WWF

REPORT

UK

2012

Conservation | Climate Change | Sustainability

Building green economies

Creating prosperity for people and planet

About WWF-UK

We're at the heart of global efforts to address the world's most important environmental challenges. We work with communities, businesses and governments to help people and nature thrive. Together, we're safeguarding the natural world, tackling climate change and enabling people to use a fair and sustainable share of natural resources.

These are challenging times: people are faced with converging and related economic, social and environmental problems. But we believe in humanity's capacity to find integrated solutions – to protect the ecosystems on which we and other species depend, tackle unacceptable levels of poverty, and strengthen economies for the long-term benefit of all.

Acknowledgements

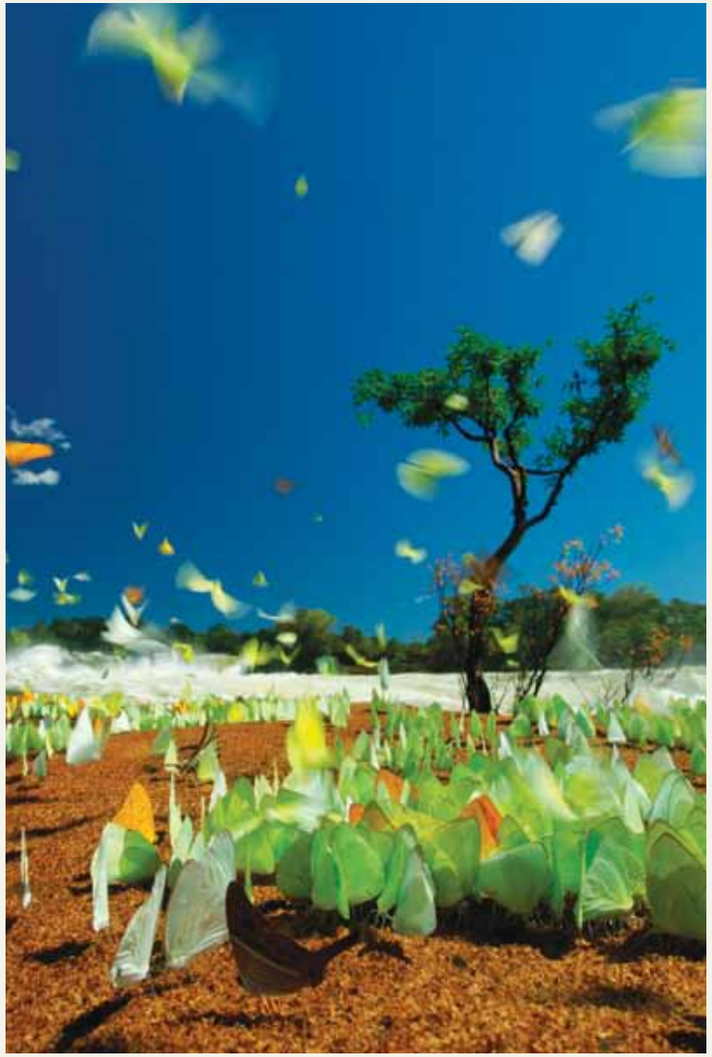
Author: Luke Wreford, One Planet Economy team, WWF-UK.

The author would like to thank the following for their comments and suggestions:

Keith Allott, Victor Anderson, Dan Barlow, Rachel Brown, Niamh Carey, Sandra Charity, Sue Charman, Glyn Davies, Ray Dhirani, Jacqueline Dragon, Nicola Frank, Neva Frecheville, Kate Foreshew, Oliver Greenfield, Emmalene Gottwald, Louise Heaps, Sarah Hutchison, Alun James, Guy Jowett, Amanda Larsson, Zoe Leader, Cliff Lee, Conor Linstead, Dax Lovegrove, Emily McKenzie, Nick Molho, Jen Morgan, David Nussbaum, Margaret Ounsley, Emma Scott, George Smeeton, Dave Tickner, Andrea Westall, Dominic White.

CONTENTS

CASE STUDIES



© ZIG KOCH / WWF

The transition to green economies is essential both to protect nature for its own sake, and to maintain the conditions required for humanity to thrive

FOREWORD

The words ‘economy’ and ‘ecology’ share the same root in the Greek word, *oikos*, which means ‘home’. As the names suggest, the two fields are intimately related; yet for too long, economists and conservationists have failed to find sufficient common language.

David Nussbaum, chief executive, WWF-UK

The green economy agenda aims to bridge this gap. It addresses the central political and economic challenge – and opportunity – of our times: to live within our financial and ecological means, while eradicating poverty and improving wellbeing for all.

However, economic stagnation and instability in many parts of the world, including the UK, is strengthening resistance to environmental policies which some perceive to be holding back recovery. Others pin the blame for our current problems on the prioritisation of economic goals above social and environmental goals.

These opposing views share the underlying belief that there’s a fundamental conflict between the economy and the environment which can’t be resolved. We see the imperative of an alternative approach which recognises that both economic prosperity and human wellbeing depend fundamentally on the health of the natural world.

The transition to green economies is essential both to protect nature for its own sake, and to maintain the conditions required for humanity to thrive. The science tells us that we need nothing less than a major transformation of our economies, policies, technologies, and modes of production and consumption.

My experience at the UN Conference on Sustainable Development at Rio in June 2012 left me concerned by the lack of political leadership in the plenary hall. But in the side events, I was inspired by the energy, ideas and commitment of the communities, cities and companies who are already starting to build a sustainable world.

This report sets out our perspectives on green economies – why we need them, what they are, and how to get there – and shows how WWF is working around the world to make the shift to green economies happen. We also suggest some priority actions that governments in the UK should take to foster the conditions for sustainable innovations to flourish in our businesses and communities.

EXECUTIVE SUMMARY

Why do we need green economies?

The benefits of economic development have still not reached over a billion people who live in extreme poverty, and have come at a significant cost to the Earth's natural systems, on which we all depend. The overall improvement in living standards over the last century is remarkable, but current patterns of resource use are both inequitable and unsustainable.

ENVIRONMENTAL DEGRADATION UNDERMINES THE CAPACITY OF THE EARTH'S NATURAL SYSTEMS TO MEET ESSENTIAL HUMAN NEEDS

By 2011, the top 1% of the global population owned 44% of global assets, while the bottom 50% owned barely 1%.[1] Current global trends in greenhouse gas emissions present a high risk of dangerous and irreversible disruption to the climate system.[2] Human activities are the main driver of almost a 30% decline in biodiversity since 1970 – including habitat loss from land use change such as deforestation, over-exploitation of renewable resources such as fish stocks, unsustainable use of water, and pollution.[3] Environmental degradation undermines the capacity of the Earth's natural systems to meet essential human needs including food, fibre and timber, as well as clean air and water.

Current economic problems threaten to undermine political commitment to environmental sustainability. But economic recovery can only be sustained by shifting to green economies. In an era of high commodity prices, resource and energy efficiency will be the key to competitive advantage – EU businesses could save US$340bn-$630bn per annum by 2025 in the cost of materials by adopting more efficient processes.[4] Sustainable low-carbon industries are performing well during the recession and are ripe for investment and growth.[5] And there's a need to mitigate environmental risks to the economy, not least those associated with climate change impacts.

By contrast, promoting investment in high-carbon, resource-intensive infrastructure may boost short-term growth but will expose economies to rising fossil fuel, carbon and commodity prices, and the costs of more severe environmental impacts such as extreme weather events, crop failures and resource scarcity. Short-sighted long-term investments will burden future generations with a legacy of high-carbon 'stranded assets'.

What are green economies?

There is no single definition or model, but we believe green economies should improve people's wellbeing, and restore, maintain and enhance the healthy natural environment that people and other species need to survive and thrive. Green economies are a means to achieving sustainable development and should therefore be based on the principle of equity within and between generations. Global sustainable development goals are needed to build a shared understanding of the outcomes that economies should achieve, in terms improving human wellbeing and maintaining natural systems.

WE CAN MAKE POVERTY HISTORY WITHOUT STRESSING THE PLANET

We can make poverty history without stressing the planet. Human wellbeing is dependent on healthy ecosystems, so the transition to green economies is essential to end poverty for the long term. Providing the billion people who currently live in extreme poverty with essential material needs would require just 1% of the resources we currently use.[6] There will sometimes be trade-offs between increasing current levels of wellbeing, leaving space for nature and meeting the needs of future generations. But these can often be managed, or even avoided, by solutions that are good not only for the environment but also for equity and human development.[7]

The links between wellbeing, sustainability, fairness and economic security should be central to governments' thinking as they seek positive agendas beyond austerity and deficit reduction. These objectives are often framed as competing priorities, so bold leadership is required from governments, business and civil society to shift this perspective and to realise the potential for complementary solutions that deliver for people and nature.

How can we build green economies?

'Top-down' government action to change the rules of the game should shape, and be shaped by, 'bottom-up' green innovations that are emerging in communities and the private sector (see Figure 1 overleaf). Building green economies will require different approaches to suit local conditions. But coherent and strategic government policies are vital. Innovation by businesses and communities also has a crucial role to play in the shift to sustainable high-impact systems, such as energy, food, transport and buildings. Innovations include new sustainable technologies and business models, but also social innovations such as new norms, behaviours and lifestyles.

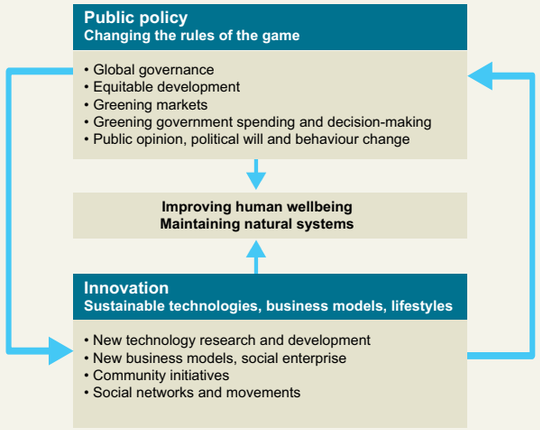


Figure 1: Complementary 'top-down' and 'bottom-up' solutions are needed to build green economies

Priority actions for UK governments include:

Global governance

1. Promote global goals for sustainable development and long-term poverty reduction: as co-chair of the UN High Level Panel on the post-2015 development framework, the UK prime minister should ensure environmental goals are in line with scientific advice.

Equitable development

2. Support sustainable development in all countries, particularly least developed countries: uphold welcome commitments on overseas development assistance (0.7% of GDP by 2015) and climate finance for developing countries (£2.9 billion over the next three years).

3. Ensure a just transition to green economies in the UK: support the transition to green jobs, for example through training and skills strategies; and maximise the potential for energy efficiency measures to eradicate fuel poverty.

Greening markets

4. Drive the transition to a low-carbon energy system at EU, UK and devolved levels:

- Set ambitious renewable energy targets for 2030 at EU, UK and devolved levels, and give absolute policy certainty to deliver the legally-binding target for 2020.
- Ensure the EU increases the ambition of its 2020 emissions target to deliver domestic reductions of at least 30% below 1990 levels.
- Ensure the UK Energy Bill is intended to deliver a nearly carbon-free power sector by 2030, with strong provisions for demand reduction and renewable energy.
- Immediately adopt the 'intended' UK carbon budgets recommended by the Committee on Climate Change.
- Include aviation and shipping emissions in carbon budgets by the end of 2012, as recommended by the Committee on Climate Change.
- Invest revenues from the EU emissions trading scheme and carbon floor price in energy efficiency measures.
- Ensure the Green Investment Bank is allowed to borrow from capital markets, and that lending is restricted to investments that are compatible with delivering the UK's carbon budgets.
- Commission the Committee on Climate Change to advise on reducing the UK's consumption footprint, including emissions embedded in imported goods.

5. Implement a significant, fiscally-neutral green tax shift, towards pollution and resource use, and away from wages and company profits. Reverse the decision to exclude fuel duty, vehicle excise duty and air passenger duty from the UK government's definition of 'environmental taxation', which opens the door for green tax cuts and higher emissions.

6. Implement smarter regulation of financial markets and corporate governance to promote long-term thinking and environmentally sustainable investment in the UK and overseas, including recommendations of the Kay Review.

7. Create multi-stakeholder sectoral forums to develop specific green economy solutions for different industries. Make this approach a key part of a forward-looking industrial policy, with effective collaboration between business, environment and energy ministries.

Greening government spending and decision-making

8. Make the shift to green economies central to plans for economic regeneration, including taxation, spending, plans for growth, infrastructure and planning policies. Divert funds from high-carbon infrastructure such as roads and airports, to renewable energy, smart grids, energy efficiency, railways and broadband.

9. Mainstream sustainable development throughout government:

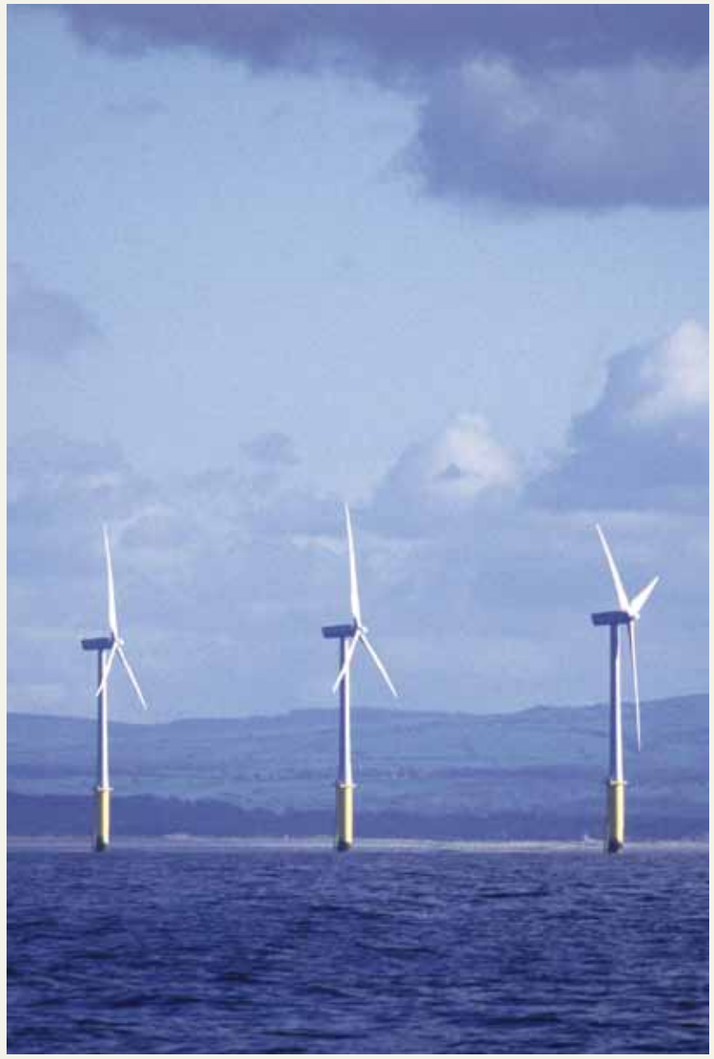
- Adopt new targets and measures of government performance and societal progress beyond GDP, and aim to decouple wellbeing from environmental impact.
- Ensure government decision-making takes full account of environmental risk, and the monetary and non-monetary value of the natural environment, for example, in policy appraisals, macroeconomic models, the Comprehensive Spending Review, impact assessments, planning policies etc.
- Ensure government policy is consistent with the advice of the Natural Capital Committee.
- Implement stronger sustainability screening in public procurement policies and practice to drive greening of supply chains.

Public opinion, political will and behaviour change

10. Ensure greater leadership from the UK prime minister and chancellor, linking environmental sustainability to the wider call for responsible capitalism and a fairer, more resilient economy. Create a positive agenda beyond deficit reduction based on the links between wellbeing, sustainability, fairness and economic security.

11. Implement comprehensive and effective regulations across all media protecting children from excessive and inappropriate advertising, as per the 2011 Bailey Review on the commercialisation and sexualisation of childhood.

12. Develop strategic policy interventions in key systems such as food, housing, transport and energy that make sustainable choices easier and more affordable for consumers, as well as commercially viable for businesses.



North Hoyle wind farm, Liverpool Bay. Governments need to set ambitious renewable energy targets for 2030 at EU, UK and devolved levels, and give absolute policy certainty to deliver the legally-binding target for 2020 (15% of energy demand met from renewable sources)

1. INTRODUCTION

The term 'green economy' has been around for many years, but has gained momentum in the turbulent wake of the 2008 financial crisis.[8] Growing awareness of the relationship between converging economic, social and environmental challenges is motivating the quest for integrated solutions, to bring about an economic system that's stable, fair and environmentally sustainable.

Green economy was one of the main themes of the Rio+20 UN Conference on Sustainable Development in June 2012. And in 2011 the UK government published *Enabling the transition to a green economy*, which sets out ways the government and business can work together on a range of environmental policy areas.[9]

Yet the term 'green economy' has proved to be both ill-defined and controversial. A number of different interpretations of 'green economy' are commonly found in political and media debates:

- Industries directly involved in, or dependent on, environmental products and services, such as renewable energy, electric vehicles and energy efficiency.
- New payment schemes for 'ecosystem services' such as reducing carbon emissions from deforestation, which provide financial incentives for conservation.
- Valuing environmental costs, benefits, assets and liabilities, in economic terms, to enable sustainable decision-making by governments and businesses.
- An environmentally-sustainable economy that manages and minimises the impacts of energy and resource use.
- An environmentally-sustainable and socially-just economy.
- A means of achieving sustainable development.

All these interpretations are valid. However, those that refer to whole economies becoming environmentally sustainable, rather than specific green sectors, are the most significant and prevalent in international processes such as Rio+20. In this sense, the green economy agenda is broadly concerned with the macroeconomics of sustainable development.

THE GREEN ECONOMY AGENDA ADDRESSES THE FULL RANGE OF ECONOMIC IMPACTS ON THE ENVIRONMENT – INCLUDING CLIMATE CHANGE, HABITAT AND BIODIVERSITY LOSS, WATER SCARCITY, POLLUTION AND RESOURCE DEPLETION

Building on the notion of a low-carbon economy, the green economy agenda addresses the full range of economic impacts on the environment – including climate change, habitat and biodiversity loss, water scarcity, pollution and resource depletion; and also the full range of economic benefits that the environment provides – such as carbon storage to regulate the climate, water regulation and purification, providing food, fibre and energy, and protecting coastlines from storm damage.

However, critics suggest the concept is a 'Western' or 'Northern' construct that ignores the principle of equity within and between generations, which is central to the more established idea of sustainable development.[10] There are also concerns that establishing payments and markets for services provided by nature will lead to privatisation and inequitable exploitation of common resources.[11]

Proponents assert that a green economy necessarily implies social equity, and that it's an essential means or precondition of sustainable development.[12] Rather than balancing, or managing trade-offs between separate social, economic and environmental 'pillars' of sustainable development, they point to the need for a more integrated approach that sees healthy ecosystems as the foundation of economic security and human wellbeing. Hence measures of economic performance should be reconfigured to account for positive and negative environmental impacts.

To move beyond these debates, some now refer to the need for *green, fair and inclusive economies*. Despite these tensions, WWF believes the transition to green economies, as part of the push for sustainable development, is critical. In this report, we first make the case for an urgent shift away from business as usual, which is failing people and the planet. We then look at the alternatives – green economies – and what they should deliver in terms of improving human wellbeing and maintaining the healthy natural environment that people and other species need to thrive. Finally, we examine some immediate steps we need to take, to address systemic problems with the status quo, and commence the journey to a better future. And throughout the report we've included some case studies to illustrate how features of green economies are beginning to take shape around the world, and in the UK.

2. WHY DO WE NEED GREEN ECONOMIES?

"Economies are teetering. Inequality is growing. And global temperatures continue to rise. We are testing the capacity of the planet to sustain us. [...] The signposts are clear: we need to change dramatically, beginning with how we think about our relationship to each other, to future generations, and to the ecosystems that support us." UN Secretary General's High Level Panel on Global Sustainability.[13]

Appraising business as usual

Economic development has yielded remarkable benefits. Millions have been lifted out of poverty, and most people enjoy better opportunities and healthier and longer lives than ever before.[14] Significant progress has been made to tackle extreme poverty: for example, the world is on track to meet the Millennium Development Goal to halve the proportion of people living on less than a dollar a day between 1990 and 2015.[15]

50M

OVER 50 MILLION JOBS HAVE BEEN LOST GLOBALLY SINCE THE ONSET OF THE 2008 FINANCIAL CRISIS

Nevertheless, there are still more than a billion people that have yet to benefit from economic development. They remain without access to the basic resources they need to lead a decent life.[16] Over 50 million jobs have been lost globally since the onset of the 2008 financial crisis,[17] and austerity measures in many countries are having a disproportionate impact on lower income groups. Disparities of wealth are worsening: income inequality both within and between countries has increased over the last two decades.[18] And by 2011 the top 1% of the global population owned 44% of global assets, while the bottom 50% owned barely 1%.[19]

Planet under pressure

Overall, economic activities have come at a high cost to the Earth's natural systems. Some impacts have been successfully addressed, such as halting damage to the ozone layer, reducing acid rain, and improving air and water quality in many countries. Protected areas now cover about 13% of the Earth's land surface,[20] an area larger than India and China combined.

But humanity's ecological footprint – a measure of our demand for natural resources – has grown steadily, and is now over 50% greater than the capacity of the planet to regenerate resources, and absorb pollution and waste.[21] Technological efficiencies have yet to offset the combined environmental impacts of population growth and rising per capita consumption of resources.

As a result, we're depleting our 'natural capital' – the natural resources and services used in economic production – and disrupting the natural systems on which we and future generations depend.

The biggest recorded increase in global greenhouse gas emissions occurred in 2010 – 6% more than the previous year.[22] Even if current pledges to reduce emissions are delivered, we're on track for global warming of 2.5-5°C above pre-industrial levels, with devastating social, economic and environmental consequences.[23]

28%

WWF'S LIVING PLANET INDEX INDICATES A 28% DECLINE IN GLOBAL BIODIVERSITY SINCE 1970

WWF's Living Planet Index indicates a 28% decline in global biodiversity since 1970, due to deforestation, habitat loss, pollution, over-exploitation of renewable natural resources such as fish stocks, and unsustainable use of water.[24] Evidence across a wide range of other environmental indicators signals an 'ecological recession'.[25]

To understand and explain the impact of environmental damage on global systems, a group of scientists has proposed nine critical thresholds, or 'planetary boundaries', which define the 'safe operating space' for humanity. According to these scientists, we've already breached three of these boundaries – climate change, biodiversity loss and nitrogen/phosphorous pollution.[26]

Over the coming decades, rising population and resource use will put further pressure on the planet, threatening human wellbeing. In 2009, the UK government's chief scientist, Sir John Beddington, argued that if we don't urgently change course we'll face a 'perfect storm' of multiple crises caused by energy, food and water shortages within the next two decades.[27] And the International Energy Agency warns that a major shift away from high-carbon energy systems in the next five years is essential to avoid dangerous climate change.[28]

Our dependence on nature

People and economies depend on nature – for a stable climate, food, clean air and water, energy and raw materials. Maintaining the flow of these benefits – or 'ecosystem services' – is essential for prosperity and eradicating poverty.[29] These benefits, in turn, depend on biodiversity – the web of life that underpins natural systems.[30] Environmental degradation has significant social and economic costs, such as more frequent floods and droughts, crop failures, soil degradation, water scarcity and pollution.[31]

Poorer people suffer most from environmental damage, because they tend to live in more vulnerable places such as tropical regions and drylands; their wellbeing depends more directly on the conditions of local ecosystems; and they have less access to financial resources and social protection.[32] At the same time, particularly with regard to climate change, poorer people are the least responsible for environmental degradation. People in high-income countries have an ecological footprint on average five times higher than those in low-income countries.[33] There is also considerable variation within countries.

>1/3

OVER ONE THIRD OF THE BIOMASS (FOOD, FIBRE, TIMBER, BIOFUELS, ETC) USED IN THE UK IS IMPORTED

National economic activity and policies have impacts that go beyond national boundaries. Advanced and, increasingly, emerging economies depend heavily on resources and goods imported from other parts of the world. Over one third of the biomass (food, fibre, timber, biofuels, etc) used in the UK is imported. And water used in the production of imported goods accounts for 66% of the UK's overall demand for water.[34] A national concern for environmental integrity and sustainable resource use should therefore extend well beyond our shores – we have both a strategic interest in sustainable international supply chains, and a responsibility to minimise the environmental impact of our consumption on other people and places.

From crisis to opportunity

Our current economic, social and environmental problems are inextricably linked. They result primarily from market and government failures, whereby the benefits of pursuing short-term economic gain are outweighed by costs to society as a whole, future generations and the natural world.[35] In more developed countries, an excessive dependence on debt-financed growth has enabled overall levels of consumption that are neither financially nor ecologically sustainable.[36] Increased frequency of droughts and floods is contributing to rising food prices and social unrest in developing countries. For example, a drought in eastern China in winter 2011 led to a doubling of global wheat prices which contributed to the Arab Spring.[37] However, these links between economic, environmental and social problems make it both possible and necessary to find cross-cutting solutions that work for people and the planet.

While governments around the world recognise these issues, political priorities in Europe and the US are currently dominated by the need to reduce budget deficits, stabilise capital markets, boost economic growth and create jobs. Against this backdrop, some political leaders and opinion formers consider environmental objectives to be irrelevant, unaffordable or a barrier to economic recovery.[38] But postponing environmental concerns until the return to pre-crisis levels of growth will not solve the underlying problems that could lead to future crises. On the contrary: now is the time to invest in the transition to green economies – to boost recovery, create jobs, build resilience to rising and volatile commodity prices, and mitigate environmental risks to businesses, and local and national economies.

Boosting economies through green investment

> *"With something like a third of all our growth accounted for by green business last year [2011], the UK could be a global front-runner in the shift to low-carbon."*
> John Cridland, Director-General, Confederation of British Industry.[39]

£122BN

THE UK GREW ITS SHARE OF THE £3.3 TRILLION GLOBAL GREEN MARKET BY 2.3% IN 2010/11, REACHING £122 BILLION (8% OF GDP)[39]

Many economies are currently suffering more from a lack of confidence and demand, than a lack of cash for investment.[40] According to the Grantham Research Institute at the London School of Economics, figures for the US and UK show that "just as the public sector is borrowing like never before, the private sector is saving like never before."[41] But these record surpluses are not being invested in productive activities because of lack of confidence in future demand and uncertainty about government policies. Instead, households, institutional investors and businesses are hoarding savings in low risk 'safe havens' such as government bonds.[42]

As the political agenda shifts from austerity to growth, the temptation for governments is to promote public and private investment in existing, high-carbon and resource-intensive technologies, infrastructure and business models. For example, the current UK government growth strategy includes support for road building, airport expansion, and oil and gas industries.[43] Such investments may have made sense in the past, because fossil fuel prices were relatively low, and environmental costs were not factored in. But now this approach will further expose economies to the risks of rising fossil fuel and carbon prices, as well as more severe climate impacts. Short-sighted long-term investments will burden future generations with a legacy of high-carbon 'stranded assets'.

With clear targets and policies, governments could instead boost economies by mobilising public and private investment in clean technologies and infrastructure, such as energy and resource efficiency, renewable energy and sustainable transport.[44] This would stimulate demand and create jobs now, as well as build long-term economic security. For instance, large-scale energy efficiency programmes for existing buildings yield multiple benefits to governments, households and the construction sector, as the example from Germany in Box 1 shows.

Box 1:
Energy efficiency in buildings in Germany – saving carbon and creating jobs

In Germany, the state-owned bank KfW has been highly successful at leveraging private investment from public funds to deliver energy efficiency in existing and new housing at scale. In 2010, public funds of €1.4 billion leveraged €21.5 billion in private investment, creating and safeguarding 340,000 jobs, mainly in small construction firms, and reducing household energy bills.[45] The federal government received a five-fold return on this investment through additional tax revenues and reduced unemployment costs.[46] Since 2001, over two million existing homes have been insulated. And since 2006, 156 million tonnes of CO2 have been saved (about 20% of Germany's annual emissions).[47]

In contrast, the UK government's Green Deal programme to promote energy efficiency in homes is unlikely to deliver on this scale in its current form. This is mainly because higher interest rates on loans will keep consumer demand lower than in Germany. The UK's new Green Investment Bank could play a crucial role, but it will need to be able to borrow from capital markets as soon as possible, and have a clear mandate to leverage only sustainable low-carbon investment.

The shift to green economies will reshape the labour market significantly, but evidence points to significant net gains for employment: a review of 20 studies covering eight countries by the International Labour Organisation suggests greening economies offers the potential for 15-60 million additional jobs overall, taking into account both losses and gains.[48]

"Environmental sustainability is not a job killer, [...] it can lead to more and better jobs, poverty reduction and social inclusion."
Juan Somavia, Director-General, International Labour Organisation.[49]

Building resilience to rising commodity prices

During the 20th century, technological advances enabled commodity prices on average to be halved despite a huge increase in demand for resources.[50] In the last decade, a dramatic rise in commodity prices has entirely wiped out this decline.[51] Despite short-term fluctuations, the medium-term trend continues upwards, due to a complex mix of factors including growing demand from emerging markets, geopolitical and resource constraints on supply, and speculation in commodity markets. This is a major challenge for countries in recession, as historically, a drop in demand has led to lower commodity prices, which then aids recovery.

Environmental factors also threaten the availability of resources such as food and water, further compounding the problem. The worst drought in over half a century in the US in 2012 has destroyed 45% of the corn and 35% of the soyabean crop and will lead to rising food prices.[52] Public policy responses to protect ecosystems for societal wellbeing may include a shift in taxation towards resources and pollution, putting additional upward pressure on resource costs.

Rising commodity prices increase costs for businesses and households. Improving resource productivity – in other words, producing products and services with fewer resources – thus presents a huge business opportunity, and is set to become more important than labour productivity as a driver of competitive advantage.[53]

The McKinsey Global Institute estimates that improving resource productivity has the potential to deliver cost savings to EU businesses of between US$340 billion and US$630 billion per annum by 2025,[54] and global savings of US$2.9 trillion by 2030.[55]

Mitigating environmental risks

While significant investment is required to achieve the shift to green economies, the cost of inaction is much higher. The annual cost of environmental degradation from human activity was estimated to be 11% of global GDP in 2008, and could rise to 18% of global GDP in 2050 if no action is taken.[56] For example, global marine fisheries currently underperform by US$50 billion annually due to over-exploitation of fish stocks.[57] Climate change impacts such as greater frequency of extreme weather events and crop failures could lead to annual costs of 5-20% of global GDP,[58] while reducing greenhouse gas emissions by halving deforestation by 2030 could avoid climate change damage of US$3.7 trillion.[59]

These costs will be avoided only to the extent that we can build green economies. Economic modelling by UNEP estimates that reallocating just 2% of global GDP from 'brown investment' to make key sectors of the economy greener will enhance economic performance, increase global wealth, reduce environmental risks and rebuild capacity to generate future prosperity.[60] At the national level, investment in natural capital is also essential to long-term prospects for economic prosperity – as the Borneo study in Box 2 on page 22 shows.

US$3.7 TRILLION

HALVING DEFORESTATION BY 2030 COULD AVOID CLIMATE CHANGE DAMAGE OF US$3.7 TRILLION

There is growing awareness among businesses of the strategic importance of mitigating environmental risks. For example, water risks relate not only to a company's direct need for and use of water, but also those of its suppliers, and its customers in terms of their requirements for water when using the company's products. As well as physical aspects of water risk, such as scarcity, flooding and pollution, there are regulatory and reputational risks to consider.[62] To address these issues and promote sustainable practice, WWF – in partnership with German development bank DEG – has developed a water risk tool. This helps companies build a picture of where their areas of greatest risk are. And it enables them to work with other water users and local authorities in order to increase water security for all parties in regions of concern.[63]

Other new initiatives demonstrate that investors are also taking environmental risk seriously. In 2011, the International Finance Corporation (IFC) of the World Bank Group introduced into their performance standards the requirement that client projects maintain benefits from ecosystem services to be eligible for IFC investment. In 2012, over 30 financial institutions from around the world signed the 'Natural Capital Declaration' which calls on private and public sectors to work together to understand and integrate natural capital considerations into lending practices and investment decisions.[64] And the Corporate Sustainability Reporting Coalition, which includes institutional investors managing assets worth US$2 trillion, is pushing for national requirements for all listed and large private companies to include material sustainability issues in their annual reports.[65]

In summary, the case for a shift away from business as usual is clear: a billion people remain below the poverty line; current levels of resource use are eroding the ecological foundations of our wellbeing; and rising commodity prices, environmental costs and high-carbon infrastructure pose significant risks to economic security. In the next chapter we explore what the alternatives to business as usual might look like.

Box 2:
Heart of Borneo – investing in nature for a green economy

A 2012 study initiated by WWF concludes that a green economy pathway in Borneo makes more economic sense than business as usual.[61] The Heart of Borneo is a 220,000 sq km area of rainforest that spans the borders of Brunei, Indonesia and Malaysia. It's home to 6% of the world's biodiversity. The economy of Borneo depends largely on this natural treasure trove, but unsustainable forestry, mining and agriculture are undermining natural services that are not currently valued adequately in decision-making. These include water availability and quality, soil quality, flood control, air quality and carbon storage. This erosion of natural capital is made worse by climate change impacts, including sea level rise, risk of floods and fires, and changes in the duration and intensity of wet and dry seasons.

The study found that continuing on a business as usual pathway would mean that, by 2020, the environmental costs of economic growth are projected to outweigh revenues from natural capital. Under a green economy scenario, an investment of 0.6% of GDP per year is necessary to ensure economic growth and environmental quality beyond 2020. In the long term, growth will increase more rapidly under a green economy scenario where natural capital is sustained. This is due to avoided costs: reduced risk and damage from floods and droughts, resulting also in lower road and infrastructure disruption, higher river transport capacity and reduced siltation; and added benefits: higher production of non-timber forest products, ecotourism, higher biodiversity, more carbon stored and enhanced ecosystem services.

The key to this will be the shift to an economic framework where taxes, spending and subsidies favour sustainable practices and reward stakeholders who restore, maintain and enhance ecosystems and the services they provide. *www.hobgreeneconomy.org*

The Heart of Borneo is a 220,000sq km area of rainforest that spans the borders of Brunei, Indonesia and Malaysia. It's home to 6% of the world's biodiversity

3. WHAT ARE GREEN ECONOMIES?

Defining and understanding 'green economy'

Green economy can mean different things in different contexts to different people. On the one hand this is a strength, as it reflects the notion that there is no 'one-size-fits-all' approach: specific opportunities and challenges occur within different economic, political, cultural and environmental contexts. On the other hand, the lack of common understanding impedes trust and collective action at global and regional levels, which are just as important as 'bottom-up', locally relevant responses.

As mentioned earlier, the focus here is on interpretations of 'green economy' that refer to whole economies becoming environmentally sustainable, rather than just sectors traditionally associated with 'environmental goods and services', such as renewable energy and other clean technologies.

A number of definitions have recently been put forward that fall into this category:

United Nations Environment Programme (UNEP): a green economy delivers 'improved human wellbeing and social equity, while significantly reducing environmental risks and ecological scarcities'.[66]

Green Economy Coalition (GEC):[67] 'our vision is one of a resilient economy that provides a better quality of life for all within the ecological limits of the planet'.[68]

UK government: a green economy is one that 'maximises value and growth across the whole economy, while managing natural assets sustainably'.[69]

Building on these, we put forward the following definition, though we emphasise that many paths can be taken, and models of green economies may vary condiderably in different places:

Green economies improve people's wellbeing, and restore, maintain and enhance the healthy natural environment that people and other species need to survive and thrive.

Further discussion on building a shared understanding of 'wellbeing', and 'healthy natural environment', can be found in the section below on goals of green economies.

Green economies and social equity

The word 'green' may or may not be interpreted to include social equity, or fairness, depending on different contexts and perspectives. The recognition of critical environmental and resource thresholds brings to the fore how the 'safe operating space' for humanity is to be shared, especially given that around a billion people currently don't have access to the food, water and energy they need to live a decent life.

Some definitions of green economy, such as that of the UK government, focus on the environmental dimension, while asserting that a green economy needs to be consistent with separate social goals. Other organisations (e.g. UNEP and GEC, as above) have made social equity and human wellbeing integral to their definitions.

During the Rio+20 process, the G77 group of developing nations raised questions about the relationship between the green economy agenda and social equity, and implications for people living in poverty. Underlying this is a concern that richer countries may impose high environmental standards on imports, heralding a new 'green protectionism' that restricts development in poorer countries.

AT WWF, WE BELIEVE GREEN ECONOMIES MUST BE FAIRER ECONOMIES, BASED ON THE SUSTAINABLE DEVELOPMENT PRINCIPLE OF EQUITY WITHIN AND BETWEEN GENERATIONS

At WWF, we believe green economies must be fairer economies, based on the sustainable development principle of equity within and between generations. We also believe that addressing issues of equity will be critical to building political will and collective action for the transition to green economies. The eradication of poverty and fair distribution of resources must therefore remain central to discussions.

> *"The green economy is just as much about economic growth, poverty eradication and social justice as it is about the environment."*
> Janez Potočnik, European Commissioner for the Environment.

Goals of green economies

Goals are important: they shape the workings and outcomes of a system. Therefore, goals are high-level 'leverage points' for change.[70] In green economies, economic growth would not be an end in itself. Green economies would be the means to achieve equitable, sustainable human development.

Since there is no universal model of a green economy, we suggest

it's more useful to speak of green economies that meet particular needs, challenges and opportunities in different parts of the world. However, the process of globalisation, and the global nature of many environmental and social challenges, has increased recognition of the importance of international rules and governance frameworks within which diverse economies evolve.

Significant shifts in rules and governance at various levels are required to address new and complex challenges, and to achieve more sustainable and inclusive development. These changes will require the emergence of a more enlightened sense of self-interest at national and individual levels, based on an understanding of interdependence between nations, and our shared interest in healthy ecosystems. This is especially true of issues relating to the 'global commons', such as the atmosphere and oceans, and the broad range of human activities that affect them.

A PRACTICAL STEP WOULD BE FOR GOVERNMENTS TO AGREE A NEW SET OF GLOBAL SUSTAINABLE DEVELOPMENT GOALS

A practical step would be for governments to agree a new set of global sustainable development goals to guide reforms of international institutions and agreements, and policy making at national level. Governments agreed at Rio+20 to set in train a process to develop such a framework, building on the Millennium Development Goals which are due to be renewed in 2015. While agreeing such goals will itself be a difficult task, the real challenge will be ensuring that they lead to significant policy changes which catalyse and complement 'bottom-up' processes of economic, technological and social change oriented towards sustainable development.

Sustainable development is about meeting human needs now and in the future. Given that green economies are a means to achieve sustainable development, they should deliver two main goals: improving human wellbeing, and maintaining the natural 'life support' systems required to meet the needs of people and other species now and in the future.

At the global level, goals and indicators for green economies could therefore include those set out in the table opposite. We recognise these are not comprehensive, and that global goals would need to be agreed through an inclusive, transparent process informed by science.

Global goals for equitable development and wellbeing should prioritise the needs of those currently living below the poverty line. National and local goals and indicators should be consistent with global goals but also reflect national and local needs and priorities. In the UK, the government is developing new indicators of national wellbeing and sustainable development, see Box 3, page 31.

Potential scope of global sustainable development goals

Improving current wellbeing through equitable human development	Securing current and future wellbeing by maintaining natural systems
• **Food security:** access to sufficient nutrition. • **Income:** eradication of poverty (below $1.25 (at purchasing power parity (PPP)) per day); avoid excessive income inequality. • **Water and sanitation:** access to improved drinking water source; access to improved sanitation. • **Health care:** access to essential medicines. • **Education:** primary school enrolment; literacy rates. • **Energy:** access to electricity; access to clean cooking facilities. • **Gender equality:** employment gap; representation in national parliaments. • **Jobs:** employment levels in decent work.	• **Climate:** atmospheric greenhouse gas concentrations less than 350 parts per million; warming kept below 1.5°C above pre-industrial average; 100% renewable energy by 2050. • **Biodiversity:** halt and then reverse biodiversity loss (Living Planet Index or equivalent measure). • **Forests:** Zero Net Deforestation and Forest Degradation (ZNDD) by 2020 and maintained thereafter. • **Freshwater:** restore and maintain environmental flows in rivers, lakes and aquifers. • **Marine:** restore and maintain depleted fish stocks to sustainable levels; marine protected areas in at least 10% of national waters and the high seas; improve ocean health. • **Nitrogen and phosphorus:** dramatically reduce inputs to the biosphere and oceans. • **Ecological footprint:** stay within the Earth's capacity to renew resources and absorb pollution and waste. • **Waste:** zero waste economy.
Adapted from Raworth (2012), A safe and just space for humanity, published by Oxfam. Illustrative goals/ indicators were compiled from an analysis of social priorities in governments' submissions to the Rio+20 conference in 2012.	*Adapted from WWF policy positions and Rockström et al (2009), Planetary Boundaries. Ecology and Society.*

Can we make poverty history without stressing the planet?

The key issue is compatibility between the dual aims of equitable development and environmental integrity. Since human wellbeing is dependent on healthy ecosystems, the shift to green economies is essential to eradicate poverty for the long term.[71] However, there will sometimes be shorter-term trade-offs between increasing current levels of wellbeing and leaving space for nature and future generations. But evidence is growing that trade-offs can be managed, or even avoided, by solutions that are good not only for the environment but also for equity and human development.

For example, in the case of energy in developing countries, off-grid, decentralised and renewable energy services for poor households are feasible both technically and financially, and would have minimal impact on the climate.[72] And sustainable farming practices have been shown to increase yields, thus contributing to food security and poverty reduction. A review of 286 'best practice' projects across 12.6 million farms in 57 developing countries found that resource-conserving practices (such as integrated pest management, integrated nutrient management, low tillage farming, agroforestry and water harvesting) increased yields on average by 79%, while improving the flow of vital environmental services.[73]

A recent Oxfam paper points out that eradicating extreme poverty *"could be achieved with strikingly little additional demand on resources"*. The paper highlights the following examples:

ERADICATING EXTREME POVERTY "COULD BE ACHIEVED WITH STRIKINGLY LITTLE ADDITIONAL DEMAND ON RESOURCES"

- Food: Providing the additional calories needed by the 13% of the world's population facing hunger (850 million people) would require just 1% of the current global food supply.
- Energy: Bringing electricity to the 19% of the world's population (1.3 billion people) who currently lack it could be achieved with less than a 1% increase in global CO2 emissions.
- Income: Ending income poverty for the 21% of the global population who live on less than $1.25 a day (1.4 billion people) would require just 0.2% of global income.[74]

Given the extreme inequalities of wealth highlighted in Chapter 2, the key challenge and opportunity is achieving a more equitable distribution of resources. WWF believes that the transition to green economies should be guided by the principle that any short-term economic costs involved should not be borne by those currently living in poverty. Rather the costs should be borne by those who can best afford it, having benefited most from unsustainable economic activity to date.

Green growth: holy grail or contradiction in terms?

The current economic crisis, coupled with the environmental limits implied by climate change and other resource thresholds, has led to renewed suggestions that a truly green and sustainable economy would require a shift away from our current growth model.[75] Economic growth is defined as increases in gross domestic product (GDP) and is central to the functioning of the current economic system – sustaining employment, company profits, and government funds to provide public services and infrastructure.

The social consequences of very low or negative economic growth in the current system are plain to see in many European countries today. Austerity and recession are also environmentally damaging as government budgets are cut and regulations may be relaxed. The transition to green economies will require substantial capital investment in sustainable infrastructure and technologies, which will be harder to achieve in the absence of growth.

THE TRANSITION TO GREEN ECONOMIES WILL REQUIRE SUBSTANTIAL CAPITAL INVESTMENT IN SUSTAINABLE INFRASTRUCTURE AND TECHNOLOGIES

Yet the kind of economic growth we depend on now is unsustainable, requiring energy from fossil fuels that threatens our stable climate, and damaging the natural wealth and ecosystems that provide the conditions for life – and future economic growth.

Prospects for green growth

Economic growth has always been closely correlated to physical growth in the amount of energy and resources used by the economy. Achieving 'green growth' would mean breaking this link, so that GDP continues to rise but environmental impacts decline in absolute terms – a process known as 'absolute decoupling'. Previous theories suggested that this process inevitably occurs at advanced stages of economic development; but these did not account for the displaced impacts of heavy industry outsourced to other countries, and subsequent reliance on imported goods. For example, while the UK's territorial greenhouse gas emissions declined by around 20% between 1990 and 2008, the carbon footprint of products and services consumed in the UK (including imports) grew by 20% over the same period.[76]

Absolute decoupling at the global level is theoretically possible. In the context of the need to reduce greenhouse gas emissions to

mitigate climate change, it would require a substantial decline in the carbon intensity of GDP to offset the effects of population and economic growth. In his 2009 book *Prosperity without Growth*, Tim Jackson calculates that carbon intensity would need to decrease annually from now until 2050 by about 10 times the historical rate since 1990, in order to avoid dangerous climate change.[77] This leads him to conclude that the notion of absolute decoupling, and by extension green growth, is a 'myth'.

Others economists[78] suggest that a lack of historical precedent is not a sufficient argument against the feasibility of green growth, and question how an economy without growth could work in practice. WWF's analysis demonstrates how a growing world economy could potentially be almost completely decarbonised by 2050, through a combination of renewable energy and managing demand through energy efficiency and more sustainable lifestyles.[79] Beyond carbon, there is also the potential vastly to improve resource productivity by shifting to 'closed loop' or circular systems that reuse and recycle materials and minimise waste much more than our current linear supply chains.[80]

In practice these represent radical social and technical changes: for example WWF's 100% renewables scenario for 2050 would require a 50% reduction in meat and dairy consumption in OECD countries, to reduce greenhouse gas emissions from agriculture and create space for sustainable biofuels.[81] The inadequacy of the current global response to curbing greenhouse gas emissions illustrates the difficulty and scale of the political challenge.

Measuring progress beyond GDP

The focus on economic growth as an end in itself is problematic. GDP is a measure of economic activity and is widely recognised to be limited as a proxy indicator of human wellbeing and societal progress.[82] GDP does not account for depletion of natural and social capital; it masks inequalities; and it grows with increased spending to address worsening social problems such as ill-health, crime and pollution. We agree with the many organisations and economists who are calling for governments to adopt broader measures of progress, alongside GDP, to orient policy and markets towards delivering human wellbeing now and in the future.[83] Box 3 shows how this is being pursued in the UK.

Box 3:
What is wellbeing? New measures of progress in the UK

In 2010, UK prime minister David Cameron commissioned the Office for National Statistics (ONS) to develop a new framework to measure national wellbeing. In a speech introducing the new initiative, he said:

"This measure that we are setting out today reaffirms the fact that our success as a country is about more than economic growth. It will open a national debate about how together we can build a better life. It will help bring about a re-appraisal of what matters, and in time, it will lead to government policy that is more focused not just on the bottom line, but on all those things that make life worthwhile." [85]

The ONS then conducted a national debate to find out what people consider important to their wellbeing. When asked "What things in life matter to you? What is wellbeing?", the top five answers were as follows:

- health
- good connections with friends and family
- good connections with a spouse or partner
- job satisfaction and economic security
- present and future conditions of the environment.[86]

The ONS used these results to inform the new framework of 40 subjective and objective indicators. They cover a number of 'domains' including health, personal finance, what we do, where we live, and education and skills. There's also a natural environment domain of four indicators: greenhouse gas emissions; air pollution; the extent of protected areas; and percentage of energy consumed from renewable sources.[87]

The proportion of four out of 40 indicators arguably doesn't sufficiently reflect the importance of the natural environment to both current and future wellbeing. However, the ONS points out that sustainable development is measured using a separate set of indicators monitored by the Department for Environment, Food and Rural Affairs.[88] So while the Prime Minister's support for new measures of national wellbeing is welcome, the focus of this support is more on current wellbeing, rather than sustainable development. It will be important for wellbeing to be integrated into a coherent and strategic approach to sustainable development across departments and polices.

Central to this shift will be accounting for stocks and flows of natural capital and ecosystem services, and defining and monitoring critical environmental thresholds – and taking account of these in decision-making. This entails policy and planning processes at local, national and regional levels that consider the impacts and trade-offs that alternative decisions would have on natural capital.[84]

Debates and research on the compatibility of economic growth with environmental sustainability are important, and will continue. But given the severity and urgency of the challenge it seems necessary to do everything we can to make the current system more sustainable, while simultaneously experimenting with alternative economic models. Furthermore, given the limits of GDP as an indictor of wellbeing, it's perhaps necessary to move the debate beyond decoupling growth from environmental impact, to how we can achieve a high quality of life, while living sustainably.

Should we put a price on nature?

A central point of the green economy agenda is that human wellbeing and economic prosperity are dependent on healthy ecosystems. Protecting the environment is therefore an economic and social imperative, as well as a moral responsibility.

To enable a better understanding of the relationship between wellbeing and the environment in particular contexts, methods and tools are available to estimate the value of the services that ecosystems provide to people, and the costs and benefits of different policy options.[89] Thus, for example, the value of forests goes beyond the current market price of timber: it includes the vital role forests play in supporting a range of services, such as storing carbon to regulate the climate, regulating and purifying flows of fresh water for drinking, irrigation and hydropower, as well as cultural and spiritual benefits. These values can be estimated in monetary terms, but also using biophysical or social metrics, such as tons of carbon sequestered or the number and socioeconomic status of people protected from coastal storms.[90]

Currently, many of these 'hidden' values are not reflected in market prices or in government decision-making. This means businesses and consumers enjoy the benefits of economic activity that damages the environment, while the costs are borne by society as a whole and, in particular, by poorer people and future generations. In green economies, policies, prices and decisions would take full account of the hidden value of nature. Decision makers would consider the impacts of alternative decisions on people who benefit from services, and ensure, for example, that the use of forest resources is sustainable, such that the flow of critical ecosystem services is maintained.

IN GREEN ECONOMIES, POLICIES, PRICES AND DECISIONS WOULD TAKE FULL ACCOUNT OF THE HIDDEN VALUE OF NATURE

Concerns

The purpose, philosophy and implications of economic valuation of nature's benefits are debated in both academic literature and policy forums. At Rio+20, some government delegations, civil society organisations and groups representing indigenous peoples argued that the natural environment should be protected not principally because of its economic value, but for its own sake.[91]

There are also concerns that creating financial incentives to sustain ecosystem services will lead to privatisation of common resources, and the 'commodification of nature' – the extension of markets into new areas in ways that could be exploited by elites, leading to inequitable appropriation of new streams of revenue from nature.[92] For example, providing incentives for Reducing Emissions from Deforestation and Forest Degradation (REDD+) poses a number of risks and opportunities for both poverty reduction and conservation, and much hinges on how schemes are designed.[93]

In addition, some critics highlight the methodological challenges to assigning monetary metrics to complex natural processes: different methods can produce different results; valuations can be costly and not easily transferable from one ecological context to another; and there is often a lack of reliable data.[94]

Our view

AT WWF, WE BELIEVE THE NATURAL ENVIRONMENT HAS MANY DIFFERENT VALUES, ONLY SOME OF WHICH CAN BE USEFULLY MEASURED IN MONETARY TERMS

At WWF, we believe the natural environment has many different values, only some of which can be usefully measured in monetary terms. Different people value nature in different ways, and nature also has intrinsic value – beyond that attributed by humans. Governments should ensure these diverse monetary and non-monetary values are taken into account in decision-making and market outcomes.

For example, when appraising policy options and impacts, governments should move beyond cost-benefit analysis based solely on monetary metrics, and towards multi-criteria analysis and inclusive, participatory, deliberative techniques that empower stakeholders to learn and debate how alternative decisions affect environmental values for different groups.[95] At WWF, we're supporting spatially explicit analyses that assess how multiple ecosystem services are affected by well-defined changes in

ecosystem management or use. This new knowledge is often jointly produced with stakeholders through an iterative, participatory decision-making process. We believe this type of valuation process has great potential to create sustainable and fair outcomes for people and nature.

Through the Natural Capital Project (see Box 7, page 46) we've found that decision makers can consider nature's benefits in powerful ways, without always ascribing monetary values. Decision makers have found it useful to examine the consequences of their actions for a host of market and non-market benefits, including cultural and spiritual values, market commodities, and biodiversity. In particular, we encourage, and are pursuing, innovative attempts to understand specific consequences of ecosystem change for livelihoods – for example, how changes in biodiversity and ecosystem services affect different measures of human wellbeing, and the social, economic and demographic status of people affected. It's also possible and consistent to consider the value of biodiversity for its own sake, alongside the value of nature's benefits to people.[96]

IT'S POSSIBLE AND CONSISTENT TO CONSIDER THE VALUE OF BIODIVERSITY FOR ITS OWN SAKE, ALONGSIDE THE VALUE OF NATURE'S BENEFITS TO PEOPLE

We believe that valuation studies should not necessarily lead to commodification or market-based solutions – often, regulatory or community-based responses will be more appropriate.[97] Where market-based solutions are proposed, they should be carefully designed, monitored and adapted, to ensure outcomes are equitable and environmentally sustainable.

© Y. J. REY-MILLET / WWF-CANON

Jaguar (*Panthera onca*), Pantanal, Brazil

4. HOW CAN WE BUILD GREEN ECONOMIES?

No silver bullet

The world faces a range of complex and related challenges, including food, water and energy security, poverty, disease, conflict, climate change, biodiversity loss and economic stagnation. Our current modes of governance and decision-making are struggling to cope. Underlying this is a paradox: in an increasingly complex and dynamic world, we strive increasingly for stability and control through simple blueprints, technological fixes and regulations that can be universally applied.[98] This approach is based on a dominant view of the environment and economies as stable systems that can be controlled by quantifying and managing risks.

SOLUTIONS THAT WORK IN ONE SETTING MAY NOT IN OTHERS, UNLESS ADAPTED TO LOCAL CONDITIONS

Greater understanding of the nature of uncertainty, complexity and (sometimes abrupt) change in social, economic and ecological systems suggests the need for more adaptive and responsive institutions and policies. Solutions that work in one setting may not in others, unless adapted to local conditions.[99] Diverse and complex challenges require diverse responses across multiple scales and domains, not only to ensure effectiveness but also legitimacy – by including people affected by decisions.

In this report we don't attempt to set out a comprehensive roadmap for the transition to green economies; rather we highlight some of the key challenges and potential policy responses at global, national and local levels. This section is divided into 'top-down' change through public policy, and 'bottom-up' social and technological innovation. Crucially, however, these processes interact: changes in public policy shape, and are shaped by, new ideas, technologies, business models and social norms emerging in the private sector, civil society and communities - as illustrated in Figure 1 on the adjacent page.

Public policy: changing the rules of the game

In the current system, economic incentives and social norms are such that environmental degradation is profitable, and sustainable choices are hard to make. Underlying this situation are the predominance and reinforcement of short-term thinking and behaviour, and a lack of understanding about our dependence and impact on nature. But while these human traits are prevalent, we also have remarkable capacities to understand and solve problems, and to plan for the long term.

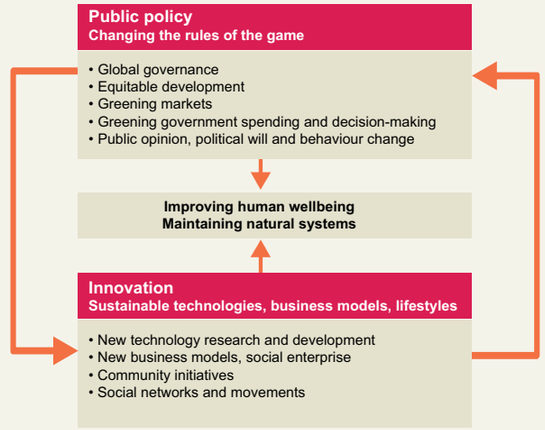


Figure 1: Complementary 'top-down' and 'bottom-up' solutions are needed to build green economies

A cultural shift to longer-term thinking and greater concern for protecting the environment – for its own sake, for ourselves and for future generations – is crucial. But this shift will need to support, and be supported by, public policies that ensure economic incentives are aligned with social justice and maintaining the environmental conditions for our continued prosperity. Only when sustainable activities are rewarded more than unsustainable ones will we achieve a shift to green economies.

Governments have a key role to play. They must create enabling conditions that foster bottom-up technological and social innovation oriented towards sustainable, inclusive development. And they must provide frameworks within which sustainable decisions can positively be made.

Here are some of the key challenges for the shift to green economies, and some corresponding policy responses. These are intended to be illustrative, rather than exhaustive or definitive. There are also significant interdependencies between the issues identified.

Global governance

Challenges

Our economies have become ever more globalised and interdependent, but our institutions have not sufficiently adapted to these changes. Some global issues such as climate change, trade and financial regulation require collective action, but this is hindered by pursuit of narrow national self-interest and lack of trust. Decision-making is insufficiently accountable and transparent. This enables powerful interests, vested in retaining the status quo, to have a disproportionate influence, at the expense of poor and marginalised people, future generations and the natural world. Governance of natural resources and systems is further hindered by a lack of reliable data.

Policy responses

- High-level political commitment, goals and indicators for sustainable development: a global development framework to succeed the Millennium Development Goals from 2015, that fully integrates environmental sustainability with equitable development; new global standards for national accounts that include natural and social capital, and measurement of societal progress beyond GDP. See Box 4.
- Institutional reform: better integration of social and environmental objectives, and a greater voice for poor and marginalised communities, in international institutions such as the UN, World Bank, International Monetary Fund and the World Trade Organisation.
- Improved natural resource management through local, national and global institutions with the mandate and capability to manage trade-offs and ensure sustainable use of resources; investment in ecosystem assessments to close data gaps.

Box 4:
Global sustainable development goals and natural capital accounting

The outcomes from the UN Conference on Sustainable Development at Rio in June 2012 were widely regarded as disappointing and inadequate. However, most stakeholders welcomed the commitment to agree a new framework of global goals for sustainable development to succeed the Millennium Development Goals in 2015. This is an important opportunity to promote collective action by governments, and focus policies on achieving equitable development while maintaining natural systems. The process for agreeing the goals needs to be transparent, inclusive, and informed by the latest science on critical global environmental thresholds or planetary boundaries.

At national level, governments will need to manage and monitor environmental impacts in a much more rigorous and strategic way. To this end, the UK government has set up the Natural Capital Committee to advise on the condition of the natural environment and sustainability of natural resource use. The government has also committed to integrating natural capital into national accounts so environmental assets and liabilities are accounted for when measuring economic progress. These are important developments that should be replicated in other countries, but the real test will be the extent to which they influence the government's central economic strategy.

Equitable development

Challenges

Rising levels of inequality are related in complex ways to sustainability. For example, poverty is both a cause and effect of population growth, but both could be seen as symptoms of a dysfunctional economic system. Conspicuous consumption is more prevalent in highly unequal societies where concern for social status is more acute.[100] Poor people often depend most directly on the ecosystems threatened by economic activities geared towards global markets. But badly designed environmental policies could disproportionately affect low-income groups in the short term – for example by increasing the cost of energy and food, and contributing to job losses in energy-intensive industries.

Policy responses

- Greater representation for poor and marginalised people at all levels of governance: multiple, diverse solutions are required to address complex poverty challenges. These should be developed through direct involvement of those affected by decisions, using participative democratic processes.
- Ensure a fair distribution of the costs and benefits of the transition to green economies: specific measures to protect low-income groups could include tax credits, land ownership and access rights, energy-efficient social housing, better public transport, etc.
- Support for the transition to green jobs: training programmes for new skills requirements; income security for workers' transition from declining firms to growing firms and sectors; assuring worker rights and promoting social inclusion in new green sectors.
- Non-coercive measures to reduce the rate of population growth, including tackling poverty, and promoting education, empowerment and access to health services for women.

Greening markets

Challenges

Many of the benefits we derive from nature, such as clean air, fertile soil and a stable climate, are not currently recognised and valued in markets, and therefore don't have a price. Decisions in business and government are shaped by calculations of economic efficiency and financial return that don't take into account the cost of depleting natural capital. When economic activity damages the capacity of ecosystems to continue providing benefits, businesses and consumers often avoid paying the costs, which are borne instead by society at large, vulnerable communities and future generations. Meanwhile, commodity prices for food, fossil fuels and metals are rising and volatile due to a range of economic, environmental and political factors, adding costs to business and threatening future prosperity. While these changes provide an incentive for resource efficiency, in the short term the poorest are hit hardest as they spend a greater proportion of their income on life's essentials.

Policy responses

Provide incentives for resource productivity, sustainable renewable energy, conservation and ecological restoration through:

- Tax and subsidy reform to reflect environmental costs and benefits: a greener and fairer tax system where the burden is shifted from labour, salaries and profits, towards natural resources and pollution, and closing loopholes and tax havens. Phase out harmful direct and indirect subsidies on fossil fuels, agriculture and fisheries, and deploy transition measures to protect low-income groups.
- Financial market reform: current national and international regulatory reform processes that aim to promote financial stability should be broadened to promote environmentally sustainable investment, and a more diverse and decentralised banking system. Mandatory sustainability reporting to inform investor decisions. See Box 5 , page 42.
- Energy market reform: long-term government targets for decarbonised and renewable energy; clear policy frameworks to achieve targets, providing certainty for investors.[101]
- Green investment banks: hybrid, state-owned banks that mobilise private investment for clean technologies and infrastructure projects.

- **Innovation and industrial policy:** ensure sustainability is a key cross-cutting objective for all sectors of the economy.
- **Equitable financial mechanisms, licensing and permit schemes** to provide businesses and communities with incentives to engage in conservation and sustainable resource use.
See Box 6, page 44.

Box 5:
Greening China's global footprint

China is the world's second-largest economy, behind the US – and it's one of the fastest-growing. China's demand on natural resources and ecosystems around the world is correspondingly large and increasing. However, on a per capita basis, China's ecological footprint in 2008 was 30% that of the US, and 45% of the UK's.[102] WWF is working in China to promote sustainable international capital and trade flows between China and the rest of the world. Our overall goal is to ensure sustainability criteria are at the heart of economic decision-making processes.

WWF contributed to the establishment of guidelines to promote environmental standards for high-impact sectors including finance, forestry and mining – the first of their kind in China. We're also supporting the implementation of the 'Guidelines for Chinese forestry operators working overseas' in Gabon and Mozambique, to ensure they make a real difference on the ground. In the finance sector, the Chinese Banking Regulatory Commission has recently issued green credit guidelines for Chinese financial institutions investing both at home and overseas. The guidelines include new requirements for effective environmental and social risk management, and adoption of international sustainability best practices or standards for overseas projects.

WWF is also developing the *China Green Economy Index Report 2012*, which ranks China's provinces according to scores on a new framework of economic, social and environmental indicators. This promotes a 'race to the top' among provincial governments, and highlights the importance of broadening measures of progress beyond GDP.

People working at Nature, a laminate flooring factory, Shanghai, China. Nature is a member of the WWF's Forest Trade Network and is working to ensure that its timber is procured from forests that are sustainably managed. Flooring from this factory is exported to markets in the US and EU

Box 6:
Sustainable forest economies in Acre, Brazil

The conventional economic paradigm views forests as obstacles to more financially rewarding activities such as agriculture and mining. Local communities that depend on forest land for their livelihoods often don't benefit from this approach.

In Brazil's north-western state of Acre, the state government has responded to popular resistance to forest clearance by pursuing an alternative pathway. It aims to unlock the value of forest assets by improving harvesting and processing of sustainable products such as timber, rubber, brazil nuts and açaí berries.

The government has also designed a system of incentives for environmental services such as forest carbon, water resources and climate regulation. Legislation was passed following extensive public consultation, and the system is geared primarily to support forest-based socioeconomic development for low-income groups.

In 1998, 95% of timber from Acre was illegal; now 98% is legal.[103] The substantial reduction in deforestation during this period has not come at the expense of economic development: GDP is now three times higher than it was 12 years ago.[104]

WWF has partnered with Sky to support work in Acre through the Sky Rainforest Rescue initiative. We're also supporting the Global Canopy Programme on a pilot project in Acre on sustainable financing of forest conservation and valuation of natural capital.

Greening government spending and decision-making

Challenges

At a time of urgent need for investment in public goods such as environmental protection, there is less public money available in countries with large deficits. Government responses include spending less on environmental objectives and public services, and more on high-carbon infrastructure such as roads and airports to boost growth. Harmful subsidies exist for established fossil fuels and nuclear industries while new clean technologies that need support to overcome barriers to market entry remain underfunded.

Policy responses

- **Boost economies through public investment in sustainable renewable infrastructure, and energy and resource efficiency,** for example, renewables, smart grids, energy-efficient buildings and sustainable public transport. Green investment could be sourced from green tax revenues (such as the EU emissions trading scheme and the UK carbon floor price) and by phasing out harmful subsidies.
- **Embed the value of 'natural capital' in government decision-making,** ensuring public sector investments sustain, restore and protect the benefits that nature provides to people. See Box 7, page 46.
- **Stronger sustainability screening in public procurement policies and practice** to drive greening of supply chains, including certified sustainable wood, soy, palm oil and seafood.

Box 7:
The Natural Capital Project

Government decision-making often disregards the benefits that nature provides, leading to policies and plans that harm ecosystems, biodiversity and human wellbeing. WWF, The Nature Conservancy, Stanford University and the University of Minnesota joined forces to develop a free, open source software tool – InVEST – to help decision makers better assess the impacts of different decisions on nature's benefits to people.

InVEST has been used successfully around the world in places as diverse as Colombia, China, Hawaii, Sumatra, Borneo and Belize. It can be used to map, quantify and value the impacts on nature's benefits in the context of land use and marine spatial planning, strategic environmental assessments, climate adaptation strategies and business strategy and operational decisions. Decision makers develop future scenarios to map out, for example, where marine protected areas could be established, where agricultural land might be converted to residential development, or where climate change is expected to affect precipitation and temperature patterns. They can then assess the impacts of these scenarios on services that ecosystems provide to people.

In Sumatra, the InVEST tool showed how landscapes providing habitat for tigers also provide carbon storage in forests and soil, as well as erosion prevention and other services. Local governments are using these results to prioritise forest carbon and watershed conservation projects, which improve both wildlife conservation and human wellbeing.
www.naturalcapitalproject.org

Public opinion, political will and behaviour change

Challenges

Political will for green policies is undermined by lower public concern about environmental issues during harder times.[105] There's a mismatch of responsibility and impact – with richer people and nations bearing more responsibility for degrading the global environment, and low-income people and nations bearing the brunt of the consequences. In richer countries, immediate economic concerns about jobs, housing and inflation outweigh concerns about seemingly long-term, distant and uncertain threats such as climate change. Strong and entrenched social norms encourage resource-intensive lifestyles.

Policy responses

- Bold leadership from politicians, opinion formers, business and civil society to promote new, positive sustainability narratives. These should highlight the benefits of sustainable lifestyles, emphasise our dependence on nature and the links with economic security, and our responsibility to people in other countries and future generations.
- Policies to promote sustainable lifestyles: support grassroots community networks and projects for sustainability; encourage and support schools to embed sustainability principles in their curriculum, ethos and operations; promote systems, technologies and infrastructure that make sustainable behaviour easier – such as smart meters, better public transport, recycling services, etc; integrate sustainability into public health messaging, for example, sustainable and healthy diets.[106]

Priority actions for UK governments

Global governance

1. Promote global goals that deliver sustainable development and long-term poverty reduction: as co-chair of the UN High Level Panel on the post-2015 development framework, the UK prime minister should ensure that sustainable development is central to discussions and recommendations; and that the work of the panel is transparent, inclusive, and informed by the latest science on global environmental challenges.

Equitable development

2. Promote sustainable development in all countries, particularly least developed countries:

- Uphold the welcome commitment to meeting the G8 target of investing 0.7% of GDP in overseas development assistance by 2015, ensuring investments target sustainable development, underpinning long-term poverty reduction.
- Uphold the £2.9 billion pledged for climate adaptation and low-carbon development in developing countries over the next three years; and support efforts to develop new and innovative forms of climate finance such as from international aviation and shipping.

3. Promote a just transition to green economies in the UK:

- Ensure a fair distribution of the costs and benefits of government policies, and support the transition to green jobs, for example through training and skills strategies.
- Maximise the potential for energy efficiency measures to eradicate fuel poverty, including by strengthening provisions in the Energy Company Obligations and ensuring that minimum standards in the private rented sector are upheld and enforced.

Greening markets

4. Drive the transition to a low-carbon energy system at EU, UK and devolved levels:

- Set ambitious renewable energy targets for 2030 at EU, UK and devolved levels, and give absolute policy certainty to deliver the legally-binding target for 2020.
- Ensure the EU increases the ambition of its 2020 emissions target to deliver domestic reductions of at least 30% below 1990 levels.
- Ensure the UK Energy Bill is intended to deliver a nearly carbon-free power sector by 2030, with strong provisions for demand reduction and renewable energy.
- Immediately adopt the 'intended' UK carbon budgets recommended by the Committee on Climate Change.
- Include aviation and shipping emissions in carbon budgets by the end of 2012, as recommended by the Committee on Climate Change.
- Invest revenues from the EU emissions trading scheme and carbon floor price in energy efficiency measures.
- Ensure the Green Investment Bank is allowed to borrow from capital markets, and that lending is restricted to investments that are compatible with delivering the UK's carbon budgets.
- Commission the Committee on Climate Change to advise on reducing equitably the UK's consumption footprint, including emissions embedded in imported goods.

5. Implement a significant, fiscally-neutral green tax shift, towards pollution and resource use, and away from wages and company profits. Reverse the decision to exclude fuel duty, vehicle excise duty and air passenger duty from the UK government's definition of 'environmental taxation'. This change hugely weakens the government's welcome commitment to increase the overall proportion of environmental taxation during this Parliament.

6. Implement smarter regulation of financial markets and corporate governance to promote long-term thinking and environmentally sustainable investment in the UK and overseas. And implement the recommendations of the Kay Review on UK equity markets and long-term decision-making.

7. Create multi-stakeholder sectoral forums to develop specific green economy solutions for different industries. Make this approach a key part of a forward-looking industrial policy, with effective collaboration between business, environment and energy ministries.

Greening government spending and decision-making

8. Make the shift to green economies central to plans for economic regeneration, including taxation, spending, plans for growth, infrastructure and planning policies. Divert funds from high-carbon infrastructure such as roads and airports, to renewable energy, smart grids, energy efficiency, railways and broadband.

9. Mainstream sustainable development throughout government:

- Adopt new targets and measures of government performance and societal progress beyond GDP, and aim to decouple wellbeing from environmental impact.
- Ensure government decision-making takes full account of environmental risk, and the monetary and non-monetary value of the natural environment, for example, in policy appraisals, macroeconomic models, the Comprehensive Spending Review, impact assessments, planning policies etc.
- Ensure government policy is consistent with the advice of the Natural Capital Committee.
- Implement stronger sustainability screening in public procurement policies and practice to drive greening of supply chains.

Public opinion, political will and behaviour change

10. Ensure greater leadership from the UK prime minister and chancellor, linking environmental sustainability to the wider call for responsible capitalism and a fairer, more resilient economy. Create a positive agenda beyond deficit reduction that brings together wellbeing, sustainability, fairness and economic security.

11. Implement comprehensive and effective regulations across all media protecting children from excessive commercial pressures, as per the 2011 Bailey Review on the commercialisation and sexualisation of childhood.

12. Develop strategic policy interventions in key systems such as food, housing, transport and energy that make sustainable choices easier and more affordable for consumers, as well as commercially viable for businesses.

Innovation: sustainable technologies, business models and lifestyles

As discussed, government action to change the rules of the game should enable, and be enabled by, complementary actions by citizens, communities, businesses and civil society organisations. The shift to green economies will require transformative change in complex systems of production and consumption such as energy, food, transport and buildings. On the one hand, these systems meet essential human needs. But on the other, they currently have a high impact on the environment and are not sufficiently beneficial to poor and marginalised groups.

Research into such systems has shown that processes of change are often 'locked in' to unsustainable and inequitable pathways, shaped by existing policies, technologies, infrastructure, vested interests and social norms that exclude sustainable and equitable alternatives.[107]

In the UK, for example, the integration of more widely distributed, small-scale and renewable energy production is hampered not mainly by technological feasibility, but by policies, infrastructure and mindsets that favour a centralised, large-scale energy system based on fossil fuels and nuclear.[108] However, new business models are beginning to emerge at the grassroots, see Box 8, page 52.

The shift to more sustainable systems therefore requires not only technological innovation, but also new policies, business models and institutions. It also requires 'social innovations' such as new mindsets, behaviours and norms that promote more sustainable lifestyles and consumption patterns.

GREEN INNOVATIONS OFTEN EMERGE IN 'NICHES' AT THE MARGINS OF MAINSTREAM ACTIVITIES, PROTECTED FROM DOMINANT MARKET AND CULTURAL FORCES

How innovation happens

Green innovations often emerge in 'niches' at the margins of mainstream activities, protected from dominant market and cultural forces. They may take the form of research projects, community initiatives, small businesses, innovation units in larger companies, social enterprises, social movements and so on. Innovations can occur at any point in systems of production and consumption, from more efficient industrial processes to shifts in consumption practices towards more sustainable lifestyles; and interventions at one 'leverage point' can influence change across the system as a whole.[113]

Innovations face many challenges in breaking into the mainstream, including the resistance to change of established social norms, and economic and policy frameworks; lack of knowledge and financial resources; and inadequate mechanisms to promote the spread of new ideas and practices. But the successful creation and diffusion of 'bottom-up' solutions can lead to higher-level policy and legislative change that further promotes more widespread change in technology and practice on the ground.[114]

For example, in the UK the Transition Town movement, which promotes positive local responses to address climate change and rising oil prices, has influenced the thinking of all the main political parties on localism and community empowerment. International policy processes are also influenced by innovations and best-practice at national and local levels, which leads to change well beyond the scope of the initial idea.

Box 8:
Harnessing community energy in the UK

Community innovations for sustainable energy are flourishing in the UK: by 2005, over 500 community projects were involved in activities such as renewable energy production, household energy efficiency measures and behaviour change to reduce energy demand.[109] Since 2008, 30 community-owned renewable energy co-operatives have been set up, and there are 24 more in the pipeline.[110]

N evertheless, this is just a drop in the ocean. About 7% of the UK's electricity demand is met with renewables, and only 1% of this capacity is community-owned. But there is huge potential for growth: in Germany, renewables account for 20% of total electricity production, a quarter of which is community-owned.[111] One important benefit is that community ownership helps to build local support for renewable energy projects that otherwise people can feel are imposed on them from outside.

Community initiatives face many barriers in the UK, where six energy companies dominate 99% of the market.[112] Energy market reforms should aim to remove barriers to entry for smaller providers: this would promote a more sustainable energy system, and increase competition, reducing bills for consumers.

WWF has long played a role to convene stakeholders in specific sectors and systems to catalyse sustainable solutions. In the UK, we've developed initiatives to promote sustainable innovations in two key systems: finance (Box 9) and food (Box 10).

Box 9:
Finance Innovation Lab – rethinking finance for people and planet

Launched in the wake of the 2008 financial crisis, this project aims to inspire and catalyse change in the financial system to create a new prosperity – for people and planet. It was initiated by WWF and the Institute of Chartered Accountants in England and Wales. The Lab connects over 3,500 participants from all over the world, from mainstream finance, academia, NGOs, the creative industries and the alternative business and finance world.

The Lab has become a space to develop and incubate projects that focus on the type of financial system we want for the future. Projects so far include support for nine social entrepreneurs and a group campaigning for monetary policy alternatives. The Lab also hosts the TEEB for Business Coalition, which aims to shift corporate behaviour so it enhances rather than depletes natural capital. *www.thefinancelab.org*

Box 10:
Tasting the Future – promoting healthy and sustainable diets

The current Western diet is neither ecologically sustainable nor good for people's health. Tasting the Future is a community of practitioners in the UK who are working towards a sustainable food future. We launched it in 2010, and it has already attracted over 600 participants from across the food system including retailers, producers, NGOs, community groups, social enterprise and government.

The community connects innovators, cultivates capacity and influences the conditions that shape change in the food system – for example in public policy and private finance. Members collaborate on innovation 'domains' such as new business models, changing consumption, reducing food waste, and supply chain innovation. *www.tastingthefuture.ning.com*

COMMUNITY ENERGY

Community innovations for sustainable energy are flourishing in the UK. In April 2012, community groups Repowering South London and Brixton Energy installed the UK's first inner-city co-operatively owned solar power plant on social housing. As well as generating clean energy, the project promotes low-cost energy efficiency measures and provides work placements for local people.

Pictured left to right are Agamemnon Otero, Director Brixton Energy Solar 1; Afsheen Rashid, Lambeth Community Energy Officer; and Kevin Wilson, work experience placement

5. CONCLUSION

Linking wellbeing, sustainability, fairness and economic security

In this report we've addressed a major challenge facing humanity: globally, around a billion people are without the food, water and energy they need to live a decent life, yet we are already putting too much pressure on the planet.

To rise to this challenge we need to build green economies. We need a global economic transformation that promotes a rapid shift to sustainable infrastructure, technologies and lifestyles, and a more equitable distribution of resources. While this will not be easy, we believe it's both possible and necessary. We have faith in humanity's capacity to create solutions for a better world.

But are the required changes politically realistic? To what extent do they align with people's aspirations and wellbeing? The dominant view of wellbeing, as promoted by mainstream economists and marketeers, is that it's equivalent to the amount and type of goods and services we consume. This mindset has for a long time permeated through governments, the media and advertising, and influenced people's aspirations.[115] According to this view, there are significant tensions and trade-offs between the environment, sustainability and wellbeing.

But broader conceptions of human wellbeing suggest there are a number of other important factors that are common across cultures. These include access to basic material needs, economic security, decent jobs, strong social relationships, good health, and freedom of choice and action.[116] These broader conceptions offer more scope for synergies between personal wellbeing and sustainable development.

As we have seen, a healthy natural environment is essential to provide humanity's basic material needs such as food, water, fibre, and energy. Economic recovery, decent jobs and long-term security are dependent on the shift to green economies – to manage rising commodity prices, minimise environmental costs, and develop new sources of sustainable growth in low-carbon, resource-efficient infrastructure and industries.

THERE IS EVIDENCE THAT SUSTAINABLE LIFESTYLES CAN PROMOTE WELLBEING

There is also evidence that sustainable lifestyles can promote wellbeing. For example, UK government guidelines on healthy diets include eating less meat than is currently consumed on average, which would also be environmentally beneficial.[117] And sustainable travel behaviours, such as driving less, and walking and cycling more, can improve fitness, reduce stress, reduce traffic and improve air quality.[118]

Arguments for green economies can thus resonate with people's concern for their own wellbeing. They can also resonate with concerns about the wellbeing of their children, future generations, and people less fortunate than themselves. And they can resonate with people's love for nature, and the millions of species that share our home.

The links between wellbeing, sustainability, fairness and economic security should be central to the thinking of governments as they seek positive agendas beyond austerity and deficit reduction. However, ministerial responsibility for these objectives is often spread across several departments, which frames them as competing priorities.[119] Governments, business and civil society need to show bold leadership to change this perspective, realise the potential to develop complementary solutions, and create a better future for people and the planet.

NOTES

1 Credit Suisse (2011), *Global Wealth Report*.

2 US Department of Energy figures published in November 2011; Intergovernmental Panel on Climate Change (2007), *Fourth Assessment Report*.

3 WWF (2012), *Living Planet Report*.

4 Ellen MacArthur Foundation (2012), *Towards the circular economy*.

5 CBI (2012), *The colour of growth: maximising the potential of green business*.

6 Raworth (2012), *A safe and just space for humanity*, published by Oxfam.

7 UNDP (2011), *Human Development Report: Sustainability and equity: a better future for all*; UNEP (2011), *Towards a Green Economy: pathways to sustainable development and poverty eradication*.

8 See for example United Nations Environment Programme's (UNEP) Green Economy Initiative, and the creation of the Green Economy Coalition in 2010.

9 UK Government (2011), *Enabling the transition to a green economy*.

10 The classic definition of sustainable development is from the 1987 Brundtland Commission report, *Our Common Future*: 'sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.'

11 See for example Monbiot (2012), *Putting a price on the rivers and rain diminishes us all*. The Guardian, 6 August.

12 See for example UNEP (2011), *Towards a Green Economy: pathways to sustainable development and poverty eradication*.

13 From *Resilient People, Resilient Planet: A Future Worth Choosing* (2012), report of the High Level Panel of 22 serving and former senior politicians from around the world.

14 For example, the UN Human Development Index, which measures changes in income, education and life expectancy, rose by 22% globally between 1980 and 2011.

15 UN (2011), *Millennium Development Goals Report*; World Bank (2012) *An update to the World Bank's estimates on consumption poverty in the developing world*. The poverty line was raised to US$1.25 dollars a day to account for inflation.

16 UN (2011), *Millennium Development Goals Report*.

17 International Labour Organisation and International Institute for Labour Studies (2012), *World of Work Report 2012*.

18 Milanovic (2011), *The haves and the have nots: A brief and idiosyncratic history of global inequality*.

19 Credit Suisse (2011), *Global Wealth Report*.

20 UN (2011), *Millennium Development Goals Report*.

21 WWF (2012), *Living Planet Report*.

22 US Department of Energy figures published in November 2011; Intergovernmental Panel on Climate Change (2007), *Fourth Assessment Report*.

23 UNEP (2011), *Bridging the emissions gap*.

24 WWF (2012), *Living Planet Report*.

25 See for example UNEP (2012), *Global Environmental Outlook 5*; OECD (2012), *Environmental Outlook to 2050*; Millennium Ecosystem Assessment (2005), *Ecosystems and human wellbeing: synthesis report*.

26 Rockström et al (2009), *Planetary boundaries: exploring the safe operating space for humanity*, Ecology and Society. The full list of nine suggested boundaries are climate change, stratospheric ozone, land use change, freshwater use, biological diversity, ocean acidification, nitrogen and phosphorus inputs to the biosphere and oceans, aerosol loading, and chemical pollution.

27 Beddington (2009), *Food, Energy, Water and the Climate: A Perfect Storm of Global Events?*

28 International Energy Agency (2011), *World Energy Outlook*.

29 TEEB (2010), *The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB*.

30 Mace, Norris and Fitter (2012), *Biodiversity and ecosystem services: a multilayered relationship*. Trends in Ecology and Evolution, 2012:27; Naeem, Bunker, Hector, Loreau and Perrings (eds) (2009), *Biodiversity, ecosystem functioning and human wellbeing*.

31 TEEB (2010), *The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB*; UNEP (2011), *Towards a Green Economy: pathways to sustainable development and poverty eradication; Millennium Ecosystem Assessment* (2005), *Ecosystems and human wellbeing: synthesis report*; Intergovernmental Panel on Climate Change (2007) *Fourth Assessment Report*.

32 UNDP (2011), *Human Development Report 2011*; TEEB (2010).

33 WWF (2012), *Living Planet Report*.

34 UK National Ecosystem Assessment (2011), Chapter 21: *UK dependence on non-UK ecosystem services*.

35 TEEB (2010), *The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB*.

36 WWF (2012), *Living Planet Report*; and Simms et al (2009), *The Consumption Explosion*. Published by the New Economics Foundation and Open University.

37 Sternberg (2012), *Chinese drought, bread and the Arab Spring*. Applied Geography.

38 See quote from UK chancellor George Osborne under note 2 above; and media campaigns in the Daily Telegraph and Daily Mail that blame low-carbon policies for rising energy prices, despite the main cause being rising wholesale gas prices.

39 CBI press release, 5 July 2012, on the launch of their report, *The colour of growth: maximising the potential of green business*.

40 Zenghelis (2012), *A strategy for restoring confidence and economic growth through green investment and innovation*, Grantham Research Institute on Climate Change and the Environment.

41 Ibid.

42 Ibid; see also Romani, Stern and Zenghelis (2011), *The basic economics of low carbon growth in the UK*. Grantham Research Institute on Climate Change and the Environment.

43 See UK chancellor George Osborne's Autumn Statement, November 2011, the UK Budget Report 2012, and the UK National Infrastructure Plan 2011, all published by HM Treasury.

44 Hewett (2012), *Saving for a sustainable future*. Green Alliance.

45 KfW press release (2011), *KfW programmes Energy-efficient Construction and Refurbishment: public budgets benefit up to fivefold from 'promotional euros.'*

46 Ibid.

47 Statistics cited by Damian Carrington, writing in The Guardian, 24 May 2012. Total CO2 emissions in 2011 were 799.7 million tonnes according to German government figures published in April 2012.

48 International Labour Organisation (2012), *Working towards sustainable development: opportunities for decent work and social inclusion in a green economy*; see also International Labour Organisation and Organisation for Economic Co-operation and Development (2012), *Sustainable development, green growth and quality employment*, and OECD (2012), *The jobs potential of a shift towards a low carbon economy*.

49 International Labour Organisation press release, 31 May 2012, *Transition to green economy could yield up to 60 million jobs, ILO says*.

50 McKinsey Global Institute (2011), *Resource Revolution: Meeting the world's energy, materials, food and water needs*.

51 Ibid.

52 Elliott (2012), *US drought will lead to inflation and higher food prices, says report*. The Guardian, 20 August.

53 McKinsey Global Institute (2011), *Resource Revolution: Meeting the world's energy, materials, food and water needs*.

54 Research by the McKinsey & Co published in Ellen MacArthur Foundation (2012), *Towards the circular economy*.

55 Ibid.

56 Research by Trucost for UNEP Finance Initiative and Principles for Responsible Investment (PRI) initiative (2010), *Universal Ownership: Why environmental externalities matter to institutional investors*.

57 TEEB (2010), *The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB*.

58 Stern (2006), *Review on the economics of climate change*.

59 TEEB (2010), *The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB*.

60 UNEP (2011), *Towards a Green Economy: pathways to sustainable development and poverty eradication*.

61 Van Paddenburg, Bassi, Buter, Cosslett and Dean (2012), *Heart of Borneo: Investing in Nature for a Green Economy*. WWF Heart of Borneo Global Initiative, Jakarta.

62 Pegram (2010), *Global water scarcity: risks and challenges for business*. Lloyds and WWF.

63 See *http://waterriskfilter.panda.org/*

64 See *www.naturalcapitaldeclaration.org*

65 See *www.aviva.com/earthsummit2012*

66 UNEP (2011), *Towards a Green Economy: pathways to sustainable development and poverty eradication*.

67 Members of the Green Economy Coalition include WWF, International Institute for Environment and Development, UNEP's Green Economy Initiative, International Union for the Conservation of Nature, International Institute for Sustainable Development, International Trade Union Confederation, World Business Council for Sustainable Development, Consumers International, Global Reporting Initiative and others, see *http://www.greeneconomycoalition.org/*

68 Green Economy Coalition (2011), *Submission to the UN Conference on Sustainable Development zero draft text*.

69 UK Government (2011), *Enabling the transition to a green economy*.

70 Meadows (1999), *Leverage points: places to intervene in a system*. The Sustainability Institute.

71 UNEP (2011), *Towards a Green Economy: pathways to sustainable development and poverty eradication*.

72 UNDP (2011), *Human Development Report: Sustainability and equity: a better future for all*.

73 Pretty et al (2006), *Resource Conserving Agriculture Increases Yields in Developing Countries*. Environmental Science and Technology, 40. Cited in UNEP (2011), *Towards a green economy: a synthesis for policy makers*.

74 Raworth (2012), *A safe and just space for humanity*. Published by Oxfam. The following sources were used. Food: UN Food and Agriculture Organisation statistics (author's calculations). Energy: OECD/IEA (2011), *Energy for All: Financing Access for the Poor*. Income: Chandy and Gertz (2011), *Poverty in numbers: The changing state of global poverty from 2005 to 2015*. The Brookings Institution.

75 For example Jackson (2009), *Prosperity without growth*; and Simms, Johnson and Chowla (2010), *Growth isn't possible*.

76 UK Department for Environment, Food and Rural Affairs figures, published 2011.

77 Jackson (2009), *Prosperity without growth*.

78 For example Michael Jacobs (University College London) and Matthew Lockwood (Institute of Development Studies).

79 WWF (2011), *The Energy Report: 100% renewable energy by 2050*.

80 McKinsey Global Institute (2011), *Resource Revolution: Meeting the world's energy, materials, food and water needs*; Ellen MacArthur Foundation (2012), *Towards the circular economy*; and Aldersgate Group (2012), *Resilience in the Round – seizing the growth opportunities of the circular economy*.

81 WWF (2011), *The Energy Report: 100% renewable energy by 2050*.

82 See for example Stiglitz, Sen and Fitoussi (2009), *Report on the Measurement of Economic Performance and Societal Progress*; and UK prime minister David Cameron's 2010 speeches on the need for new measures of wellbeing.

83 For example, this agenda is supported by UNEP, the European Commission, the UK and French governments, Green Economy Coalition, OECD, and the UN high level panel on Sustainability. Supportive economists include Joseph Stiglitz, Amartya Sen, Jean-Paul Fitoussi, Partha Dasgupta and Dieter Helm.

84 McKenzie et al (2011), *Integrating ecosystem services in decisions*. Chapter 19 in Kareiva et al, *The theory and practice of mapping ecosystem services*.

85 UK prime minister David Cameron's speech on measuring national wellbeing, 25 November 2010. From the Number 10 website.

86 ONS (2011), *National Statistician's reflections on the national debate on measuring national wellbeing*.

87 ONS (2012), *Measuring national wellbeing: summary of proposed domains and indicators*.

88 Ibid.

89 See for example TEEB (2010), *The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB*; Goulder and Kennedy (2011), *Interpreting and estimating the value of ecosystem services.* In, Kareiva et al, *The theory and practice of mapping ecosystem services;* Millennium Ecosystem Assessment (2003), *Concepts of ecosystem value and valuation approaches.* In *Ecosystems and Human Wellbeing. A Framework for Assessment; A Report of the Conceptual Framework Working group of the Millennium Ecosystem Assessment.*

90 Ruckelshaus et al (2012), in review. *Notes from the field: Lessons learned from using ecosystem services to inform real-world decisions.* Ecological Economics.

91 Critical voices at Rio included Bolivia and Venezuela; the World Development Movement; and see also the *Kari-Oca 2 Declaration of Indigenous Peoples.*

92 See for example Monbiot (2012), *Putting a price on the rivers and rain diminishes us all.* The Guardian, 6 August.

93 Peskett et al (2008), *Making REDD work for the poor.* Poverty Environment Partnership report.

94 Spangenberga and Settelea (2010), *Precisely incorrect? Monetising the value of ecosystem services.* Ecological Complexity.

95 More information on the limits of, and alternatives to, cost-benefit analysis can be found in Wegner and Pascual (2011), *Cost-benefit analysis in the context of ecosystem services for human well-being: A multidisciplinary critique.* Global Environmental Change; and Turner (2010), *A Pluralistic Approach to Ecosystem Services Evaluation.* CSERGE Working Paper.

96 Reyers et al (2012), *Finding common ground for biodiversity and ecosystem services.* Bioscience.

97 McKenzie et al (2011), *Integrating ecosystem services in decisions.* Chapter 19 in Kareiva et al, *The theory and practice of mapping ecosystem services.*

98 Leach, Scoones and Stirling (2010), *Dynamic Sustainabilities: Technology, Environment, Social Justice.*

99 Ostrom (1990), *Governing the commons: the evolution of institutions for collective action.*

100 See Royal Society (2012), *People and Planet;* Jackson (2009), *Prosperity without Growth.*

101 See WWF (2011), *Positive Energy: how renewable electricity can transform the UK by 2030.*

102 WWF (2012), *Living Planet Report.*

103 From a speech by Acre's Governor, Tiao Viana, at the World Forum on Enterprise and the Environment, 2011, quoted by Damian Carrington writing in The Guardian, 29 June 2011.

104 From a speech by Acre's Governor, Tiao Viana, at the World Forum on Enterprise and the Environment, 2011, quoted in the *Summary of proceedings.*

105 Scruggs and Benegal (2012), *Declining public concern about climate change: Can we blame the great recession?* Global Environmental Change.

106 Research shows a strong correlation between UK government healthy eating guidelines and sustainable diets: WWF and Rowett Institute of Nutrition and Health (2011), *Livewell: a balance of healthy and sustainable food choices.*

107 For a summary of the literature, see Elzen, Geels and Green (2004), *System Innovation and the Transition to Sustainability*; and Leach, Scoones and Stirling (2010), *Dynamic Sustainabilities: Technology, Environment, Social Justice.*

108 Leach, Scoones and Stirling (2010), *Dynamic Sustainabilities: Technology, Environment, Social Justice.*

109 Hielscher, Seyfang and Smith (2011), *Community innovation for sustainable energy.* CSERGE working paper.

110 Willis and Willis (2011), *Co-operative renewable energy in the UK.* Published by Co-operatives UK and The Co-operative.

111 Julian and Dobson (2012), *Re-energising our communities.* A ResPublica green paper.

112 Platt (2012), *The true cost of energy.* Published by IPPR.

113 Elzen, Geels and Green (2004), *System Innovation and the Transition to Sustainability*; Meadows (1999), *Leverage points: places to intervene in a system.* The Sustainability Institute.

114 Ibid.

115 Jackson (2009), Prosperity without growth.

116 See for example Millennium Ecosystem Assessment (2005), *Ecosystems and human wellbeing: synthesis report*; Sen (1999), *Development as Freedom*; and ONS (2011), *National Statistician's reflections on the national debate on measuring national wellbeing.*

117 WWF and Rowett Institute of Nutrition and Health (2011), *Livewell: a balance of healthy and sustainable food choices.*

118 De Hartog et al (2010), *Do the health benefits of cycling outweigh the risks?* Environmental Health Perspectives; Pucher et al (2010), *Walking and cycling to health: a comparative analysis of city, state, and international data.* American Journal of Public Health.

119 For example, in the UK government, the Cabinet Office leads on wellbeing, the Department for Environment, Food and Rural Affairs on sustainable development, the Department of Energy and Climate Change on climate policy and the Treasury and the Department for Business, Innovation and Skills on economic policy.

Green economies in numbers

100% RECYCLED

US$630 BILLION

EU businesses could save $340bn-$630bn per annum by 2025 in the cost of materials by adopting more efficient processes. *[Source: Ellen MacArthur Foundation]*

1%

Providing the billion people who currently live in extreme poverty with essential material needs would require just 1% of the resources we currently use. *[Source: Oxfam]*

18%

The annual cost of environmental degradation from human activity could rise to 18% of global GDP in 2050 if no action is taken. *[Source: Trucost/UNEP]*

15-60 MILLION

Greening economies offers the potential for 15-60 million more jobs than business as usual, taking into account both losses and gains. *[Source: International Labour Organisation]*

WWF

Why we are here
To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.

wwf.org.uk