even unable to access certain species or varieties. A benefit-sharing agreement and system – currently a topic of hot debate between governments – could make a vital difference to biodiversity's potential to reduce poverty.

We've had a glimpse of what biodiversity means in terms of grassroots subsistence and local economies. What part does it – or could it – play in national contexts? We find out in the next chapter.

Butterfly effect

If you've ever strolled through a butterfly house, you've had a brush with biodiversity at its most enthralling. You may not have thought about the insects' provenance, but this is a multimillion-pound industry supplied by tropical butterfly farms round the world. One, at the edge of a forest near Kenya's north coast, is a poverty and conservation success story that has been financially self-sustaining since 1999. In the early 1990s, however, the signs were not hopeful. The villagers living round the forest – a protected, globally important biodiversity hotspot – hated it. Prevented from freely using wood and other resources and with crops regularly marauded by elephants and baboons, most local farmers wanted the forest cleared for settlement. The Kipepeo Project proved a community metamorphosis. NatureKenya (BirdLife in Kenya) and the National Museums of Kenya stepped in to run the project and a small grant was found to pay for training the village farmers to produce forest butterfly pupae for export. From 1994 to 2001 community earnings totalled over US$130,000. Through this community-based work, farmers and their families now have in-depth knowledge of insect lifecycles, parasites and diseases. More, there has been no adverse effect on wild butterfly populations.

Source: Gordon, A. and Ayiemba, W. 2003. Harnessing butterfly biodiversity for improving livelihoods and forest conservation: the Kipepeo Project. *The Journal of Environment & Development*. 12, 1: 82-98.

Chap

New wealth of nations: biodiversity and poor economies

Take a forest in rural India. Local villagers graze their livestock, gather fuelwood, fruit and medicinal bark, and hunt for honey. The trees help prevent drought and flood damage by drawing up groundwater and anchoring soils with their roots.

Most, if not all, of such direct and indirect 'flows' of value into rural or forest-dependent households are public goods and services – received free from wild nature, and not priced or traded in any markets. Because of this, 'ecosystem services' are economically invisible.

And they do not generally figure in the national accounts that measure a country's economic activity.

Does this matter? Yes. We cannot manage what we do not measure, and economic invisibility is not a good starting point for ensuring that ecosystem services thrive. We risk depleting them because of trade-offs such as replacing forests with cultivated crops.

Putting a value on nature and factoring that into national accounting can help governments and business wake up to the fact that healthy economies rest on healthy ecosystems – as do the wellbeing and livelihoods of the poorest of the rural poor. »

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Measuring what we manage

We have some way to go in making these connections. First off, the ways we currently measure wealth and development are all limited. Traditional statistics capturing national income, such as GDP, measure the flow of goods and services. But they can be misleading as indicators of social progress in 'mixed' economies (which combine agriculture-driven rural economies with more industrial and service-sector-driven urban economies) because they fail to represent natural resource flows accurately, if at all. Given the rural poor's heavy dependence on those flows, this means the statistics also fail to tell us much about them.

Clearly, the focus on income alone doesn't paint an accurate picture of a country's development. Unfortunately, neither do most of the alternatives to GDP. The UN Development Programme's Human Development Index (HDI), for instance, was crafted to measure human wellbeing as well as economic progress. But the index – which measures life expectancy at birth, literacy and school enrollment, and standard of living – does not look at the contribution of natural resources to livelihoods.

Developing national 'green accounts', which would adjust GDP to account for the depletion of natural capital, is a step in the right direction. Even this, however, fails to show the social dimension because of the 'tyranny of the average': available indicators such as GDP average out the incomes and savings of rich and poor alike, and so give no indication of their relative fortunes.

A tale of two tragedies

For developing countries where the poor depend heavily on natural resources both for their day-to-day living and employment, our collective failure to measure the true economic, social and environmental wealth of nations accurately can easily become a tale of two tragedies.

The first tragedy is that excluding ecosystem service flows from national accounts results in a lack of policy attention and public investment in ecosystem and biodiversity conservation – which carries the risk of triggering an unsustainable future for generations to come.

The second tragedy is linked to the tyranny of the average. A combination of psychological conditioning and bad economics has made GDP growth a proxy for all forms of national economic performance – something it was never intended to be. What may look like 'development' at the national level can mask static or worsening environmental and economic conditions for millions of the poor. Rapidly industrialising countries such as China and India are cases in point. »

GDP of the poor

If we focus closely on the wellbeing of the poor, the costs to their welfare of losing or facing shortages in natural capital such as clean water become real (see 'Raining wealth', opposite). As these costs are not usually recorded systematically, however, they are largely invisible to policymakers. To counteract this, a UN study on The Economics of Ecosystems and Biodiversity (TEEB) has proposed a new indicator, 'GDP of the poor'. This weighs up the value of ecosystem services for people ordinarily under the accounting radar – herders, small farmers and foresters, and others involved in informal, natural resource-based work.

TEEB crunched the numbers for mixed economies with big disparities in income, such as India and Brazil, and has already shown that compared to the national economy, the economic activities of the rural poor are much more dependent on biodiversity – and vulnerable to its loss. In India, for example, ecosystem services count for 16 per cent of GDP – but 47 per cent of GDP of the poor (see 'Ecosystem losses and poverty', below). Exercises like this, that reframe biodiversity as central to national prosperity, are a crucial first step to better national policy – and could become an engine for change worldwide.

As we'll see next, sustainably using biodiversity is also crucial in tackling another global issue: climate change.

Ecosystem losses and poverty

'GDP of the poor' is most seriously affected by ecosystem losses

Ecosystem services dependence

Ecosystem services as a percentage of classical GDP

Ecosystem services as a percentage of 'GDP of the poor'

Ecosystem services

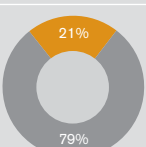
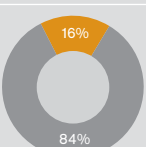
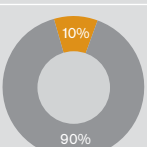
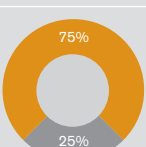
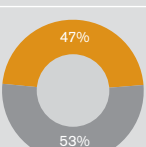
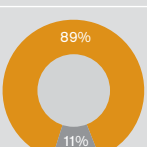
Source: Gundimeda, H. and Sukhdev, P. 'GDP of the poor' data. In TEEB. 2010. *TEEB for National and International Policy Makers*. www.teebweb.org/ForPolicymakers/tabid/1019/Default.aspx.

Raining wealth

A farming village in the arid reaches of India's Maharashtra state might seem an unlikely hotbed of affluence. Yet Hiware Bazaar boasts over 50 wealthy families and one of the country's highest average rural incomes – and all from good stewardship of natural riches coupled with solid support from national government. The turning point came in the early 1990s, when low rainfall and unsustainable use of forests culminated in acute water shortages. Little land could be farmed, and many moved away. Galvanised by the crisis, village elders and leaders drew up a plan for integrated management of their water supplies and forests and harnessed support from the government's Employment Guarantee Scheme. Locals regenerated 70 hectares of damaged forest and built 40,000 small earthen dams or *bunds* – a traditional rainwater collection system that recharges groundwater.

The result? Wells have doubled in number, more land is under irrigation, fodder and milk production is booming, and farming income shot up to US$550,000 in 2005 alone. Hiware Bazaar reveals that when governments value small-scale rural efforts, village economies will show up on the national radar.

Source: TEEB. 2010. Box 5.1: A village with 54 millionaires: agricultural revolution in an Indian village. In *TEEB for Local and Regional Policy Makers*. www.teebweb.org/ForLocalandRegionalPolicy/tabid/1020/Default.aspx.

Indonesia	India	Brazil
99 million	**352 million**	**20 million**
		
		

Chap

Global wins: breathing life into climate solutions

Climate and biodiversity are profoundly interlinked – unsurprisingly, as the atmosphere forms part of the biosphere, and planetary systems such as the water and carbon cycles are bound up with both. So disruptions to climate will affect biodiversity, and vice versa. As human-driven emissions continue to push up atmospheric levels of greenhouse gases and trigger climate shifts, impacts such as longer drought will affect biodiversity – for example, by killing off forests. Losses of habitats and species affect climate in their turn – say, when forests are felled and locked carbon released.

Both biodiversity loss and climate change hit marginalised people in poor countries hardest, and together can create a downward spiral with the poor caught in the middle. But, as we will see in this chapter, protecting and sustainably using biodiversity can help in lessening the often intertwined environmental and social impacts of climate change.

'Lose-lose' scenarios

Right now, one of the most severe of those intertwined climate impacts is the destruction of coral reefs. The International Coral Reef Initiative, which partners governments with international organisations and NGOs, estimates that catches from coral reefs support a billion people in Asia alone. Yet reefs are degrading at a frightening rate as climate change causes the seas to warm and become more acidic. In the Caribbean, nearly 30 per cent of warm-water corals have disappeared since the 1980s. And terrestrial species are suffering too (see 'Birds at the borderline', page 36).

The Intergovernmental Panel on Climate Change – the thousands of researchers who assess climate science – says temperature increases above 2 to 3°C are very likely to trigger substantial changes in all ecosystems' structure and functional »

ter 4

Birds at the borderline

Climate change is effectively redrawing the ecological map. Shifting rainfall, rising temperatures and other impacts are forcing change in ecosystems: as plants, insects and microorganisms fail or thrive under the new conditions, habitat and ecosystem borders shrink or expand. Populations of species higher up the hierarchy, like birds, may die out or move on. For poor communities, that means the loss of vital cogs in the provision of ecosystem services such as pest and disease control, pollination and a link in the food chain.

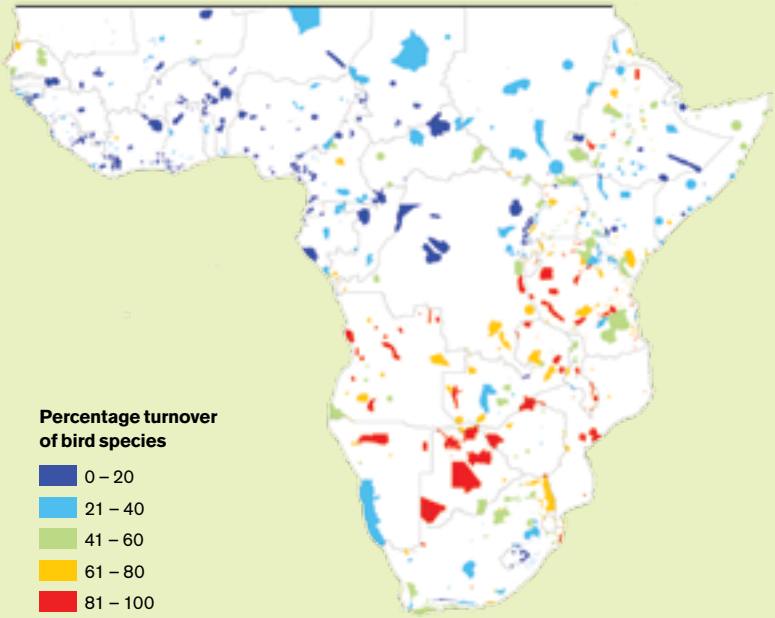
Scientists from global bird conservation charity BirdLife International, the universities of Durham in the UK and Copenhagen in Denmark, and the UK-based Royal Society for the Protection of Birds have modelled how climate change is affecting the distribution of breeding birds in sub-Saharan Africa. As birds can serve a 'canary in the coal mine' role in relation to biodiversity, the models are good indicators of the future health of regional ecosystems. The findings show that by 2085, when climate change is set to grip harder, the mix of bird species in Africa's Important Bird Areas (IBAs) – key bird and biodiversity conservation sites – is likely to change

dramatically. As conditions in IBAs shift, some species will move on and others move in, with big potential impacts on ecosystem services.

What kind of services? For the Boran, pastoralists in the arid reaches of northern Kenya where climate shifts are likely to turn up the heat, birds such as oxpeckers, vultures and honeyguides deliver direct benefits. The honeyguide reveals the location of wild beehives to the Boran and saves the hunter almost 65 per cent of the time they would otherwise have spent on the search. Honey is a key food, medicine and cash commodity for the Boran.

The map below shows how the mix of bird species in Africa's IBAs may change by 2085 under projected climate scenarios. Warmer colours indicate a higher projected shift: 'red' sites show a predicted change in over 80 per cent of bird species.

Source: Hole, D. G. *et al.* 2009. Projected impacts of climate change on a continent-wide protected area network. *Ecology Letters* 12: 1–12; Isack, H.A. 1987. The cultural and economic importance of birds among the Boran people of northern Kenya. In Diamond, A.W. and Filion, F. (eds) *The Value of Birds.* Technical Publication No. 6. The International Council for Bird Preservation (BirdLife International), Cambridge, UK.



capability, and that the rise may happen too fast for ecosystems to adapt. If we make no change to emissions levels, we could hit an increase of 4.8°C by 2100.

The implications of this for all of us are not good. The implications for the poor are worse. The effects of waning biodiversity, such as scant forage and disappearing game, combined with climate impacts such as drought, flooding, sea-level rise and cyclones, can devastate communities already living on the edge.

However bleak these pictures, biodiversity could be part of the solution to climate change. We saw in Chapter 2 how biodiversity makes for resilient environments. Conserving and managing biodiversity can help mitigate or curb effects of climate change and help vulnerable people and the natural systems they rely on adapt to changing conditions.

Controlling carbon to regulate climate

Some ecosystems contain huge stores of carbon: forests lock in about 50 per cent of terrestrial carbon, while peatlands hold about 25 per cent of all soil carbon. Healthy grasslands, oceans and water bodies also absorb and store hefty amounts. However, these ecosystems release carbon dioxide (CO_2) into the atmosphere when they are cut, burnt, drained or converted to other uses, contributing to the emissions that fuel global warming. In fact, land use changes, particularly deforestation in tropical regions, are responsible for between 15-20 per cent of human-driven CO_2 emissions.

By preventing this kind of land use change and conserving carbon-rich habitats, we can do atmosphere and biosphere a favour. Biodiversity meanwhile plays a starring role in maintaining the integrity of carbon-rich ecosystems. In tropical forests, many of the most carbon-dense tree species rely on a range of animal species to transport their seeds and ensure successful reproduction.

International financing mechanisms are currently being developed to pay for such carbon storage schemes – at least for forests. These payments could potentially provide a significant source of income to poor people who are often the managers, custodians or owners of these lands. »

2

REDD – a green solution?

One such financial mechanism is known as 'REDD' (reducing emissions from deforestation and forest degradation) – sometimes extended to REDD+, where the '+' signifies the role of conservation, sustainable management of forests and enhancement of forest carbon stocks. REDD and REDD+ have real potential for offering significant, stable flows of income to poor forest communities (see 'Community, cash, carbon', page 42). But the right safeguards must be in place to ensure that their knowledge and rights over the forests are recognised, and that biodiversity and ecosystem services are maintained.

Ecosystems: first line of defence

Even if mitigation succeeds, the effects of climate change will almost certainly persist for centuries. Adapting to those impacts in the here and now is increasingly recognised as vital. We've already seen how biodiversity buffers blows to the environment. As TEEB puts it, the 'stabilizing effect of a "biodiverse" portfolio is likely to be especially important as environmental change accelerates with global warming and other human impacts'. Such 'security value' is most important, of course, to the poor.

Poor communities are often regarded as helpless victims of climate change. But while they are being hit hardest, many in these communities are practised innovators equipped with solutions that recognise the close links between wellbeing, livelihoods and nature.

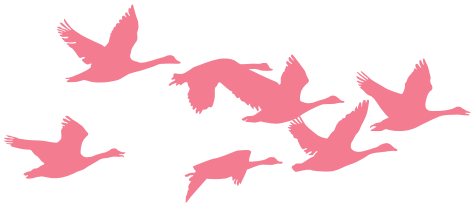
In Bangladesh, subsistence and cash-crop farmers are fighting the floods that wash their crops away by resurrecting an old tradition: *baira*, floating plots fashioned from clumps of the invasive water hyacinth, packed with mud and planted up with okra and other cash and subsistence crops. *Baira* ride the tides without becoming inundated, and biodegrade when spent. Cheap, replicable, 'green' and using only what's on offer locally, this age-old technique is more effective than many 21st-century concepts imported into the country.

The poor, working with nature on 'soft' solutions like this, that support healthy and resilient ecosystem services, can provide a more cost-effective and sustainable response to climate change than investment in 'hard' technological or infrastructural alternatives such as flood barriers. Engineered solutions can end up working against nature when they aim to constrain natural periodic cycles such as annual river flooding.

Community, cash, carbon

The Amazon may be a byword for biodiversity, but cattle ranching, crime and corruption destroy many poor communities in this region. They are also big drivers of the logging that has decimated an estimated 17 per cent of Brazil's rainforest. Now, deep in the forest covering most of the country's largest state, Amazonas, a community is showing how REDD (reducing emissions from deforestation and forest degradation) can buck this trend. Through the Juma Sustainable Development Reserve REDD Project, families here conserve their forest – and cut emissions – in exchange for social and economic investment, including a debit card that can be used in local banks and post offices. By 2050, the project aims to have prevented the release of 189 million tonnes of CO_2 equivalent. Run by the non-profit Amazonas Sustainable Foundation, Juma is part of Bolsa Floresta, a 'payment for environmental services' programme initiated by the state government and banking giant Bradesco that supports over 6800 families in Amazonas' protected areas. In 2008, after independent validation, the Climate, Community and Biodiversity Alliance awarded Juma its highest (Gold) standard. And in 2010 the Rainforest Alliance's Eco-Index database on conservation projects across the Americas recognised Juma as first in the monitoring and evaluation methodology category.

Sources: Amazonas Sustainable Foundation. www.fas-amazonas.org/en/; Viana, V. 2009. *Seeing REDD in the Amazon: A win for people, trees and climate.* IIED Opinion. IIED, London. http://www.iied.org/pubs/pdfs/17052IIED.pdf.



Concl

Biodiversity – a development issue

The next time you get a prescription, think about where the stuff in that bottle or box originated. Let's say it's the bark of a Southeast Asian tree, prized for centuries as an infection fighter by forest people. Like many such 'folk remedies', it arrived at your chemists' through a circuitous route – from pharmaceuticals scout to the lab scientist who isolated the compound, a manufacturer in India, packager in Belgium and retailer in Croydon, Paris or Des Moines. The fruit has fallen a long way from the tree.

We have a vast and seemingly limitless supply, and choice, of food and medicines. So we may barely notice if one product disappeared from the shelves – another would swiftly take its place.

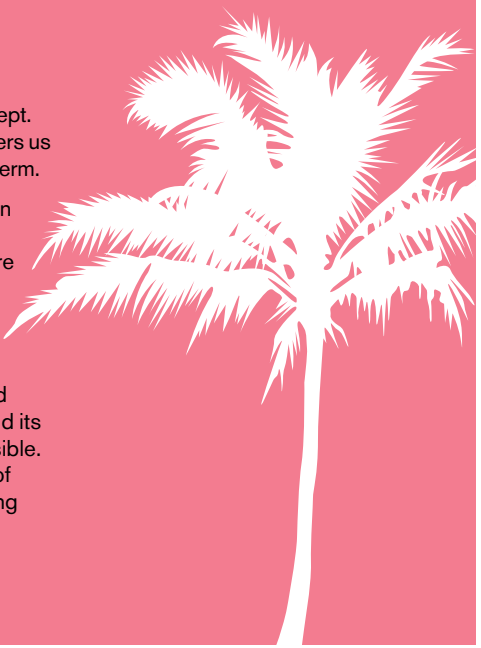
But what if the only wound treatment a Vietnamese village has is a stand of those trees? Chop them down and it's a very different story. When you live 'up close and personal' with nature, the demise of treasured sources for food or basic medicine is calamitous.

Ultimately, we all depend on biodiversity absolutely. But for those of us living in the industrialised North, our prosperity, globally networked markets, complex social and political systems,

usion

and often obsessive focus on technological fixes make losing biodiversity a near-abstract concept. Our half-divorce from nature buffers us from its loss, at least in the short term.

Yet the environmental and human costs of that loss continue to skyrocket. It has never been more urgent for us to counteract our tendency to either see biodiversity as a parade of plants and animals 'out there', or fail to think of it at all. We need to make the biodiversity drain and its toll on the poor, and on us all, visible. Visible, that is, not just in terms of awareness, but in terms of getting it onto balance sheets, and into the boardrooms where big decisions are made. »

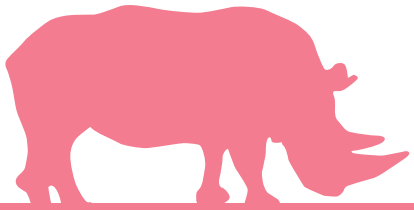


A fifth of Earth

The 'elephant in the room' here is an ethical issue. As we've seen, the rural poor in developing countries are the primary custodians of biodiversity. In fact, indigenous peoples manage or control nearly 20 per cent of the Earth's surface. Their knowledge and customs have sustained thousands of crop varieties and medicinal plants over millennia, yet many barely benefit when resources or land are 'shared'. From game parks that shun the villages within them to Northern patents on Southern riches, the pattern is repeated all over the developing world.

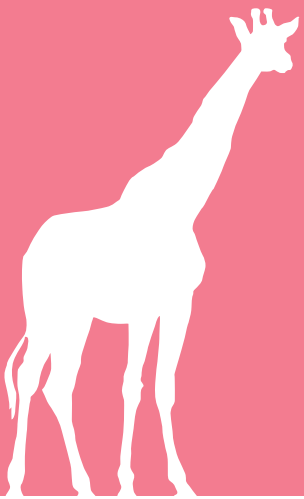
Back in 1992 when governments adopted the UN Convention on Biological Diversity (CBD), industrialised countries agreed to share the benefits from genetic resource use with poor developing countries. Such a deal could pave the way for changed lives and livelihoods among some of the world's poorest. It could also be a strong incentive for continued biodiversity conservation. But, so far, this North-South agreement has failed to materialise – and even if it does, just like REDD (see Chapter 4), it will need careful provisions and safeguards.

Wild card: the ultimate life insurance

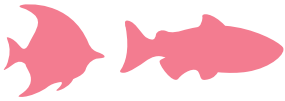


What can we do?

Can we do anything on the ground? Seeking out biodiversity-friendly products like Marine Stewardship Council (MSC) certified fish, or bananas, coffee and cocoa certified by the socially and environmentally focused Rainforest Alliance, is one way of voting with our feet. Think about whether you have to fly and if you have to, offset your emissions with a scheme that ensures poor people and biodiversity benefit too. The Climate, Community and Biodiversity Alliance has developed voluntary standards to help design and identify land management activities that simultaneously reduce emissions, support local communities and conserve biodiversity (www.climate-standards.org).



The disappearance of the living fabric of our planet is the pulling of a globe-sized rug from beneath our collective feet. Yet as a global community, we are failing to stop it. Worldwide, spending on biodiversity loss is an estimated US$8-10 billion a year, when we need something like five times that just to make protected areas work effectively. Most glaringly, the North provides just US$1.25 billion a year in biodiversity aid to the South. We need to think about our choices. Faced with economic meltdown in 2008/9, the UK spent over £100 billion (US$133 billion) on bank bailouts. Faced with a more fundamental breakdown, we manage a fraction of that. The cost – some US$4 trillion a year in loss of natural services, according to The Economics of Ecosystems and Biodiversity (TEEB) study – is a blow to human welfare. If we're to balance the planetary books, the first step is recognising the value of biodiversity.



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Poverty and Conservation Learning Group
www.povertyandconservation.info

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***The Economics of Ecosystems and Biodiversity (TEEB)** study is a major international initiative drawing attention to the global economic benefits of biodiversity, to highlight the growing costs of biodiversity loss and ecosystem degradation, and to draw together expertise from the fields of science, economics and policy to enable practical actions to move forward.

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Joined-up thinking at its most urgent

We're in the midst of a biodiversity crisis – so science and the media keep telling us. But what does it really mean if the variety and abundance of genes, fish, bacteria, rhinos, trees or crop varieties decline? It might all seem a little abstract for those of us whose urbanised, high-tech lives have left us far removed from nature in the raw.

For the billion or so rural poor in the developing world, it's all too real. Direct dependence on the bounty of forests, deserts and coasts can make 'biodiversity loss' a case of losing all: food, fuel, building material, medicine, forage, livelihoods and culture.

The good news is that it can work the other way. Poor communities, as long-term stewards of the South's natural riches, are steeped in profound knowledge about them. As this pocketbook shows, working with them can reverse the downward spiral of environmental degradation. By banking on biodiversity, we can protect our natural legacy while tackling poverty locally, nationally and globally.