Globethics Repository



Transition to Sustainability: Towards a Humane and Diverse World

This page was generated automatically upon download from the Globethics Repository. More information on Globethics see https://www.globethics.net. Data and content policy of Globethics Repository see https://repository.globethics.net/pages/policy.

Item Type	Book
Authors	Adams, W.M;Jeanrenaud, S.J.
Publisher	IUCN
Rights	With permission of the license/copyright holder
Download date	2026-11-12 14:28:56
Link to Item	http://hdl.handle.net/20.500.12424/175707

Transition to Sustainability: Towards a Humane and Diverse World

W.M. Adams and S.J. Jeanrenaud



IUCN Future of Sustainability Initiative 2008

ISBN: 978-2-8317-1072-3
Proof reader: Tiina Rajamets
Layout by: åtta design
Printed by: SRO-Kundig,
Châtelaine, Switzerland
Available from: IUCN
(International Union for
Conservation and Nature)
Publications Services
Rue Mauverney 28
1196 Gland, Switzerland
Tel +41 22 999 0000
Fax +41 22 999 0020
books@iucn.org
www.iucn.org/publications

A catalogue of IUCN
publications is also availabe.

The text of this book
is printed on FSC paper.

The designation of geographical entities in this book, and the presentation of the material, do not imply the expression of any opinion whatsoever on the part of IUCN concerning the legal status of any country, territory, or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The views expressed in this publication do not necessarily reflect those of IUCN.

Published by: IUCN, Gland, Switzerland
Copyright: © 2008 International Union for Conservation of Nature and Natural Resources
Reproduction of this publication for educational or other non-commercial purposes is authorized without prior written permission from the copyright holder provided the source is fully acknowledged.

Reproduction of this publication for resale or other commercial purposes is prohibited without prior written permission of the copyright holder.
Citation: Adams, W. M. and Jeanrenaud, S. J. (2008). *Transition to Sustainability: Towards a Humane and Diverse World.* Gland, Switzerland: IUCN. 108pp.

Foreword 1

Executive Summary 3

Acknowledgements 5

why?

1. The Challenge of Sustainability 8

2. Do You Feel Lucky? 10

3. Environment: Surviving the Anthropocene 14

4. Equity: Living with Ourselves 22

5. Beyond the Sustainability Industry 30

what?

6. Decarbonise the World Economy 34

7. Commit to Justice and Equity 43

8. Protect Life 51

how?

9. Build a One-Planet Economy 58

10. Rejuvenate the Global Environmental Movement 74

11. Build the Wider Architecture of Change 82

12. Inspire Sustainability Transitions 93

Foreword

We are at a turning point in the history of the global environmental movement. As IUCN celebrates its 60th anniversary, and marks six decades of global conservation achievement, it is also taking stock of the urgent challenges facing life on earth and reviewing its strategies.

The new millennium started with a profound wake-up call. Over the past eight years scientists worldwide have provided policy makers with some daunting facts, which taken together present an alarming picture of the future.

In 2005 we learned that nearly two-thirds of the world's ecosystems – our life support systems – are degraded and being used unsustainably, leading to irreversible damage in some cases. In 2007 we learned that the evidence for climate change, resulting from carbon dioxide emissions from human activities, is now unequivocal, with potentially catastrophic results. We are also nearing a period of peak oil, the point at which the maximum rate of global petroleum production is reached, after which supplies decline and prices rise, with profound implications for the global economy.

All these issues are interdependent and threaten the world and human wellbeing through their cascading effects on food, water, energy and resource security. They are also all coming to a head together, and at a faster pace than most policy makers could have predicted. No one is immune from their influences, although they hit the poorest and most vulnerable groups the hardest. It is clear that we are facing profound changes to life as we know it. The 'future isn't what it used to be', as the saying goes, and there are no maps for the path ahead.

IUCN has always stood up for the protection of life and defended the diversity and beauty of the natural world. The imperative of caring for the earth and people has never been greater, and yet the challenges ahead are bigger than anything we have ever faced before, and business as usual is no longer an option. There are no simple solutions. The challenges are too big for one sector, one country, and one strategy to address alone. We need to face the changes ahead with vision, with courage, with compassion for all life on earth – and in collaboration with others.

How do we do this? This paper calls for a transition to sustainability, but more than that, it calls for the environmental movement to make a step-change in helping society live lightly and equitably on the earth.

We must demonstrate the relevance of our knowledge to all sectors of society because we all depend on biodiversity, and in a language that people can understand. We need to play a role in rethinking real wealth and in reinventing economic systems that are fit for a single planet. We need to rejuvenate the environmental movement and develop institutions that are responsive, dynamic, equitable and resilient. We need to develop practical tools and coherent political strategies to help us make the transition. Above all we must go beyond counting the problems and 'doom and gloom' messages to fostering the vision that gives us hope and that inspires us to change.

Times like these require an evolutionary leap in consciousness. Science provides us with the knowledge we need. Now we need the wisdom to direct our collective action. We are grateful to IUCN's Council for catalysing this review of conservation and sustainable development and for helping to set the direction of the evolution of our field. We thank them and all our partners who are joining us in this urgent collective endeavour. We hope that this paper will stimulate debate and help mark a watershed in thinking.

Valli Moosa
President
IUCN



Julia Marton-Lefèvre
Director General
IUCN



Executive Summary

As Kenneth Boulding pointed out back in 1965, ‘in a space ship, there are no sewers’. The challenge of sustainability at the end of the first decade of the third millennium of the Common Era is still the one that his metaphor captured. How do we devise strategies for society that will allow a peaceful, equitable, fulfilled human future: a humane future for a diverse earth?

People are having an unprecedented impact on the planet through the expansion of industrial capacity, and the urbanization and socio-cultural changes that accompany it. Indeed, geologists now propose that this should be regarded as a new geological epoch, the Anthropocene. Surviving it will be quite a challenge. To do so, will require a rapid and effective transition to sustainability.

A transition to sustainability may be necessary, but is it possible? It will certainly not be easy. This paper considers what the environmental movement can do to help make it happen: a transition to a world that sustains abundant, diverse and worthwhile life, human and otherwise, and does so humanely.

There are three things we need to do:

• First, decarbonize the world economy: we must achieve dramatic reductions in carbon use by increased technical efficiency, and by de-linking energy generation from carbon production, and energy use from economic growth.

• Second, commit the environmental movement to a path of justice and global equity: justice and equity are central to any transition to sustainability.

• Third, protect the biosphere: the conservation of nature is the fulcrum for wider change towards sustainability.

How do we do this? There is no magic bullet, but solutions include:

• Create an economy that can fit on a single planet: we must change the way we think about growth and prosperity, to achieve more with less. We need to use less carbon and other materials, create less waste, create more real wealth and quality of life.

• Rejuvenate the global environmental movement: the movement must help link together communities and organizations working out practical solutions to sustainability challenges, and ways to live with more happiness and lower energy and material consumption.

• Build an institutional architecture to bring about change: transition to sustainability depends on the collaborative and coherent actions of political and business leaders, governments (from city to nation), and an effective international environmental regime.

Transition to sustainability is vitally important, and very scary. We need to calm our fears and build our capacity to hope.

Acknowledgements

Future of Sustainability Initiative

Project Coordinator and Writer:
Sally Jeanrenaud, IUCN

Senior Consultant and Lead Author:
Bill Adams, University of Cambridge

Sponsors

Christensen Fund

Ford Foundation

International Institute for Environment and Development

IUCN

United Nations Environment Programme

WWF International

The IUCN Future of Sustainability project was catalysed by the President and the IUCN Council of 2005–2008.

IUCN would like to thank the many people who have helped shape the project between 2006–2008, including the 460 participants from 70 countries in its e-discussion Forum: The Future of Sustainability: Have your say! Special thanks go to the following for their participation in the IUCN Sustainability Forums; their active support of the initiative; or for their comments on the current text:

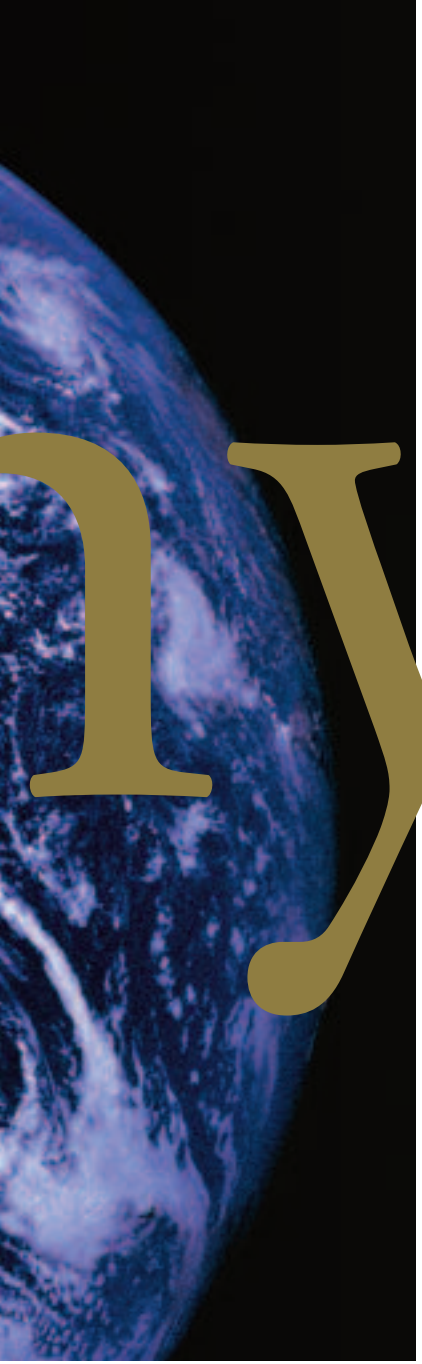
Grethel Aguilar Rojas; Nobutoshi Akao; Odeh Al Jayyousi; Juan Marco Álvarez; Steve Bass; Tom Bigg; Rubens Harry Born; Lester Brown; Susan Brown; Purificació Canals; Marion Cheatle; Munyaradzi Chenje; Angela Cropper; Barbara Dubach; Holly Dublin; Silvia Earle; Pablo Farias; Alistair Gammell; Mark Halle; Robert Hofstede; Lynn Holowesko; Maria Ivanova; Javed Jabbar; Bill Jackson; Jean-Paul Jeanrenaud; Aban Marker Kabraji; David Kaimowitz; Ashok Khosla; Jim Leape; Marcus Lee; Gabriel Lopez; Nik Lopoukhine; Hillary Masundire; Catherine McMullen; Jeff McNeely; Brenden Mackey; Patrick M'Mayi; Cláudio Carrera Maretti; Juan Martinez-Alier; Julia Marton-Lefèvre; Christine Milne; Russ Mittermeier; Mark Moody Stewart; Valli Moosa; Mohan Munasinghe;James Murombedzi; Aimé Nianogo; Manfred Niekisch; Dumisani Nyoni; Thierry de Oliveira; Mark Radka; Carlos Manuel Rodriguez; Muriel Saragoussi; David Satterthwaite; Zohir Sekkal; Diane Shand; Fulai Sheng; Gordon Shepherd; Jane Smart; Monthip Sriatana Tabucanon; Achim Steiner; Francis Sullivan; Ibrahim Thiaw; Ton Boon von Ochssée; Ken Wilson; Alexey Yablokov; Mohammad Yunus; Lu Zhi.

Contributions to this text are gratefully acknowledged from:
Steve Bass, Marion Cheatle, Juan Martinez-Alier, David Satterthwaite, Francis Sullivan and Ken Wilson.



wh

Environmentalists have been demanding change in the name of sustainability for more than four decades: from the renewed neo-Malthusianism of the 1970s to the green economy optimism of the first decade of the twenty-first century; from spaceship earth to 'earth plc'. So why do we need drastic change now, just as the world is getting comfortable with the idea of sustainability? Surely we are all environmentalists now?



ny?

"I know of no good reason for anyone to be optimistic about the human future."

David Orr [1]

1. The Challenge of Sustainability

Kenneth Boulding wrote in 1966: *'Earth has become a space ship, not only in our imagination but also in the hard realities of the social, biological, and physical system in which man is enmeshed'* [2].
The term 'Spaceship Earth',[3] and the image of the earth like a 'silver blue jewel' in space,[4] first photographed from the Apollo 8 spacecraft in 1968, became an enduring icon for environmentalists in the 1960s. The central argument of environmentalism at that time was that there was one planet, of finite size, and that human demands on it could not rise indefinitely.

People in space ships have to manage things very carefully if they are to survive. Boulding pointed out that almost everything we do is poorly adapted to that reality: our technologies focus on trivial things, our science asks the wrong questions, our society is not adapted to survival. But Boulding believed that things were changing. He wrote: *'we are now in the middle of a long process of transition in the nature of the image which man has of himself and his environment'*.[5]
To an extent, that transition has been happening, albeit slowly.

‘in a space ship, there are no sewers’

It began with the growth of environmentalism itself in the 1960s and 1970s, and evolved in the ideas of sustainability and sustainable development.[6]

We do not now tend to think of the Earth as a space ship, nor of its six billion plus human inhabitants as spacemen, or women. Spaceships do not work as metaphors in the twenty-first century as they did in the 1960s. It is 36 years since anyone flew beyond the earth’s orbit, and satellites are commonplace, whether for global positioning, communications or remote sensing, and most people take them for granted. A whole generation has reached adulthood for whom human extra-planetary space flight is a remote historical achievement, perhaps better recorded than the building of Mayan temples, but just as distanced from everyday life.

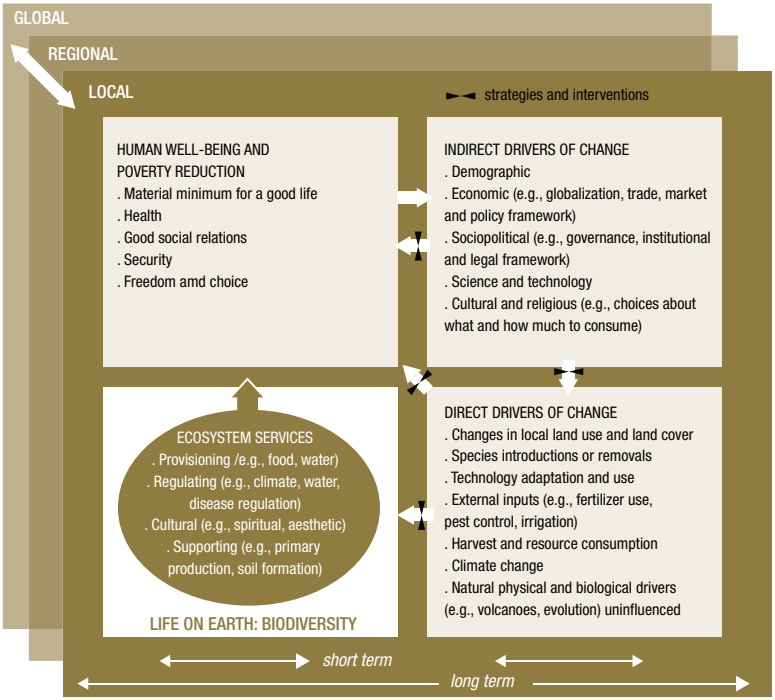
But the uncomfortable environmentalist challenge of the 1970s remains as relevant as it ever did: there is one earth, and society is constrained by the capacity of its ecosystems and natural resources. In the 1970s, environmentalists feared that the earth was running out of resources. This proved not to be the critical problem. It is true that some resources are getting scarce and expensive to extract – in particular the era of cheap oil appears to be over.[7] But it turns out that the most immediate limit to boundless human aspirations on a finite planet is not a shortage of things to dig up, but a lack of places to put the garbage. The accumulation of CO2 and other greenhouse gases in the atmosphere, of chlorofluorocarbons and other chemical pollutants that destroy the ozone layer, the spread of persistent organic pollutants in oceans, soils and human bodies: all these and other side-effects of technology and consumption threaten human life and the quality of that life on earth. As Boulding commented back in 1965, *‘in a space ship, there are no sewers’*.[8]

2. Do You Feel Lucky?

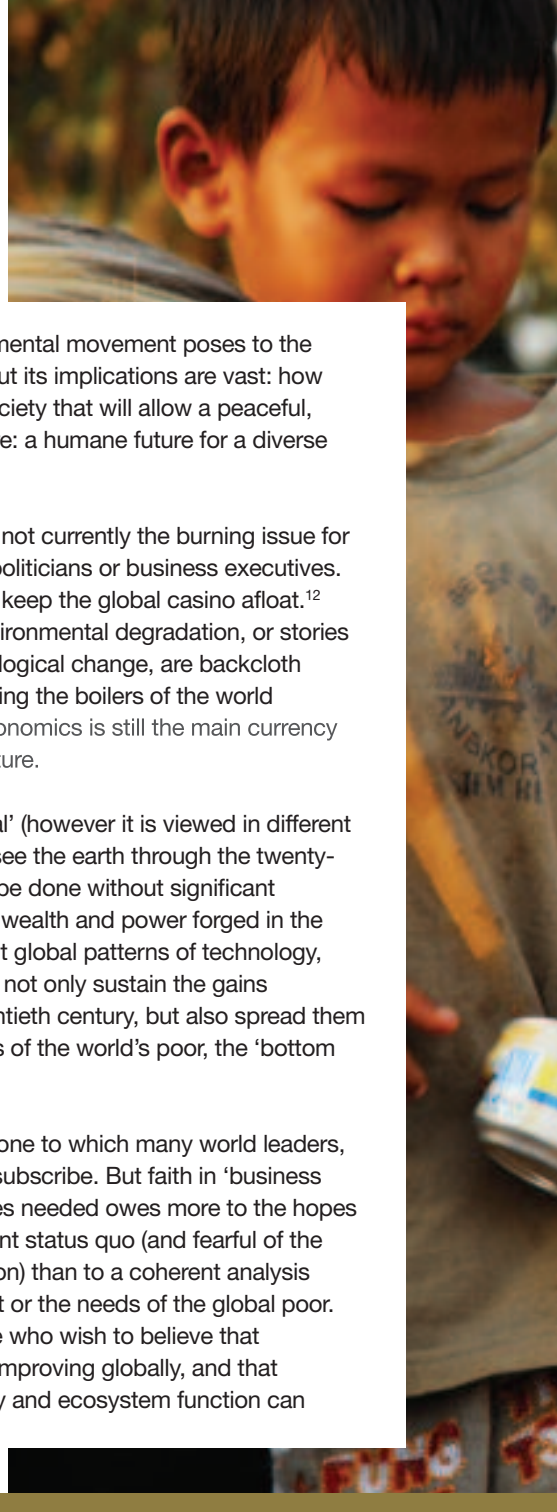
The huge literature on sustainable development has given rise to many definitions since the classic formulation of the Brundtland report.[9] This combined concern about poverty and development with concern about the state of the environment. Moreover it demanded that attention be paid both to intra-generational equity (between rich and poor now) and intergenerational equity (between present and future generations). Subsequent definitions have sought to develop these elements. Thus, for example, the UK's Forum for the Future defines it as *'a dynamic process which enables all people to realise their potential and improve their quality of life in ways which simultaneously protect and enhance the Earth's life support systems'.*[10]

Yet the challenge of sustainability at the end of the first decade of the third millennium of the Common Era is still the one that Kenneth Boulding's metaphor expressed so neatly: one earth, turning slowly in space as a home for humankind. As the Millennium Ecosystem Assessment showed, human wellbeing, poverty reduction and the state of the global environment remain closely linked (Figure 2.1).[11]

Figure 2.1
Millennium Ecosystem Assessment
Conceptual Framework



Source: Millennium Ecosystem Assessment (see note 11)



‘how do we devise strategies for society that will allow a peaceful, equitable, fulfilled human future: a humane future for a diverse earth?’

The question that the environmental movement poses to the world is superficially simple, but its implications are vast: how do we devise strategies for society that will allow a peaceful, equitable, fulfilled human future: a humane future for a diverse earth?

Unfortunately, sustainability is not currently the burning issue for most world leaders, whether politicians or business executives. Their immediate concern is to keep the global casino afloat.[12] Issues of justice, equity or environmental degradation, or stories about unstoppable global ecological change, are backcloth to the everyday business of firing the boilers of the world economy. The language of economics is still the main currency of politics in discussing the future.

And yet can ‘business as usual’ (however it is viewed in different parts of the world) somehow see the earth through the twenty-first century? And if so, can it be done without significant disturbance to the patterns of wealth and power forged in the twentieth century? Can current global patterns of technology, economy and political agency not only sustain the gains in welfare achieved in the twentieth century, but also spread them effectively to the vast numbers of the world’s poor, the ‘bottom billion’?

This is an attractive idea, and one to which many world leaders, and some environmentalists, subscribe. But faith in ‘business as usual’ to deliver the changes needed owes more to the hopes of those favoured by the current status quo (and fearful of the costs of any change of direction) than to a coherent analysis of the state of the environment or the needs of the global poor. There are indeed many people who wish to believe that environmental conditions are improving globally, and that the preservation of biodiversity and ecosystem function can



be achieved within the current patterns of production and consumption. But their belief is a delusion, their vision a dream world. They are also dangerously naïve. Theirs is an earth selectively reported and made glossy in lifestyle magazines, on television screens and advertising hoardings. Their hopes for the world, like their consumer demands, overwhelm their capacity to see or understand.

Calls by environmentalists for a transition to sustainability are different. They are awkward, uncomfortable, even alarming. They present a future full of risk and disfunctionality; a future of hard choices and considerable uncertainty. Environmentalists say we face the risks of tipping points and irreversible changes in the environment and in its capacity to support and sustain human life in all its dimensions, not least in the area of climate.[13]

It has been the appeal of the idea of sustainable development that it somewhat blurs these hard choices. A huge industry in ideas and policy has grown up around the challenge of sustainability. The concept was explored in the World Conservation Strategy published by IUCN, WWF and UNEP in 1980, and its successor Caring for the Earth in 1991, and in the report of the World Commission on Environment and Development (WCED) in 1987. It was discussed at United Nations Conferences in Stockholm in 1972, Rio in 1992 and Johannesburg in 2002.[14]

Mainstream sustainable development is built on the idea of market-driven approaches and strategies based on technology and intense regulation (termed ecological modernisation).[15] It promises to steer the world towards sustainability in ways that do not demand too many dramatic changes, and that do not upset the comfortable, the rich or the powerful.

‘you’ve got to ask yourself a question: do I feel lucky?’

Despite all this activity, we have come little nearer to answering the fundamental question: how do we deliver sustainability? Or, recognising the tyranny of impossible goals, how do we even start to make progress towards delivering sustainability? Thirty-six years after the Stockholm Conference, we need to ask that hard question. We need to ask ourselves whether we are, actually, globally and on balance, moving towards sustainability, or away?

Clint Eastwood’s character in the film Dirty Harry famously told the bank robber: ‘you’ve got to ask yourself a question: do I feel lucky?’.[16] Unless a transition to sustainability can be achieved, we might as well ask world leaders the same question. Without a new trajectory, humankind is going to need a lot of luck to survive the twenty-first century with any kind of humanity intact. The nature of the challenge humanity faces in the twenty-first century is described in Chapter 3.

A transition to sustainability may be necessary, but is it possible? It will certainly not be easy. The purpose of this paper is to consider what the environmental movement can do to make it happen: a transition to a world that sustains abundant, diverse and worthwhile life, human and otherwise, and does so humanely. It forms part of the Future of Sustainability Initiative of IUCN (see Annex 1).

3. Environment: Surviving the Anthropocene

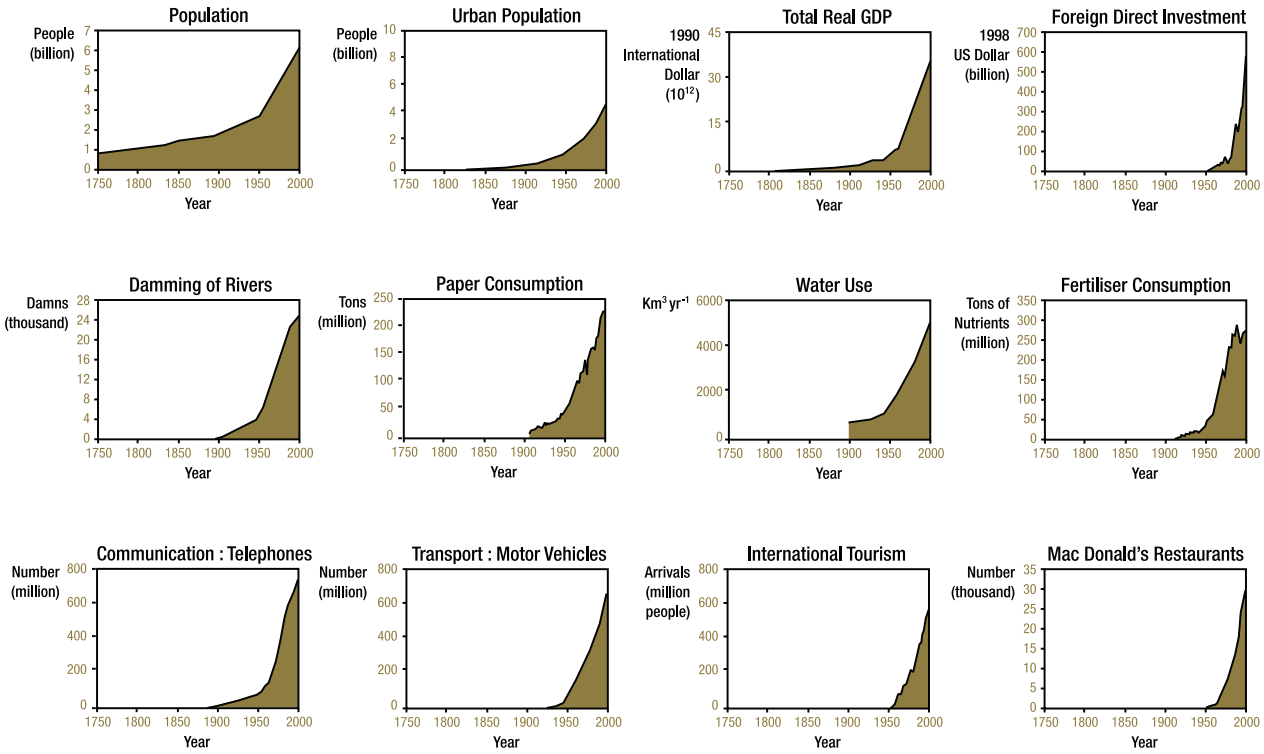
There have been many attempts to measure the 'state of the world's environment' and to show the scale of human impacts.[17] The changes are complex, and statistics on global change suffer from problems of quality and completeness. There is no lack of conservative sceptics claiming that environmentalists exaggerate.[18] In response there have been efforts to define 'headline' statistics, such as the World Wide Fund for Nature's 'Living Planet Index' (LPI), first calculated in 1998.[19]

The remarkable extent of human impacts on the biosphere (in terms of the expansion of industrial capacity, and the urbanisation and socio-cultural changes that accompany it) is beyond doubt. Indeed, the unprecedented scale of human modification of geological and ecological processes is so great that it is now proposed that they be marked by a new geological epoch, the Anthropocene.[20]

The capacity of human society to influence biological and geological processes has accelerated rapidly over the twentieth century (Table 3.1). These changes were particularly sharp in the 'great acceleration' in industrialisation and energy use that followed the Second World War (Figure 3.1).[21] Graphs of global population, urban population, and consumption (for example of fertiliser, paper or fresh water, the level of international telecommunications, the number of motor vehicles or the magnitude of international tourism) all show steep rises in the second half of the twentieth century. In the last five decades, humans have begun to change the earth at a rate and on a scale and through a combination of human activities that was fundamentally different from anything that had gone before in human history. Science has barely been able to keep up with our influence: as Peter Vitousek and colleagues observed in 1997, *'we are changing the earth more rapidly than we are understanding it'.*[22]

Figure 3.1 The change in human enterprise from 1750 to 2000

The 'great acceleration' is clear: every component was either not present before 1950 or accelerated sharply after 1950



Source: Steffen et al. (see note 20)

Table 3.1 Human impacts on the biosphere

- Evidence for global warming due to human production of CO2 and other greenhouse gases is now unequivocal.[23]
- Three-quarters of the habitable surface of the earth was disturbed by human activity by the end of the twentieth century.[24]
- People represent 0.5% of animal biomass on earth yet, on average, human appropriation of net terrestrial primary production is estimated to be 32%.[25] Locally and regionally, impacts are much greater.[26]
- Forty to sixty per cent of the nitrogen in the human body is comprised of industrially produced ammonia.[27]
- Human activities are now the most significant force in evolution.[28]
- Human activities have increased previous 'background' extinction rates by between 100 and 10,000 times.[29]
- Between five and 20 per cent of the c.14 million plant and animal species on earth are threatened with extinction.[30]
- Between 1970 and 2003, the Living Planet Index (LPI) fell by about 30%. The terrestrial index (695 species) fell by 31%, the marine index (274 species) by 27%
- and the freshwater index (344 species) by 29%.[31]
  In 2005 some 60% (15 out of 24) of ecosystem services evaluated by the Millennium Ecosystem Assessment were being degraded or used
- unsustainably.[32]
  The population of large predatory fish is now less than 10% of pre-industrial levels. Over-harvesting has devastated both ocean and inshore
- fisheries.[33]
  More than two million people globally die prematurely every year due
- to outdoor and indoor air pollution and respiratory disease.[34]
  Per capita availability of fresh water is declining globally, and contaminated water remains the single greatest environmental cause of human sickness and death.[35]

At the start of the twenty-first century, there is no doubt that we are 'in the midst of one of the great extinction spasms of geological history'.[36] Global consumption munches through species and habitats like Pac-Man,[37] consuming, displacing and converting them to human use, exchanging living diversity for industrial monocultures, species-poor built environments and degraded barren lands and seas.

'global consumption munches through species and habitats like Pac-Man'

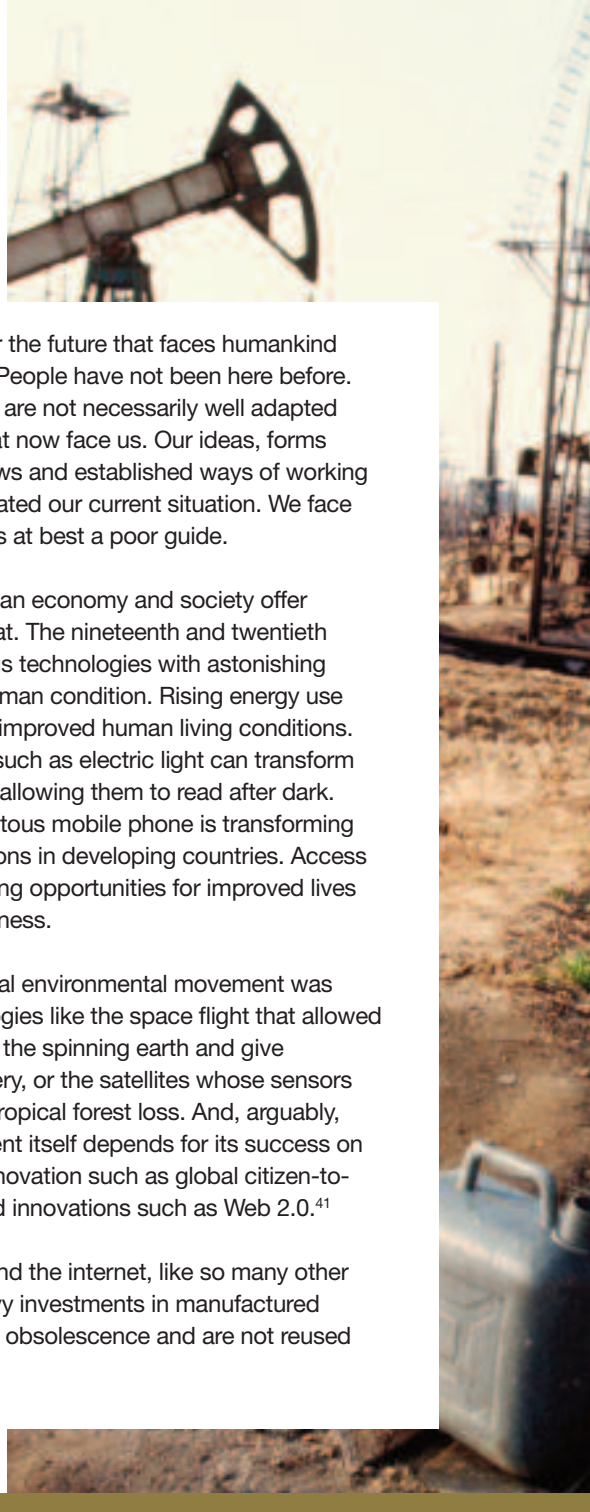
However, the most significant features of the Anthropocene may yet prove to be biogeochemical, and their impacts directly material to the quality of human lives across the globe: a 16-fold growth in energy use in the twentieth century including a sixfold increase in coal extraction; association sulphur dioxide emissions twice natural emissions; nitric oxide, carbon dioxide, and methane emissions all far above background levels; the release of manufactured chemicals such as chlorofluorocarbons.[38] The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (2007) found that the globe is likely to see a rise in temperature by about 3ºC over the next century. Eleven of the twelve years 1996–2006 were among the twelve warmest years in the instrumental record, which began in 1850.[39]

These human signals in the wider geological and biological systems of the planet earth are not simply of scientific interest. They have a much more obvious practical and material importance in terms of human futures. The Stern Review on The Economics of Climate Change in 2006 provided a detailed warning that, if unabated, climate change could cause environmental costs equivalent to 5–20% of global GDP.[40] The kinds of climatic tipping points being discussed by scientists (Table 3.2) are replete with hazards for humankind.

Table 3.2 Tipping elements in the earth's climate system

Tipping element	Global warming parameter	Key impacts
Disappearance of Arctic summer sea ice	0.5–2°C	Amplified warming, ecosystem change
Greenland ice-sheet meltdown	1–2°C	2–7m rise in sea level
West Antarctic ice-sheet collapse	3–5°C	5m sea-level rise
Reorganization of the Atlantic thermohaline circulation impacts on inter-tropical convergence	3–5°C	Regional cooling, sea-level effects,
El Niño Southern Oscillation (ENSO): increased amplitude elsewhere	3–6°C	Drought in South-east Asia and
Indian summer monsoon: change in variability	Temperature not concerned	Drought
Sahara/Sahel and West African monsoon: collapse	3–5°C	Increased rainfall in the Sahel
Amazon rainforest: dieback	3–4°C	Biodiversity loss, decreased rainfall
Boreal forest: dieback	3–5°C	Biome switch

Source: Lenton et al. (see note 13).



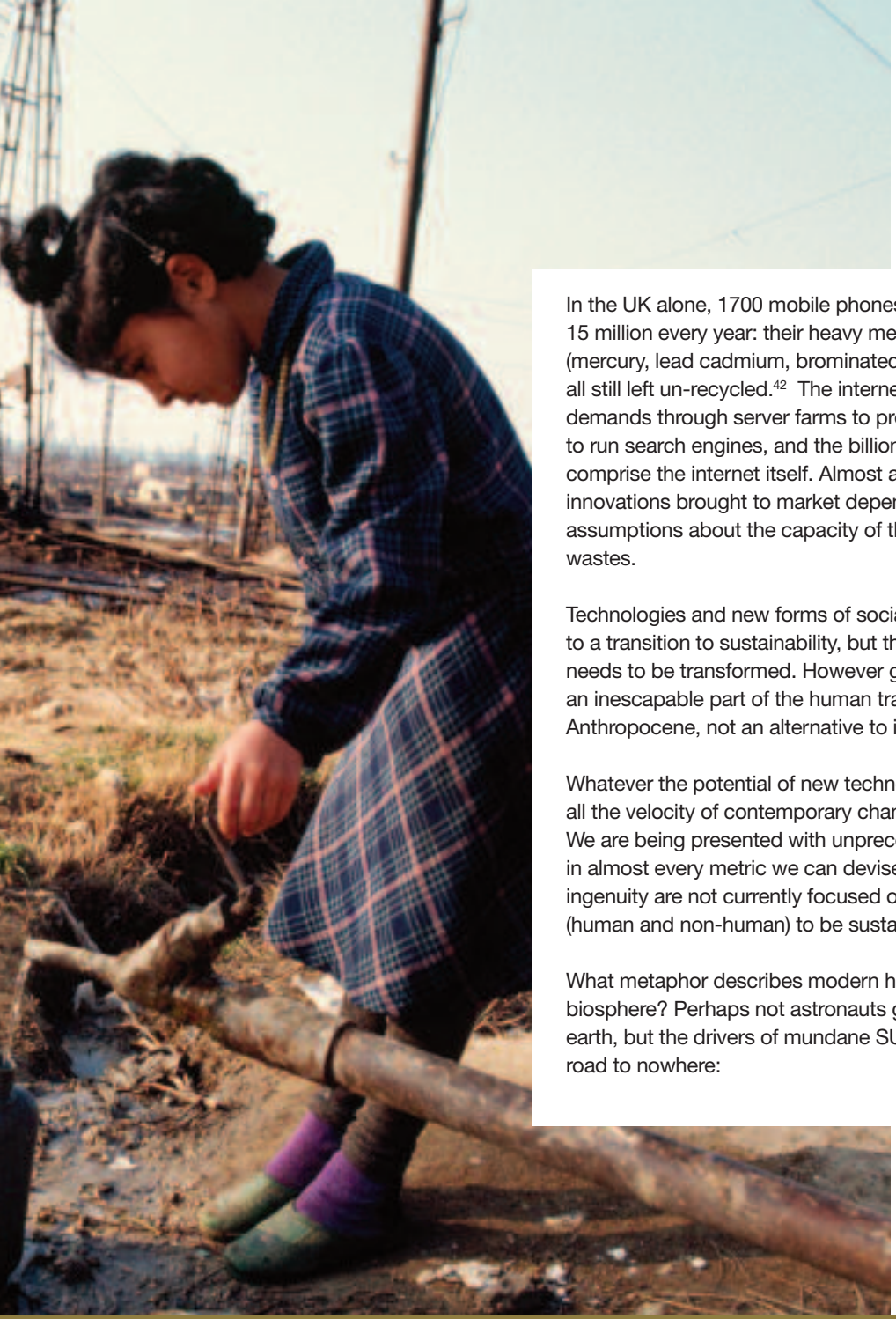
‘there are no road maps for the future’

There are no road maps for the future that faces humankind in the twenty-first century. People have not been here before. The things that got us here are not necessarily well adapted to solving the problems that now face us. Our ideas, forms of political engagement, laws and established ways of working are the very things that created our current situation. We face a future to which the past is at best a poor guide.

Of course, changes in human economy and society offer opportunity as well as threat. The nineteenth and twentieth centuries brought numerous technologies with astonishing potential to improve the human condition. Rising energy use reflects and contributes to improved human living conditions. Thus a simple technology such as electric light can transform people’s lives, not least by allowing them to read after dark. And the increasingly ubiquitous mobile phone is transforming market and social interactions in developing countries. Access to the internet offers amazing opportunities for improved lives through greater connectedness.

The very concept of a global environmental movement was made possible by technologies like the space flight that allowed astronauts to look back on the spinning earth and give environmentalism its imagery, or the satellites whose sensors allowed the monitoring of tropical forest loss. And, arguably, the environmental movement itself depends for its success on continued technological innovation such as global citizen-to-citizen communication, and innovations such as Web 2.0.[41]

However, mobile phones and the internet, like so many other advances, depend on heavy investments in manufactured products that rapidly reach obsolescence and are not reused or recycled.



In the UK alone, 1700 mobile phones are thrown away every hour, 15 million every year: their heavy metals and other pollutants (mercury, lead cadmium, brominated flame retardants) almost all still left un-recycled.[42] The internet makes massive energy demands through server farms to provide the computing power to run search engines, and the billions of computers that comprise the internet itself. Almost all new technological innovations brought to market depend on cheap energy and assumptions about the capacity of the biosphere to absorb wastes.

Technologies and new forms of social interaction can contribute to a transition to sustainability, but they are also products of what needs to be transformed. However great their potential, they are an inescapable part of the human transformations of the Anthropocene, not an alternative to it.

Whatever the potential of new technologies, the scale and above all the velocity of contemporary change are profound challenges. We are being presented with unprecedented rates of change in almost every metric we can devise. Technology and human ingenuity are not currently focused on human survival. How is life (human and non-human) to be sustained?

What metaphor describes modern humanity's attitude to the biosphere? Perhaps not astronauts gazing awe-struck at the earth, but the drivers of mundane SUVs, stuck in traffic on a high road to nowhere:

‘nobody seems to be in charge’

Box 3.1 Planet management

Video clip 1:

The screen fills with an aerial panorama of a vast dark dystopian cityscape. The camera zooms down and down, past beetling skyscrapers through layers of smog to a huge freeway thick with moving traffic. Panning forwards, it appears that the road leads straight off a cliff. The camera zooms closer, moving through the lines of moving cars, which are all full of people: men, women and children. Inside them all, arguments are raging. Nobody seems to be in charge. Different people grab for steering wheels, but the cars do not turn. It is clear that the people in the cars are not controlling them. Someone must have programmed the cars and set the route, but it seems nobody quite knows who. Lots of people are arguing about the route, the cars’ speed and internal management. One car contains famous world leaders. They are worried about whether the car’s engine is firing properly, and whether they have packed enough clothes for their next meeting. One is full of environmentalists who work in the sustainability industry; they know that the cliff is there, and they are setting up discussion groups to debate a downshift in the cruise speed and the cost effectiveness of catalytic converters. One is full of academics, trying to design a more accurate speedometer, and modelling the implications of a fuel shift to biodiesel. In another car, business executives are thinking how to increase their share of the space inside their car, and how to take over the ones next door. Every car is full, but there are also people crammed together on their roofs and hanging off the fenders. Many wear rags, and are banging on the windows and asking to get off. Nobody is listening. The cars move on. The cliff edge looms.

4. Equity: Living with Ourselves

The metaphor of the car and the cliff goes some way to capture the sense, felt by many people, that there is something seriously amiss with the way the world works. But it is a poor model of the twenty-first century in a variety of ways. One of the most important is that it suggests that global problems will affect everybody equally: that the whole of humankind, and indeed the whole biosphere, is headed for the cliff at the same rate. This is a very 1970s neo-Malthusian view, and it disregards political economy.

On a scale of decades and centuries, different people have very different chances of protecting themselves from disaster, just as they do today. The human impacts of future global environmental change will not be uniform, for the earth is a profoundly divided place. Life chances depend on who you are. This is already true, but if environmental goods become more scarce, wealth and power will increasingly distinguish the haves and have-nots, and those who live and those who do not.

The world is profoundly unequal, despite (and sometimes because of) half a century of formal 'development' efforts. The idea of development as a process in which economies 'take off' like airliners for a high life in the skies was popular in the early development decades following the end of the Second World War.[43] But the hope that such development might create a world where all countries are experiencing economic growth and gains in quality of life (let alone all people in those countries) proved an illusion.

Decades of development projects and plans have brought a mix of success and failure, but poor countries have been running up a down escalator. At the end of the twentieth century, after five decades of formal development efforts, low-income countries had less than 10% of the world's gross national product (GNP) of US$28,862.2 trillion. This figure fell to less than 2% if India and China were excluded.[44] Poverty remains a critical global issue (Table 4.1).

‘inequality has increased over the past decade’

Table 4.1 Global poverty

- Over one billion people survive on less than US$1 per day. Seventy per cent live in rural areas where they are highly dependent on ecosystem services.
- Inequality has increased over the past decade. During the 1990s, 21 countries experienced declines in their rankings in the Human Development Index (HDI).
- Over 850 million people were undernourished in 2000–02, up 37 million from the period 1997–99.
- Per capita food production has declined in sub-Saharan Africa.
- Over one billion people still lack access to improved water supplies, and more than 2.6 billion lack access to improved sanitation.
- Water scarcity affects 1–2 billion people worldwide.
- Global improvements in levels of poverty are skewed by rapid economic growth in India and China; poverty elsewhere (especially in sub-Saharan Africa) is profound and persistent.

Source: Millennium Ecosystem Assessment (see note 11).

Inequality and poverty have profound implications for the way different people view the prospect of global environmental crisis, and how they will be able to cope with it. If there are risks to future human welfare, and countervailing risks in changing the way we live on earth, the choice will look very different to people in different positions (Box 4.1).

The Brundtland Report quite rightly tied the definition of sustainable development to equity both within and between generations, between the poor and the rich today (intra-generational equity), and between people today and those who will live in the future (inter-generational equity). Addressing these together is a profound challenge. When you do not have the first, it is hard to marshal support to address the second.

Box 4.1 Life views - part 1

Video clip 2: Interviews to camera.

Gulfstream G450 Jet, Atlantic: "To be honest I don't understand environmentalists. They are always moaning about the state of the world, but they don't do anything to make it better. My company employs 200,000 people worldwide, creating jobs, spreading prosperity. We have a really effective environmental division, and external appraisal of our environmental performance. We have completely dealt with the old pollution problems: we have closed the old plants and built new ones. In the process we have moved production to China and Malaysia, where we contribute to double-digit economic growth. We don't have any problems recruiting people to work in our plants, and there is a clear and efficient regulatory environment. Where am I going now? To meet my kids, in our flat in Paris. From there we head to the Maldives for a week's diving. Then they will go to our Long Island house for the summer, while I go on to Shanghai and Tokyo. I guess I am in the air three or four days most weeks. That's what it takes to keep the world economy going. Do I worry about my kids? No, not really. Of course, they have to get into the right university, then maybe law school and then they will be ready for a corporate career. But, no, I think they'll be fine."

Yunwa village, Sahel: "We are suffering here. The rains of my father's time have gone and never come back. We do not know what to expect from one year to the next. Our well dries up, our children go hungry. The government no longer brings fertiliser or pesticides. Our crop is small because the rains are short and the birds eat it. Our lot has always been hard, but now the rains have changed we cannot survive here. Yet we cannot go. Where can we go? Everywhere is the same, our whole country is crying. The world has forgotten us. I fear for my children. Hana wani, hanà kâi." [45]

Box 4.1 Life views - part 2

Kissinger Drive, Prettyville: "We get together every Tuesday, just a group of us young mothers, while our kids are in school. The SUVs almost block the street, but there is lots of room here in the house. Our little ones watch TV upstairs, and we just talk – about our families, shopping, holiday plans, that kind of stuff. We went to Whistler skiing last winter, to Disneyland at Easter, and in the summer I think we'll do Costa Rica again. There are some amazing national parks there, and great beach hotels.
And everything is so cheap. Of course we have to think about our financial future – Hank's job seems secure now that the oilsands are opening up again, especially with all the trouble in the Middle East, but you never know. Companies get taken over all the time. We take the environment really seriously. The new air conditioning we just had fitted on the house is really energy-efficient, and we are going to shift to a new car with a turbodiesel engine, which Hank says is much better for the environment. We have just bought a composting bin for the back yard. The kids? Oh, I guess they'll want to travel, but in the end I think they'll come back and live just like we do."

Dharavi slum, Mumbai: "I live here with my mother and my brothers and sisters. Our house is made of polythene sheet and flattened cans. My mother is sick and has no work, so we go out and pick out things on the garbage dumps that we can sell for recycling. They need metals, plastics, cardboard, batteries, paper and electrical parts. On a good day I earn 100 rupees and we can all eat. We have to buy our water from a man who comes with a barrel. He takes it from the public supply somewhere far from here. My mother came from Jharkhand, where she lived in a village, but the forest department chased them away. When I am grown up, I want to live in a real house with running water and a light you can switch on when it gets dark, and I want to go to work on a bus. I want my children to learn to read. Even my daughters. Maybe they will grow up to make computers, or go to the moon."

In September 2000, the United Nations Millennium Summit agreed eight Millennium Development Goals (MDGs), with 18 targets and 48 indicators as yardsticks for measuring improvements in people's lives. And the good news is that there has been substantial progress in poverty reduction.[46] The number of people living on less than US$1 a day in developing countries fell by more than 260 million between 1990 and 2004.

But those poverty gains have been concentrated in Asia, especially China. Indeed, if China is excluded, the number of people living on less than a dollar a day actually increased between 1981 and 2004, growing from 836 million to 841 million.[47] While the proportion of the population in sub-Saharan Africa living on less than US$1 a day dropped from 47% in 1990 to 41% in 2004, the absolute number of poor people continued to increase, rising by almost 60 million over the same period.[48]

At the global level, the fundamental MDG of halving the proportion of poor people is still attainable, with a projected fall from 29% to 10% between 1990 and 2015. But many countries are likely not to achieve this, particularly in sub-Saharan Africa, where average poverty rates remain above 40%, and the World Bank expresses concerns about widening inequalities between regions. In some countries and regions, inequality is worsening, as poor people lack the opportunities to benefit from economic expansion, and fail to do so.[49]

Income poverty is only part of the equation. With it go many other forms of deprivation, for example, in Amartya Sen's vision of development, loss of individual political, economic and social freedom.[50] Poverty is complex and multi-dimensional, with cultural, social and spiritual as well as material dimensions.[51] It is not an abstract economic problem, but it 'means living as a bed-ridden person with typhoid and diarrhoea – with no water or fuelwood for basic needs and dignity'.[52] This very human reality has even been recognised by the bean counters of the World Bank: *Poverty is hunger. Poverty is lack of shelter. Poverty is being sick and not being able to see a doctor. Poverty is not being able to go to school and not knowing how to read. Poverty is not having a job, fear for the future, living one day at a time. Poverty is losing a child to illness brought about by unclean water. Poverty is powerlessness, lack of representation and freedom.*[53]

More than 10 million children in developing countries die before the age of five every year, mostly from diseases that can be prevented. Child mortality has declined in every global region since 1990, but progress has been slow: only 35 countries are on track to meet the MDG of reducing mortality in children under five years of age by two-thirds between 1990 and 2015. Progress is worst in sub-Saharan Africa, where mortality rates are driven up by AIDS, malaria and malnutrition.[54]

The twenty-first century has started with significant and persistent shortfalls in sustainable human wellbeing.[55] John Holdren defines 'sustainable wellbeing' as 'pursuing sustainable development to achieve wellbeing…as well as converting to a sustainable basis the maintenance of wellbeing where it already exists but is being provided by unsustainable means' (p. 424). The shortfalls in the achievement of sustainable wellbeing that he identifies are shown in Table 4.1.

'shortfalls in sustainable human wellbeing'

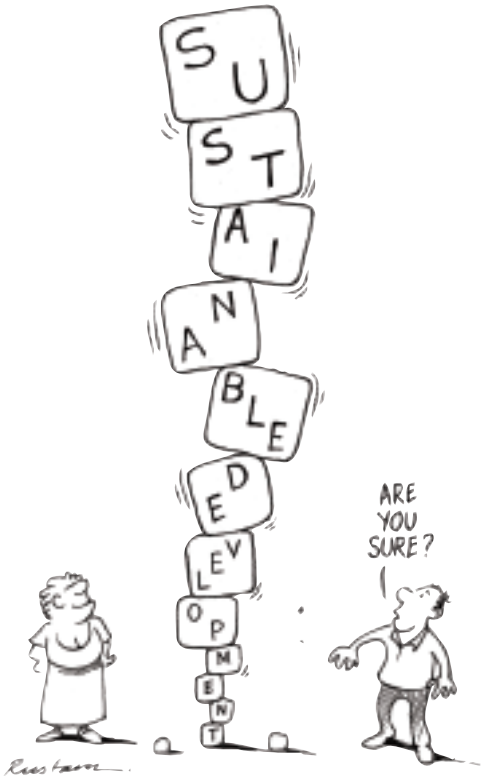


Table 4.1 Shortfalls in the achievement of sustainable wellbeing

Poverty: afflicting 2.5 billion people who live on less than US$2 per day, plus many millions more who have much more but cannot afford many of the ingredients of a decent existence in the more prosperous settings where they live.

Preventable disease: keeps infant and child mortality high and life expectancy low, especially among the very poor.

Impoverishment of the environment: progressive erosion of the environmental underpinnings of wellbeing in the qualities of air, water, soil, biota and climate.

Pervasiveness of organized violence: well over 100 armed conflicts since the Second World War (almost all in the South; loss of life tens of millions) and the global rise of terrorism.

Oppression of human rights: in other ways (for the above are also forms of oppression); denying people their dignity, liberty, security, capacity to shape their own destinies.

Wastage of human potential: resulting from all the foregoing, and the despair and apathy that accompany them, from shortfalls in education and loss of cultural diversity.

Non-use, ineffective use and misuse of science and technology: including both intentional misuse (e.g., the design and deployment of weapons) and inadvertent (e.g., in side-effects of broad-spectrum insecticides, herbicides, antibiotics).

Maldistribution of consumption and investment (between rich and poor, between military and civilian activities, between consumption and investment (too much consumption, too little investment).

Incompetence, mismanagement and corruption: pervasive in industrialized and developing countries.

Continuing population growth: not the sole cause of problems, but makes problems harder to solve.

Ignorance, apathy and denial: lack of exposure to information and lack of conviction or optimism to act on it.

Source: **Holdren (2008).**

The challenge of sustainability is profound. It engages not just the familiar concerns of global environmental change and poverty alleviation, but issues that go to the heart of the way the global economy and industrialized and developing country societies work. It demands challenges to the lifestyles of many who, if not rich in their own country, are rich by global standards. George Monbiot writes of the threat of climate change: *'if the biosphere is wrecked, it will be done by nice, well-meaning, cosmopolitan people who accept the case for cutting emissions, but who won't change by one iota the way they live'.*[56]

A transition to sustainability demands serious changes in the way humans do business with each other and with the earth, and it does so in the face of a fractured, unequal world. It's a tough call.

'the challenge of sustainability is profound'

5. Beyond the Sustainability Industry

Three decades of thinking and action about sustainable development have generated an impressive array of achievements. Steve Bass identifies a 'toolkit' of nine components (Table 5.1).[57]

Table 5.1 Sustainable development toolkit

The 'Three Pillars' model: social, environmental, economic dimensions of sustainability; appears in the idea of 'triple bottom line' in business. Better expressed as three overlapping circles, as in the IUCN Programme 2005–8, adopted in 2005.

Legal principles: e.g., 'polluter pays'; precautionary principle; prior informed consent.

International agreements: United Nations Framework Convention on Climate Change (UNFCCC) and Kyoto process, the Convention on Biological Diversity (CBD), the UN Convention to Combat Desertification.

Plans and strategies: e.g., Agenda 21, Johannesburg Plan of Implementation, national sustainable development strategies.

Political forums and councils: UN Commission on Sustainable Development, national forums, local initiatives.

Tools for sustainability assessment, and for market, project and fiscal intervention: e.g., information, analysis, planning, management, deliberative and stakeholder tools.

Voluntary codes and standards: e.g., self-regulation by leading players or NGO initiatives in food, forestry, energy and mining sectors.

Tri-sector partnerships: government, civil society, business e.g., Marine Stewardship Council, Forest Stewardship Council.

Debate and research: pure and applied science, social science, management.

Source: Bass (2007).

‘ideas about how to achieve sustainability are fragmented’

These are real achievements, but they are limited in their reach. And, as Bass points out, much is missing. Standard ideas about how to achieve sustainability are fragmented, partial, often largely symbolic. Key conceptual framings of sustainability, like the ‘three pillars’ model, are flawed. This implies that trade-offs can always be made between environmental, social and economic dimensions of sustainability, a ‘weak’ as opposed to a ‘strong’ version of sustainability. Such trade-offs are routinely made, and are a major reason why the environment continues to be degraded and development does not achieve desirable equity goals. The three pillars cannot be treated as if they are equivalent. The economy is an institution that emerges from society, while the environment underpins both society and economy, the resources available on earth and the solar system effectively presenting a finite limit on human activity.

Conventional sustainability thinking provides ways of talking about the environment as an important policy issue, or about key actors within the world system. It does not suggest the need for any fundamental change in that system. Such an approach is the product of a growing ‘sustainability industry’. This has three elements.

First, there is the legion of environmental organizations founded over the last century, and especially since the 1960s. Some of these pursue a ‘green’ agenda (conservation of nature or biodiversity). Some pursue a ‘brown’ agenda (concern for the wider environment, or for the needs and rights of people in an environmental context). Most of these organizations are non-governmental, some are part of government, and some are inter-governmental. Their achievements are considerable, not least the success with which sustainability issues have been made part of international debate, national legislation and public policy since 1992.

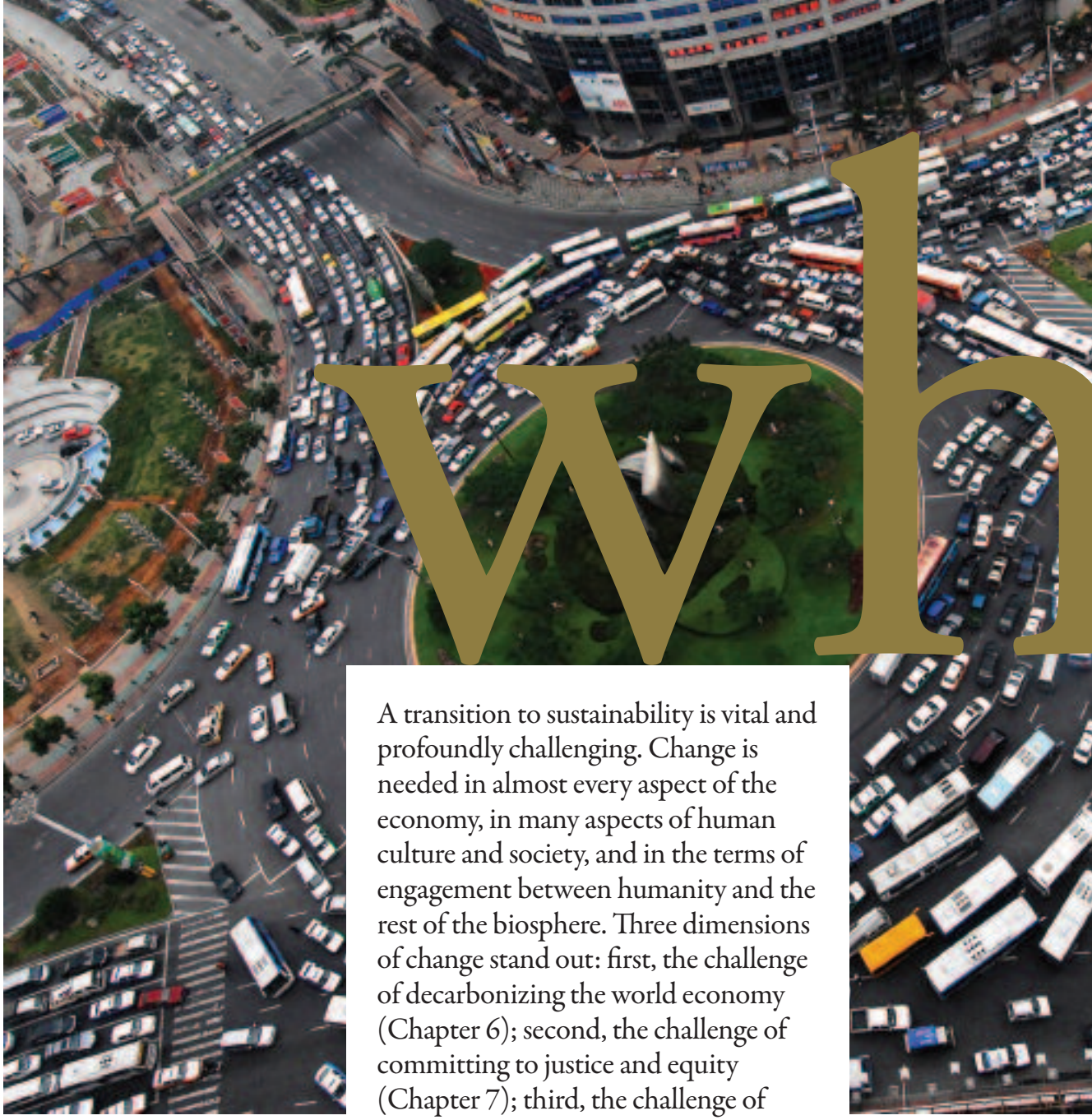
Beside these environmental organizations (indeed often intimately linked with them) lies a parallel legion of private sector industries and organizations.

This corporate environmental sector is the second part of the sustainability industry. It is the existence of this sector that has driven the mainstreaming of sustainability into the market place. Since the establishment of the World Business Council for Sustainable Development (WBCSD) in 1990, leading global corporations have absorbed and worked with the concept of sustainability in a variety of novel ways. Few major corporate websites lack statements on the environment and corporate social responsibility (CSR). Many shareholder meetings include motions relating to the environment and human rights.

The third part of the sustainability industry is government, which locks together civil society and business in a dense institutional web of legislation and regulation. In developed countries, a process of ecological modernization has led to highly technical science-based environmental bureaucracies that set the terms of engagement between business and civil society, and between human society and nature. Ecological governance is critical to the achievements of the mainstream of sustainable development.

The achievements of the sustainability industry have been remarkable. Yet something has been lost. Like political spin-doctors in the technocratic democracies of Europe and North America, opinion leaders in the sustainable development industry offer inspiring promises of future adaptation, but they are often little more than nuanced interpretations of ‘business as usual’. As this industry has developed and professionalized, it has also tended to become sclerotic. As a result, much sustainability thinking has become path-dependent, locked into regulatory procedures and trapped by its own hopeful language of ‘win-win’. The environmental movement’s very acceptance at corporate and government tables has made it harder to express sustainability’s uncomfortable challenges, harder to speak truth to power.

The challenge is to find a new passion to address the challenges at the heart of the sustainability. What needs to be done, and how do we make it happen?



Wh

A transition to sustainability is vital and profoundly challenging. Change is needed in almost every aspect of the economy, in many aspects of human culture and society, and in the terms of engagement between humanity and the rest of the biosphere. Three dimensions of change stand out: first, the challenge of decarbonizing the world economy (Chapter 6); second, the challenge of committing to justice and equity (Chapter 7); third, the challenge of conservation, of standing up for life and the biosphere (Chapter 8).



at?

"We are not told that the consumer way of life will have to be rethought and redesigned to exist within the limits of natural systems and better fitted to our human limitations"

David Orr[58]

6. Decarbonize the World Economy

The intensity of energy and material use in the world economy is critical to a transition to sustainability. At present it is characterized by high levels of energy use and high material throughputs. This cannot last. Carbon emissions from fossil fuel burning are projected to double in the next 50 years, tripling the atmospheric (CO2) concentrations from their pre-industrial level.[59] What needs to change?

The geography of consumption

Transition to sustainability is a direct challenge to existing patterns of consumption in wealthy countries. It requires nothing less than a restructuring of current patterns of global consumption through reduction in the amount of natural resources and energy used to generate wealth:

- *Reducing consumption:* to reduce human demands on the biosphere to levels that can be sustained;
- *Redirecting consumption:* to less destructive forms;
- *Redistributing consumption:* to the less well off.

Ideas of ‘decarbonization’ (systematic reduction in society’s reliance on carbon), ‘dematerialization’ (reducing the use of materials – or ‘doing more with less’)[60] or ‘power down’ (reducing per capita resource usage) are established in environmentalism. Books like Richard Heinberg’s Powerdown, or The Oil Depletion Protocol have set out both the problem and solutions.[61] Decarbonization does not have to be invented: it simply needs to be tried.

‘a shift to a low-carbon economy is essential’

Decarbonization of the world economy is the immediate critical challenge of a transition to sustainability, although it must be addressed in the context of the issues of biodiversity, water and poverty. Since the new millennium, recognition of the issue of climate change has grown, yet many people remain in denial about its severity. There is much talk of tackling Northern carbon bingeing, but we have not yet started to show how to de-link energy use and carbon consumption; or energy use and economic growth.

A shift to a low-carbon economy is essential but deeply problematic. It bites hardest those who currently use most oil and other carbon fuels – rich countries. The reduction in greenhouse gas emissions in rich countries needed to prevent drastic climate change is hotly debated, but it is without doubt very large – probably about 90% by 2030,[62] or about 200 billion tons of carbon over the next 50 years.[63] This reduction will have to take place in the face of demand that continues to grow (not least in response to climate change itself, e.g., in demands for new heating or cooling).

Energy security beyond peak oil

The world consumes about 85 million barrels of oil per day. In 2007 we consumed on average about 4.71 barrels of crude oil per person per year, although the 4.8 billion people in low-income countries consume very little per person, while the 1.8 billion who live in high-income countries consume a great deal more.[64] By 2050 there will be less energy available and more people: one billion will have more than average, seven billion will have less.[65]

We are in the era of 'peak oil' – the point at which the maximum rate of global oil production is reached. The era of cheap hydrocarbons is coming to an end.[66] High energy prices will be a major driver of change in the twenty-first century.

Adjustments to life beyond peak oil will have knock-on effects for all aspects of everyday life: how food and everyday goods are produced and transported, patterns of employment, the performance of stock markets and economies, and hence on security and geo-politics.

High energy prices will have particular implications for the world's poor who currently do not have access to modern energy services and depend heavily on biomass such as wood, charcoal or costly kerosene and oil. New boundaries of energy availability will create huge challenges in providing affordable heating, lighting and cooking as well as sustainable mobility, transport of goods, and housing.

Consumption of gas is growing but it is expected to shrink from 2020. Coal use will continue to expand (especially in China, India and USA), and it is likely to continue to be used extensively for the next 150 years. New technologies, especially carbon capture and storage, and 'clean burn' combustion will improve efficiency and reduce CO2 production.

Rapid rises in energy prices will generate huge pressure for alternative sources of energy. Carbon taxes (which seek to make energy generation pay the costs of CO2 production) would accelerate this shift to alternative power sources.

Biofuels are receiving increasing attention. First generation biofuels (bioethanol from corn, wheat or sugar; biodiesel from palm oil or Jatropha) are already in commercial production (notably in Brazil), and policies in many countries are beginning to support rapid expansion in planting of feedstocks to produce biofuels. There is increasing interest in mass power generation using organic waste products which, when combined with other renewable sources of electricity, may provide a necessary sustainable transition for the transport sector.

Belatedly, the potentially negative impacts of first generation biofuel crops on land rights, water requirements, food production, and biodiversity (particularly in remaining areas of tropical forest) are being recognised.[67] Second generation fuels from algae, grass, agricultural waste or wood cellulose are more hopeful, although woody biofuel crops are still likely to place significant demands on agricultural land and biodiverse ecosystems.

‘the era of cheap hydrocarbons is coming to an end’

In both Europe and North America, the political response to spiralling oil prices and the links between CO2 and climate change, led to a policy cascade in favour of biofuels as a substitute for oil. In his 2006 State of the Union Address, President Bush announced an ‘Advanced Energy Initiative’, to reduce US reliance on foreign sources of energy by changing the way vehicles, homes and businesses were powered. Proposals included advanced battery technologies, hydrogen fuel cells and, critically, technologies to manufacture cellulosic ethanol cheaply.

Where biofuels can be produced and consumed locally, they may have a significant role to play in global decarbonization. Yet many problems remain. As a global strategy to substitute for crude oil, biofuels offer a dubious environmental trade-off. Many biofuels capture less energy than they cost to make: growing and processing biofuel crops is highly energy-intensive. Land demand for such crops would be significant. Any sense that the shift from crude oil to biofuels involves sacrificing the food or forests of the poor so the rich can continue to drive their cars, is unlikely to be widely acceptable because it would raise significant justice issues. Biofuels offer no magic solution to the decarbonization challenge.

Technologies for a low carbon economy

Technology development is critical to decarbonization. Research on renewable energy is expanding rapidly and productively, despite a continuing bias in favour of nuclear power in countries like the UK.[68] The market for photovoltaics is growing rapidly, and costs are declining, as are material demands in manufacturing. Thin film photovoltaics are more efficient and less energy-intensive in manufacture.[69] Vast investments are being made in wind power, especially by the private sector (for example in Denmark). Geothermal energy has more potential than is often assumed.

A switch from incandescent light bulbs to compact fluorescent bulbs yields huge improvements in efficiency. A shift to LEDs (light-emitting diodes) offers further gains. In buildings, better insulation and glazing, systems of grey water use and un-powered cooling hold promise. New 'eco-cities' are being built in Shanghai and Abu Dhabi, and on a smaller scale there are experiments with energy-efficient housing, in both industrialized countries (e.g., the German *passivhaus*),[70] and in developing countries (e.g., India),[71] and increasing interest in the innovative use of shade, natural ventilation and materials. The need for low-energy low-cost but comfortable dwellings for the world's urban poor is a critical sustainability challenge. Improvements in building design need to be allied to their use (e.g., controlling plug-loads from electrical appliances), and the wider patterns of use of cities and their regions (e.g., commuting and other travel).

Fuels like hydrogen offer a means to maintain existing transport systems, but only at a huge energy cost. Hydrogen is likely to be derived from the sun and wind by 2050, but it is a carrier and not a source of energy. Electric or compressed air engines (especially in trains and buses rather than cars) offer alternative ways to store and move energy, but not to create it. There is no easy technological route to low-energy aviation, even as a temporary strategy – not only does international governance of aviation fuel preclude taxation to promote efficient use, but few fuels have the same embodied energy as aviation fuel. Airships may once again be used, although they are slow, but there is currently limited interest from airplane manufacturers: indeed much more funding is going into supersonic upper atmosphere aircraft whose prospective environmental performance is lamentable.[72] There are also technologies to improve the energy efficiency of ships (e.g., kites, novel sails and hull bubble layers), but again, these are currently only at the level of experimentation.[73]

Carbon emissions can be reduced by a range of technologies, and by changing the way people move around and live. Shifts from private cars to buses or trains, or from powered heating and cooling to house insulation, have huge potential.

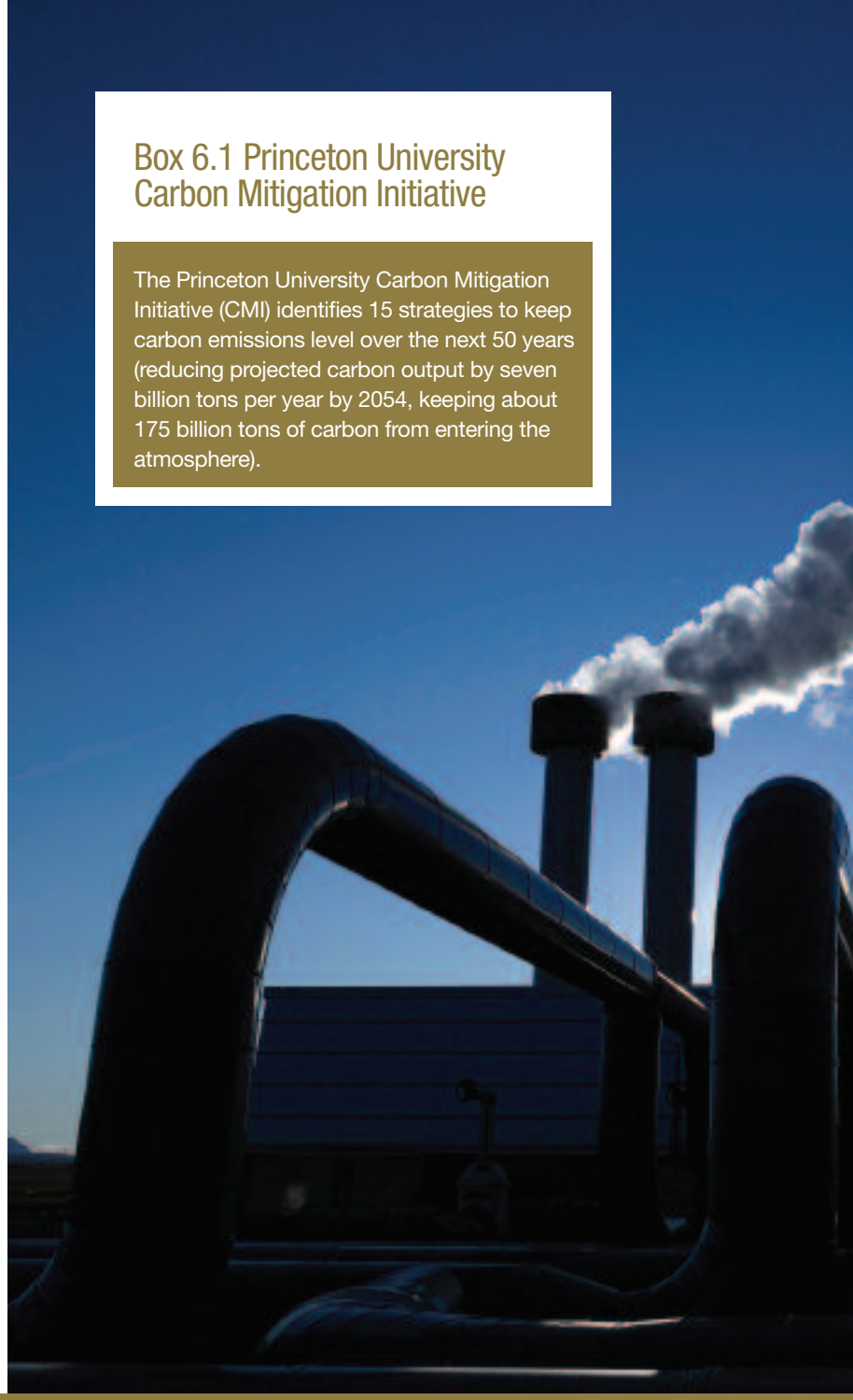
‘biofuels offer no magic solution’

Strategies for stabilising carbon emissions

The Princeton University Carbon Mitigation Initiative (CMI), for example, claims that many strategies available today can be scaled up to reduce emissions by at least one billion tons of carbon per year by 2054. These one billion ton reductions are referred to as ‘stabilization wedges’ (Box 6.1).[74]

Box 6.1 Princeton University Carbon Mitigation Initiative

The Princeton University Carbon Mitigation Initiative (CMI) identifies 15 strategies to keep carbon emissions level over the next 50 years (reducing projected carbon output by seven billion tons per year by 2054, keeping about 175 billion tons of carbon from entering the atmosphere).





Efficiency

1. Double fuel efficiency of 2 billion cars from 30 to 60 mpg
2. Decrease the number of car miles traveled by half
3. Use best efficiency practices in all residential and commercial buildings
4. Produce current coal-based electricity with twice today's efficiency

Fuel switching

5. Replace 1400 coal electric plants with natural gas-powered facilities

Carbon capture and storage

6. Capture and store emissions from 800 coal electric plants
7. Produce hydrogen from coal at six times today's rate and store the captured CO_2
8. Capture carbon from 180 coal-to-synfuels plants and store the CO_2

Nuclear

9. Double current global nuclear capacity to replace coal-based electricity

Wind

10. Increase wind electricity capacity by 50 times relative to today, to a total of two million large windmills

Solar

11. Install 700 times the current capacity of solar electricity
12. Use 40,000km2 of solar panels (or four million windmills) to produce hydrogen for fuel cell cars

Biomass Fuels

13. Increase ethanol production 50 times by creating biomass plantations with area equal to one sixth of world cropland

Natural Sinks

14. Eliminate tropical deforestation and double the current rate of new forest planting
15. Adopt conservation tillage in all agricultural soils worldwide

If all these technologies offer opportunities to reduce carbon emissions, other developments are driving in the opposite direction. Recent expansion of hydrocarbons from tar sands in Canada is deeply negative in terms of carbon and water, because of dependence on steam to liquefy the tar.[75] The conversion of coal to liquid is also highly energy-inefficient (half the energy in the coal is lost in producing liquid fuel). High energy prices in the coming decades will drive policy, but it would be a mistake to assume that they will drive sustainability.

A decarbonized global economy cannot come from technology and the urban industrial sector alone. Approximately a third of greenhouse gas emissions come from deforestation, agriculture and forestry. Patterns of future rural land-use change have profound implications for attempts to decarbonize the economy. A decarbonized world must therefore also be one that addresses rural production and poverty, and takes account of the impacts of global environmental change and their impacts on forests, peatlands and other carbon stores and sinks.

‘expensive energy presents huge political challenges’

The unstable politics of transition

The challenge of decarbonization is increased by the fact that as the energy that drives it becomes scarcer and more expensive, the more likely it is to increase global political instability. Technologies once deeply unpopular because of their risks, such as nuclear power, will come to be judged differently.[76] As energy scarcity bites in rich countries, politicians are likely to judge energy security more highly than climate change, or world peace. Like climate change, expensive energy presents huge political challenges. Major climate events (extreme temperatures, hurricanes, floods, storms etc.) can be expected to provide shocks capable of disrupting national planning (e.g., on the scale of the flooding of New Orleans from Hurricane Katrina in 2005, or the cyclone impacts on the Irrawaddy Delta in 2008), and through them to impact on the global economy.

Thus difficult decarbonization transitions need to be made under less than ideal political and economic conditions.

The market and consumers can drive rapid change in economic activities in ways that are compatible with sustainability (e.g., growth in non-fossil energy, hybrid vehicles, organic food or fair-trade products). Can they also drive dematerialization? The business challenge is considerable. Endless innovation will be needed to generate a 'race for the top' in terms of low-energy industrialism and low-impact living, and away from the more usual downward spiral of polluting, resource-heavy and energy-heavy production.

Belief systems underpin patterns of production and consumption. The growth of the environmental movement shows the power of beliefs over immediate material self-interest. The factors determining when people act as citizens and as consumers are complex, but clearly beliefs matter as much as markets.

A greater challenge is whether the market can drive dematerialization and materialization at the same time. Can it drive dematerialization in the economies that serve the wealthy, while allowing materialization of the economies that serve the poor? Can it deal with the challenge of global justice?

‘climate change needs to be very directly linked to the issue of poverty’

7. Commit to Justice and Equity

A key difficulty in addressing a sustainability agenda is the way that structures of inequality and power limit space for dialogue and alternative solutions. Issues of justice and human rights are central to any effective transition to global sustainability. Integrating equity into debate demands a focus on justice and dialogue with civil society. To bring about a transition to sustainability, the environmental and conservation movement must make a serious commitment to justice: effectively, the current concern for sustainable development needs to be replaced with a new and broader concern for *‘environmental sustainability and justice’*. This must embrace both the familiar concerns for intra-generational justice (justice for the poor now) and inter-generational justice (justice for those yet unborn). David Orr suggests the principle that *‘no human being has the right to diminish the life and wellbeing of another and no generation has the right to inflict harm on generations to come’.*[77] Security and wellbeing are both rooted in issues of justice at a global scale. Sustainability is the path that allows humanity as a whole to maintain and extend quality of life through diversity of life.

Addressing poverty-environment linkages

A significant amount of effort is going into the integration of policies to protect the environment and reduce poverty. Thus the Poverty and Environment Partnership is an informal network of development agencies which addresses key poverty-environment issues within the framework of international efforts to achieve the Millennium Development Goals.[78] Much has been done to set up safety nets for the poor (for example food aid against hunger, emergency health treatment of killer diseases, disaster relief). The challenge of delivering sustainable livelihoods remains to be met – especially livelihoods that deliver real freedoms and do not simply pass environmental degradation on to someone else or the next generation.

Yet global environmental concern does not always take account of poverty concerns. There is a worrying tendency in international environmental debates to use arguments about efficiency to impose sustainability policies on the poor. Cost-effectiveness too often trumps questions of justice, whether in plans to control the way local people use forests or to promote the growing of biofuels. Thus enthusiasm for REDD (reduced emissions from deforestation and degradation)[79] is partly driven by arguments that it is simply cheaper to reduce carbon loss from developing world forests and farmlands than by interfering with the high-value economies (and lifestyles) of developed countries. Although carbon market payments offer the potential to develop income for rural people and address climate change at the same time, there are questions of justice if the world's poor are paid the low going rate for carbon to deal with the consequences of a world economy that so strongly favours the rich.

Climate change needs to be very directly linked to the issue of poverty. Actions to tackle global climate change will not be uniform in their impacts. Responses to climate change (e.g., the balance between mitigation and adaptation or the workings of global carbon markets) therefore also have justice implications.



‘the future can be different’

Beyond ‘environment for development’

Developed countries do not provide good models for a transition to sustainability: they are the least sustainable on earth. Their levels of consumption are the chief drivers of anthropogenic climate change and biodiversity loss; their economies draw poor communities in the developing world into systems of production and exchange, but even where they generate wealth they do not stimulate equity. Very often they indirectly drive environmental degradation. The Western drive against poverty and for development is formulaic: a transition to sustainability must involve listening to voices (many of them voices of the poor in the developing world, others voices of environmental and social groups in the North) saying ‘wait, the future can be different’.

Development in the twentieth century has everywhere involved trying to tie the poor into the world economy, with the effect that they become dependent upon it, and exposed to its unequal patterns of exchange and its temporal and spatial vicissitudes.

High quality of life and high scores on measures of human development are not necessarily associated with high GDP per capita: Cuba offers an interesting challenge to the notion that rich countries show the way towards sustainability. An analysis by Mathis Wackernagel of the Global Footprint Network of ecological footprints of 93 nations over the last 30 years shows Cuba alone on the path to sustainability.[80]

There are hard questions to be asked of the opulent North about basic needs, in the light of sophisticated high-consumption lifestyles. Maslow's 'hierarchy of human needs'[81] is taken to suggest that only material needs are basic, yet measures of happiness and life satisfaction in developed economies are flatlining even as the economy, carbon consumption and material wealth continue to grow.[82]

Assumptions about the need for high levels of material wealth of the kind pursued since the Second World War in Western consumer society may not be necessary for happiness and welfare. The poor have the right to enjoy material wealth – but financial wealth, or quantity of dollars per day, is not the only metric relevant to plotting an equitable, sustainable and happy future. Maybe it is not even the most important metric. Cultural and spiritual wealth are rarely measured, but are critically important to human welfare.
The position of indigenous peoples with respect to mainstream global developmentalist thinking is a particularly urgent political issue.

Addressing population in the twenty-first century

Absolute levels of global population, and more urgently rates of population growth remain important issues for the human future on earth. Rapid population growth (and ageing populations due to falling growth) make many problems harder to tackle. It will be much harder to effect a transition to sustainability with a stable global population of 12 billion rather than nine billion; harder still with 15 billion. As population issues re-emerge it is vital to avoid the crude anthropophobic responses that characterized neo-Malthusian environmentalism in the 1970s. It is gross consumption not gross numbers that drives biodiversity loss and greenhouse gas emissions. We must understand the factors which drive the demographic transition, and recognise why people make the reproductive decisions that they do, and engage with human aspirations. The environmental movement must be clever about reproductive health and human rights, or we are doomed to repeat the mistakes of earlier decades.

‘local identity...

indigenous values...

livelihoods’

Recognising alternative environmentalisms

The global environmental movement is diverse. A number of commentators have pointed out differences between the *‘environmentalism of the rich’* and the *‘environmentalism of the poor’*, with the former dominated by concerns about the natural environment, and the latter focusing on environmental justice.[83]

Organizations dedicated to environmental justice include the US environmental justice movement, and many others across the developing world (for example OilWatch,[84] Mines and Communities,[85] International Rivers,[86] the Mangrove Action Project (MAP),[87] and the World Forest Movement).[88] Thus, in India, Toxics Link[89] denounces the exports of ships for dismantling on the coast of Gujarat, and the export of electronic waste from rich to poor countries. Or, to take another example, La Via Campesina[90] is a world network of peasant organizations which recognises that modern agriculture is less energy-efficient than traditional agriculture, using more chemical pollutants and simplifying biodiversity by placing little value on the many varieties of seeds that have co-evolved over thousands of years through peasant farming.

Such organizations combine livelihood, social, economic and environmental issues, with a strong emphasis on issues of extraction and pollution. In many instances they draw strongly on a sense of local identity (indigenous rights and indigenous values such as the sacredness of the land and the water) but they also connect easily with the politics of the left. They tend to position themselves in opposition to corporate power, and often to the militaristic or coercive forces of the state. Indeed these organizations have often been formed explicitly to oppose annexation of land, forests and water, or restrictions on rights by governments or business corporations. They are often in the forefront of environmental conflicts at the 'commodity frontiers' of oil, mineral extraction, defending biodiversity and their own livelihood.

The mainstream environmental movement is not currently reaching out effectively to organizations that represent self-mobilized expressions of environmentalism in this way. If we are to make a transition to sustainability we have to allow these movements and the people they represent to come into the forefront of planning – which means finding a place for them in the sustainability mainstream alongside the powerful thinkers and brokers that steer it.

All this does not imply that poor people are always on the side of conservation and environmental improvement, which would be patently untrue. What it means is that in many environmental conflicts of resource extraction or of pollution, the local poor people (indigenous and non-indigenous) are often on the side of conservation not so much because they are self-conscious environmentalists but because of their livelihood needs and their cultural and spiritual values.

The challenge of addressing social justice

The world movements for environmental justice are a strong force for sustainability. Issues of justice are absolutely central to debate about transitions to sustainability, because this must address the responsibilities of both the world's rich (wherever they live) and the poor. The poor have a right to energy and to carbon sinks (the oceans, and the atmosphere as a temporary reservoir), and also to other means of achieving high quality of life. To allow this, wealthy people, particularly in the industrialized countries in USA and Europe must reduce their energy use and change consumption patterns. Both affluence and poverty are linked to the environment: affluenza and povertitis are both terminal diseases.[91] Tackling ecological footprints in the North is an issue of global justice, and essential to a transition to sustainability.

‘can we reach in both directions effectively?’

Large parts of both the environmental/conservation and development movements are closely allied to mainstream multilateral and bilateral organizations. The problems associated with the size of the sustainability industry were discussed in Chapter 5. The mainstream environmental movement is currently trying to pursue a transition to sustainability through partnerships between corporations and governments. In doing so, it increases the gap with popular movements.

Too often, environmentalists seem to believe that sustainability can be delivered from above, by the same institutions and mindsets that created the problem in the first place. A commitment to justice and equity is easy to formulate on paper, but deeply challenging to achieve in practice. If those who would promote a transition to sustainability get into bed with the powerful to have more influence, they risk marginalizing the poor. As we reach out with one hand to corporations and the wealthy consumers of the developed world, what happens to the other hand? Can we reach in both directions effectively? How can the environmental movement engage with the social justice movement? On what terms would they engage? Can the mainstream environmental movement join with the energy of the grassroots justice movement, or do structures and the need for funds tie their hands?





There are areas of common interest between environmental and justice movements, and many examples of collaboration. One is the debate on large dams, where the World Commission on Dams was successful ten years ago in bringing conservationist organizations, industry, and environmental justice groups together.[92] Another is the growing debate on biofuels, where conservationists worried about deforestation find common ground with organizations representing poor people who fear loss of land, food or work with biofuel production. A third example is the conversion of mangroves to shrimp aquaculture. This brings environmental degradation and loss of biodiversity, and often involves de facto privatization of communal fishing grounds: both the poor and biodiversity lose out. Environmental justice NGOs like MAP campaign against the injustice of such transformations, and conservation organizations like WWF against their environmental impacts.

There are also areas of dispute between the established environmental and conservation movement and the wider environmental justice movement. Controversies include protected areas and human rights, the vested interests of the North and the needs of the South, the feminist and women's movements and the mainstream approaches to sustainability, and the question of population growth. Conservation and justice organizations may adopt different strategies. Thus the WWF Standards for Sustainable Agriculture sets out standards for mangrove management which groups like MAP reject. None of these controversies present insuperable challenges, but they are complex and intractable. They must be addressed with urgency and tackled with great care. Social movements will be suspicious but are open to engagement.

‘a transition to sustainability must first and foremost protect life’

8. Protect Life

The argument that we need a new global sustainable development and justice movement does not imply that the mainstream conservation movement is redundant.[93] Indeed, exactly the reverse is the case. It has never been more important for the conservation movement to stand up for species, ecosystems and the biosphere. Conservationists face a critical task: no less than preventing the destruction of the crucible of evolution.[94]

The imperative of protecting life

The classic metaphor for extinction is that species are like rivets on an aeroplane: as each goes extinct, another rivet pops. Eventually a wing or an engine will drop off, or maybe some vital piece of the flight control system will fail. This is simplistic (and anachronistic in the age of polycarbonate fuselage)[95] but it has a basis in logic. A world where techno-science seeks to deliver ecosystem services through synthetic processes is not only science fiction, but a dystopia where humane life would be impossible. Humans are part of nature. We need biodiversity if we are to remain fully human. A transition to sustainability must first and foremost protect life.

So, species matter, just as conservationists have been saying for 100 years or more.[96] Biodiversity must be at the centre of any programme for transition to sustainability. Without functioning diverse ecosystems, at every scale from gene to biosphere, the ecosystem services on which both human life as well as quality of life depend, will not endure. Success in a transition to sustainability demands full understanding and accounting for the value of biodiversity and ecosystem services in the economy.

This 'green' agenda must remain the core business of the environmental movement. It will, for example, remain a driving force within IUCN, as it will for many of its members. The environmental movement needs to focus on what it does well, and conservation is something that it does with great energy and conviction, and some success. Those diverse successes of a diverse movement need to be celebrated. Nature should be the fulcrum for wider change towards sustainability.

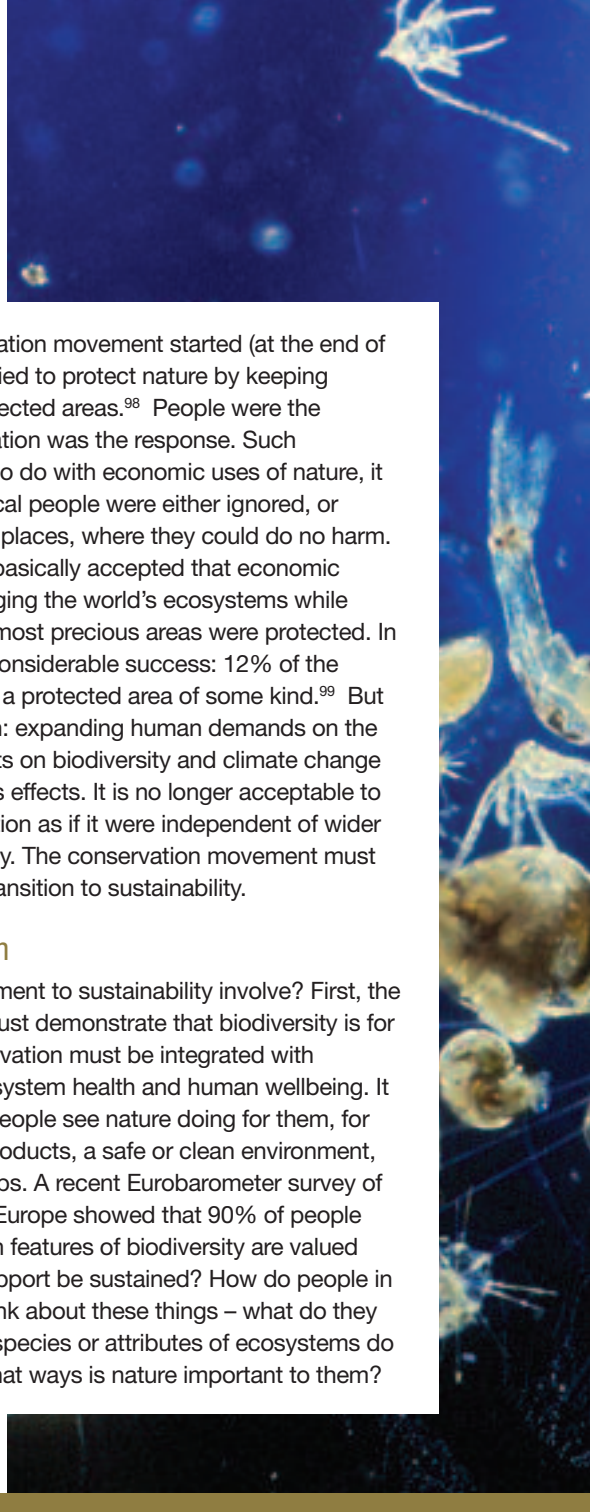
Extending the benefits of conservation

Yet conservation cannot bask in self-righteousness. It urgently needs to change to keep pace with the changes around it. The engagement with biodiversity must be comprehensive and not confined to the rare and threatened. It is clear that protected areas cannot achieve their aims as small high-biodiversity islands in an ocean of transformed and homogenous landscapes. Nor will calls for exclusive reserves necessarily achieve political support from surrounding communities or national taxpayers. The 'Durban Accord', agreed at the fifth IUCN World Parks Congress in 2003, suggested that protected areas should provide benefits *'beyond their boundaries on a map, beyond the boundaries of nation states, across societies, genders and generations'.*[97]

The biodiversity conservation movement needs to be able to imagine and describe economies that combine high levels of biodiversity and high indices of human welfare. It needs to be able to set out how the world's poorest economies can be transformed on paths that maintain biodiversity and enhance ecosystem services.

What would a sustainable African or Asian economy look like? How would its people get fed, lead lives of aspiration and hope? How can slums be transformed and life in rural communities improved? How can economies grow without pollution, deforestation, intensification of human demands on nature? What does a successful economy look like, if it is not built on vast energy and material demands, factories, airports, and jammed freeways?

How will the biodiversity and living resources of developed economies be restored, without simply exporting consumptive demand overseas, and using accumulated wealth to turn once-working rural landscapes into manicured nature parks? How does biodiversity fit within an economy that delivers high levels of welfare and happiness to citizens? In what ways is biodiversity essential for a full human life? The foolishness of the idea that people need to choose between biodiversity and sustainability needs to be demonstrated and made real through practical political solutions.

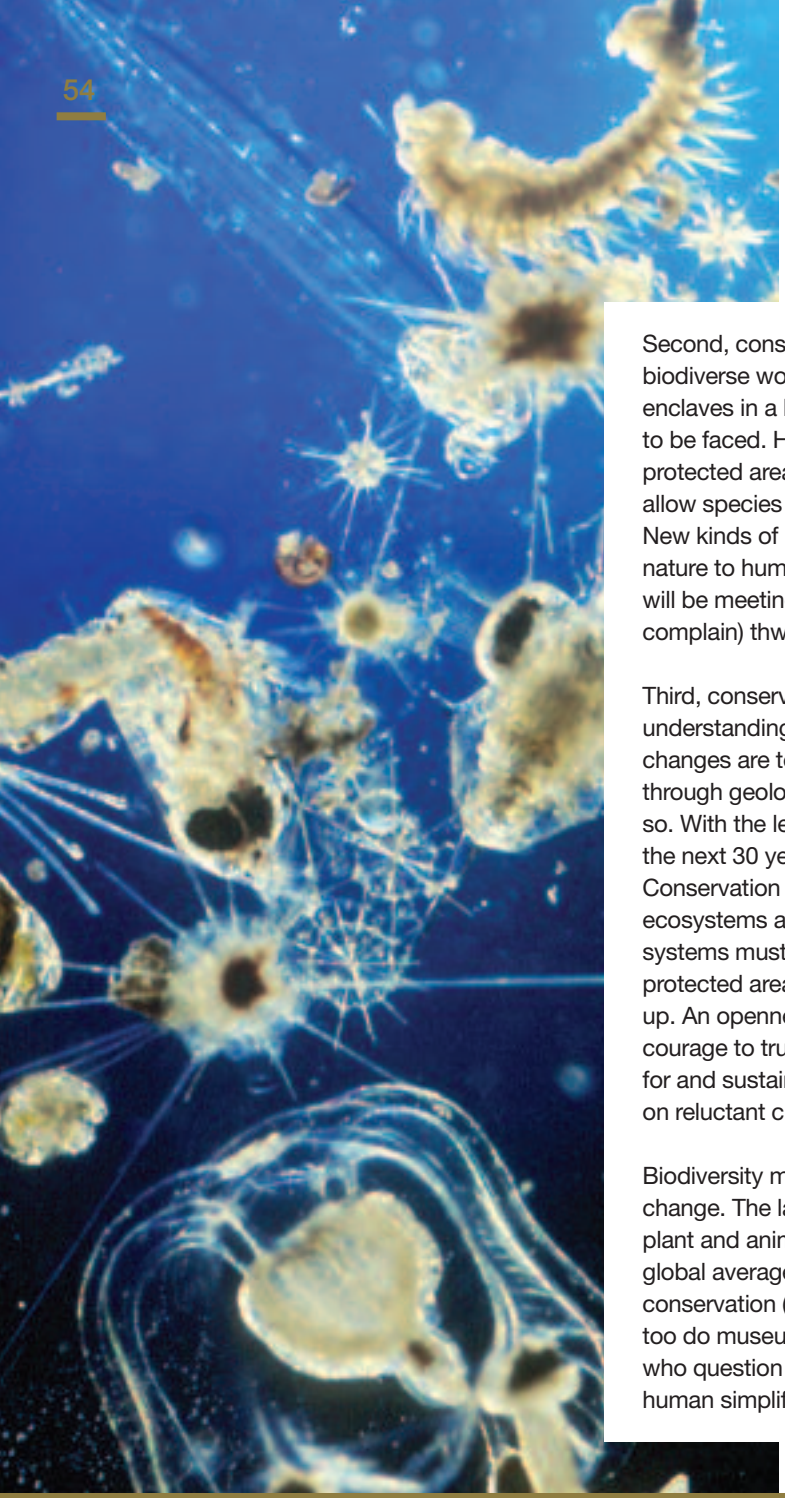


‘the conservation movement must itself become part of the transition to sustainability’

When the modern conservation movement started (at the end of the nineteenth century) it tried to protect nature by keeping people away from it in protected areas.[98] People were the problem to which conservation was the response. Such conservation was nothing to do with economic uses of nature, it was an alternative to it. Local people were either ignored, or moved away from nature’s places, where they could do no harm. In effect, conservationists basically accepted that economic growth would go on damaging the world’s ecosystems while fighting to ensure that the most precious areas were protected. In this limited goal they had considerable success: 12% of the terrestrial globe now lies in a protected area of some kind.[99] But this was a Faustian bargain: expanding human demands on the biosphere left wider impacts on biodiversity and climate change unchecked, with disastrous effects. It is no longer acceptable to treat biodiversity conservation as if it were independent of wider debates about sustainability. The conservation movement must itself become part of the transition to sustainability.

Conservation in transition

What does such a commitment to sustainability involve? First, the conservation movement must demonstrate that biodiversity is for rich and poor alike. Conservation must be integrated with concerns about wider ecosystem health and human wellbeing. It needs to work from what people see nature doing for them, for example providing food, products, a safe or clean environment, beauty and wonder, and jobs. A recent Eurobarometer survey of attitudes to biodiversity in Europe showed that 90% of people care.[100] Why is this? Which features of biodiversity are valued and why? How can this support be sustained? How do people in other parts of the world think about these things – what do they value in biodiversity, what species or attributes of ecosystems do they fear and dislike? In what ways is nature important to them?



Second, conservation strategies must be crafted that deliver a biodiverse world that includes people, not a world of biodiverse enclaves in a lifeless human landscape. There are hard questions to be faced. How much biodiversity do we need? What are protected areas for? Are protected areas in the right places to allow species and ecosystems to respond to climate change? New kinds of protected area are needed that are better at linking nature to human need. If conservation can address such issues, it will be meeting human needs and not (as its critics so often complain) thwarting them.

Third, conservation must be built on the growing scientific understanding that ecosystems will not stay static: system changes are to be expected. The biosphere has always changed: through geological time (over millions of years) quite drastically so. With the levels of anthropogenic climate change expected in the next 30 years, significant system shifts are to be expected. Conservation planning must integrate the dynamics of ecosystems and the evolution of biodiversity. Protected area systems must be revised to cope with climate change. New protected areas will be needed and some will have to be given up. An openness is needed to such give and take, and the courage to trust people in more and more countries to find space for and sustain nature, instead of trying to enforce conservation on reluctant citizens.

Biodiversity may not be able to survive extreme environmental change. The latest IPCC report has predicted that 20–30% of plant and animal species are at risk of extinction if increases in global average temperature exceed 1.5ºC–2.5ºC, so ex-situ conservation (e.g., in seed banks) also has an important role. So too do museums – if only to counter future extinction-deniers who question the former diversity of the earth and the extent of human simplification of its evolved diversity.

‘cultural diversity is integral to the conservation of landscapes’

Beyond all these things is the need for conservationists to look hard at the way nature itself is defined. Most conservation thinking is premised only on scientific definitions of what is valuable in nature, or ideas that some kind of ‘pristine’ nature can be defined and protected. Conservationists need to learn to understand and value the hybrid and social character of nature, transformed by human management in ways that can support and enhance diversity as well as destroy it, and defined by human observers in all their cultural complexity.

There are remarkable parallels and linkages between the distribution and persistence of biodiversity and of cultural and linguistic diversity, and numerous case studies demonstrate that cultural diversity is integral to the conservation of landscapes and other aspects of biodiversity. We need a collaborative approach to retaining diversity on earth, not separate or conflicting strategies for dealing with the component diversities separately.

Access to nature and its benefits is an element in the wider call for environmental justice. It needs to be recognised that justice must embrace justice with respect to other species. Indigenous groups talk about justice for themselves but also for rivers, crops and wild animals. Such ideas are not quaint pre-modern relics, but valuable insights into alternative ways to view nature as part of a sustainable future.

Future ‘social natures’ may not look like past more pristine systems, but an actuarial pursuit of imagined purity must not stand in the way of conserving living diversity as it exists. Nature’s capacity to recover from human impacts is remarkable, and if a significant level of living diversity is to endure, strategies will be needed that work with its power to evolve, not strive to lock its remnants into boxes like insects pinned in a lepidopterist’s drawer.



How do we bring about a transition to sustainability? The easy answer is to say that we need to 'think out of the box' to find solutions and strategies to bring about the profound changes needed. All well and good – but the trouble is that the boxes are part of what needs to change. All our thinking is, to a greater or lesser extent, path-dependent, locked onto versions of the trajectories of the twentieth century. How do we change it? How do we change ourselves?



W?

"We have little time, and much to accomplish."

Richard Heinberg[101]

9. Build a One-Planet Economy

Business as unusual

The twentieth century was dominated by debates about 'development', how to promote Western models of economic growth, urbanization and industrialization globally. Environmentalist critique of development in the last 30 years argued that this conventional development model was unsustainable.

The success of development on the standard 'fossil fuel automobile-based throwaway consumer economy' model in China and India demonstrates its limitations very clearly. China's success, for example, is bringing massive increases in consumption (grain, meat, steel, oil, timber).[102] China's revolutionary economic growth highlights the need for systemic change in the way development is understood and brought about globally: in the west as much as elsewhere. Business as usual is no longer an option.

‘there is an urgent need to move beyond the old-fashioned idea of development’

There is an urgent need to move beyond the old-fashioned idea of development as a single task of investment to achieve ‘take-off’, in the conventional developmentalist model of the second half of the twentieth century. According to this standard model, the process of development involves a translation to a Western-style modernity, industrial, urban, democratic and capitalist. In Walt Rostow’s classic book Stages of Economic Growth: A Non-Communist Manifesto, development was a linear path of change from traditional society, through take-off, maturity and the age of high mass consumption.[103]

The present global dilemma offers huge risks, but also outstanding opportunities. The need to create a ‘sustainable post fossil-fuel society and economy’[104] has never been more widely recognised, although the challenges on the road to achieving it remain breathtaking. There are critical technological dimensions to this contraction and convergence, discussed in the next section. More fundamental than these, however, is the need to re-conceive growth.

Re-conceiving growth: contraction and convergence

The dominant development model, based on the unlimited meeting of consumer wants leads inexorably to over-consumption.[105] Yet the continued physical expansion in the global reach of commodity supply systems means that consumers in developed countries continue to perceive resource flows as bountiful, and develop no sense of limits to consumption. Whether as consumers or citizens, people in industrialized economies show no awareness that production systems are ecologically flawed or constrained.

This model is disseminated internationally by global media and advertising as unproblematic, uniformly good and desirable. Belief in the opportunity to consume without limits in an ecologically limited world is a powerful driving force increasing global risk.

It is assumed that growth will take care of all distributional issues. Growth is indeed the main reason for economists to discount the future. Growth (because of technical change and today's investments), will mean a declining marginal satisfaction from consumption. Whatever the power of the car as symbol of success, it is likely that the third and fourth cars in the family's garage will be not so exciting as the first Fiat in post-war Italy or the first Geely King Kong in Shanghai.[106] Since growth is expected, there is then an excuse to discount the present value of future incremental consumption.

In order to achieve fair shares of the global resources available, theories of growth need to be transformed to theories of contraction and convergence, to balance the increases in energy and material use that are needed to raise living conditions among the poor against contractions among the wealthy and super-rich. There is a growing interest in ideas of 'degrowth' (décroissance). Degrowth is a term created by radical critics of growth theory intended to make space for alternative projects as part of post-development politics. Degrowth is (like sustainability) an ethical concept of how the world needs to change. Proponents of contraction want *'to create integrated, self-sufficient and materially responsible societies in both the North and the South'.*[107]

Re-conceiving growth builds on longstanding arguments about the need for, and feasibility of, 'zero-growth', notably perhaps Herman Daly's work on 'steady-state economics'.[108] Back in 1977, Daly's 'impossibility theorem' pointed out that a high mass-consumption economy in the US style was impossible (at least for anything other than a short period) in a world of four billion people. Since then, lock-in to progressivist growth economics has if anything deepened, and so too have the risks that sustainability thinking seeks to address.[109]

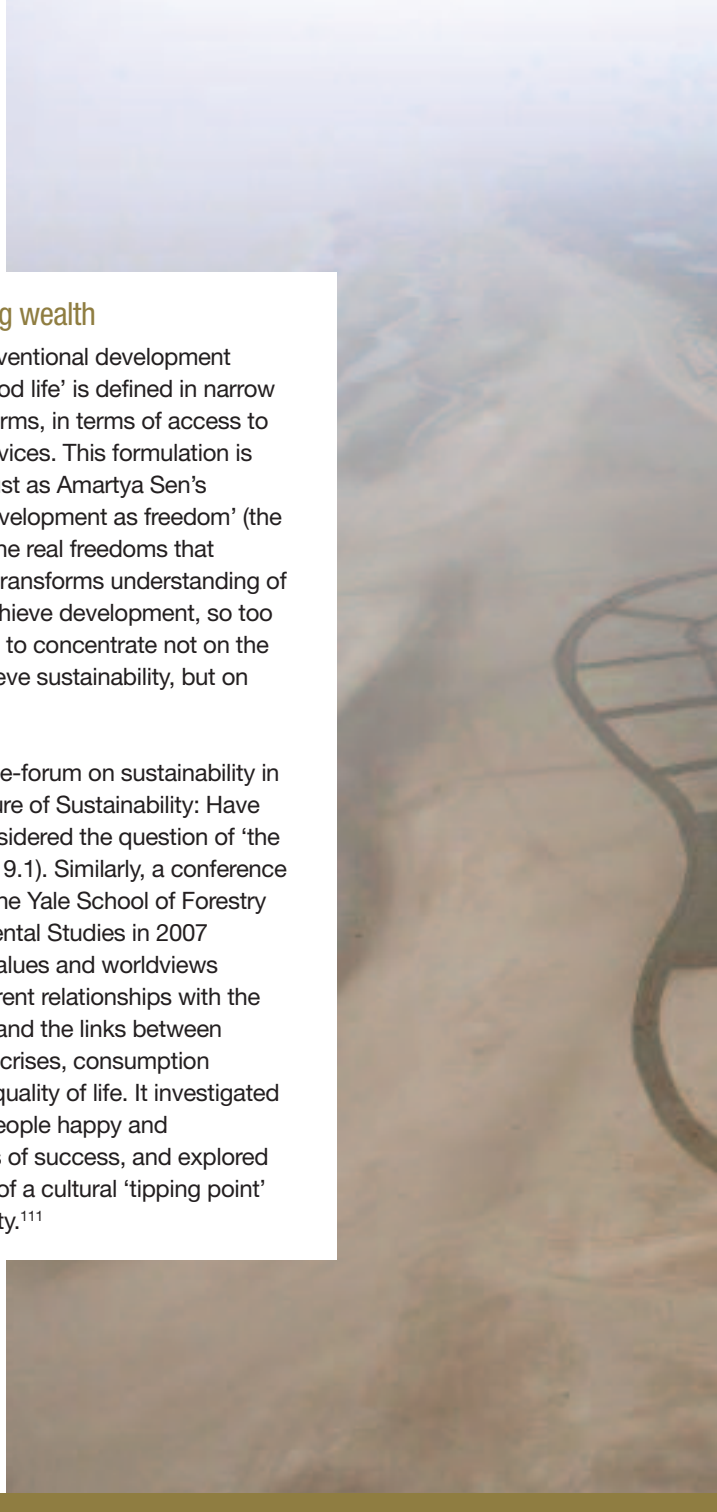
The idea of a contraction-based society poses a challenge: to find alternative models for the creation of human welfare from industry, technology and nature. Poor countries need to be able to industrialize and grow to meet the welfare needs of their people, but they need a way of doing this that avoids the world-busting models of past industrialization. Rich countries need to see ways forward that maintain quality of life, while shedding the habits and structures that damage the biosphere and corner an unfair share of the resources that are needed by the world's poor.

‘measurements of consumption and profits were regarded as poor indicators of happiness’

Understanding wealth

Under the conventional development model, the ‘good life’ is defined in narrow economistic terms, in terms of access to goods and services. This formulation is inadequate. Just as Amartya Sen’s concept of ‘development as freedom’ (the expansion of the real freedoms that people enjoy) transforms understanding of attempts to achieve development, so too there is a need to concentrate not on the means to achieve sustainability, but on ends.[110]

Thus an IUCN e-forum on sustainability in 2006 (The Future of Sustainability: Have Your Say!) considered the question of ‘the good life’ (Box 9.1). Similarly, a conference convened by the Yale School of Forestry and Environmental Studies in 2007 explored the values and worldviews underlying current relationships with the natural world, and the links between environmental crises, consumption patterns, and quality of life. It investigated what makes people happy and measurements of success, and explored the possibility of a cultural ‘tipping point’ for sustainability.[111]





Box 9.1 Redefining the 'good life'

An IUCN e-discussion Forum about sustainability in 2006 explored definitions of the 'good life'.[112] A crisis of values was a reason for the social and environmental challenges facing, in particular, industrial western society at the beginning of the twenty-first century. There were calls for a deep transformation of worldviews and for an evolution of consciousness for sustainability – one that would make room for cultural and spiritual values in decision making and for new definitions of the good life.

Simplistic connections between material wealth and wellbeing were challenged, as problems of 'affluenza', unsustainable consumption and the psychological effects of living divorced from nature were highlighted. People claimed that western society seems to have lost touch with its 'wisdom traditions' that taught that moderation in all things produces the greatest advances for human beings.

Conservation and environmental organizations were urged to tackle the 'demand' side of unsustainable consumption as well as measuring its 'impact' in order to promote environmentally friendly behaviour, and to encourage new understandings of the 'good life' beyond dreams for an 'American lifestyle'. However, the difficulties in competing with corporations who spend billions on advertising and appealing to status identity were recognised, particularly in emerging economies.

Measurements of consumption and profits were regarded as poor indicators of happiness and fulfilment, and there are calls for the promotion of new metrics that take into account social and environmental values beyond profit, such as the Happy Planet Index, or the Bhutanese indicators of Gross National Happiness.

Source: Jeanrenaud, S. (2007). [113]

‘society must urgently replace its defective economic compass’

Sustainability needs to be made the basis of a new understanding of human aspiration and achievement. The relevant metric of sustainability is *‘the production of human wellbeing (not necessarily material goods) per unit of extraction from or imposition upon nature’.*[114] Dollar metrics of development are inadequate measures of quality or richness of life. The twentieth century fixation with GDP as a measure of human development is flawed. The conclusion from the ‘Beyond GDP’ conference held in the European Parliament in 2007 was that *‘GDP is unfit to reflect many of today’s challenges, such as climate change, public health, education and the environment’*. We need to aim to go ‘beyond GDP’ and add environmental and social criteria to the existing set of metrics.[115]

A new economics of nature

A critical requirement for a one-planet economy is that economic calculations of all kinds take proper economic account of biodiversity and ecosystem services. The Millennium Ecosystem Assessment in 2005 was a major step forwards in this regard, but it lacked the hard numbers of the influential Stern review on the economics of climate change to the UK Treasury.[116] A recently launched project, catalysed by the G8+5 group in 2007, entitled ‘The Economics of Ecosystems and Biodiversity’ (TEEB) is setting out to redress the balance (Box 9.2). The study will evaluate the costs of loss of biodiversity and associated decline in ecosystem services, and compare with the costs of effective conservation and sustainable use, and make this knowledge available to policy makers.[117]

The study claims that the failure to recognise the economic value of wild nature has contributed to the continuing decline of biodiversity and degradation of ecosystems. It considers the many reasons why society finds it challenging to conserve biodiversity. These include 'market failure' resulting from lack of markets for biodiversity and ecosystem services, lack of information about many services such as pollination or scenic beauty, lack of facts and tools, lack of secure property rights, harmful taxes and perverse incentives which encourage damaging behaviour or penalise sound practices.

The analytical framework reflects critically on the ethical and equity issues embedded in tools such as discounting and integrates these concerns into its methodology. It also takes account of new insights in ecology, particularly the complexities of the non-linearity and resilience of ecosystems (Box 9.2). Preliminary analyses of the costs of the loss of biodiversity and ecosystem services from forests suggest we are losing services with a value equivalent to around US$28 billion each year.[118]

Box 9.2 The economics of ecosystems and biodiversity

Vision

Society must urgently replace its defective economic compass so that it does not jeopardise human wellbeing and planetary health through the under-valuation and consequent loss of ecosystems and biodiversity

Objectives

1. Disclose the global economic values of biodiversity and ecosystem services: the study will recommend analytical economic frameworks and preferred valuation methodologies with which to value ecosystems and biodiversity; and evaluate the ethical choices implicit in our approach.

2. Support the achievement of the MDGs: the study will consider vulnerability of societies, especially the poor, to ecosystem and biodiversity loss; and provide stakeholder compensation mechanisms to promote biodiversity conservation.

3. Enable governments to integrate valuations of ecosystems and biodiversity into national accounts, policy frameworks, and local decision making, and also provide valuation guidance towards redefining corporate performance and standardizing individual footprints: the study will evaluate the explicit policy choices available; improve the extension and effectiveness of qualitative, voluntary disclosure schemes.

Source: Sukhdev, P. (2008). [119]

‘we need to redesign and engineer the global economy so that people can get more yet consume less’

New markets

The market is a human institution of unique power and efficiency. It is capable of driving massive changes in environment and human opportunity on a scale and at a speed that dwarfs the regulatory powers of citizen, state or global organization. Human aspirations, and subsistence, are inextricably linked to the performance of that economy. The twentieth century was the first where the state of the environment became an issue for legislators. Environmentalists have long argued for tighter regulation of markets, but have only recently shown much sophistication in imagining how to engage the power of markets to secure environmental services and biological diversity. This will be vital if we are to map a transition pathway to an equitable low-carbon economy that works for both industrialized and non-industrialized economies, for rich and poor countries, and for rich and poor within those countries.

The market is central to the way the world works, but sustainability needs to be understood as a fundamental cultural idea: we need to plant a culture of sustainability. The planetary future depends on what kind of culture of consumerism we build. We need to redesign and engineer the global economy so that people can get more yet consume less. One aspect of this is an economy of services rather than objects, that generates value without generating waste or unnecessary physical or energetic throughput.

It must not be forgotten that there will be profits to be made in decarbonization. The vision of the 'environmental economy' is conventionally presented as empowering to the alert entrepreneur. Arnold Schwarzenegger, Governor of California, said recently *'Do not believe doom and gloom and disaster are the only outcomes. Humanity is smart and nature amazingly regenerative. I believe we can renew the climate on this planet'.*[120] Venture capital flows into clean technology in California doubled in 2007 to US$1.8 billion.[121] In 2006, US$52 billion was invested in renewable energy sources worldwide.[122]

New market opportunities also, of course, bring new risks. Thus it is vital that new markets in decarbonization do in fact reduce human climate change in the long term. Carbon trading, or carbon capitalism, has been created by the Kyoto Protocol, and is growing rapidly, worth US$30 billion in 2006.[123] While it may be 'the only game in town', many worries remain.[124] Without full carbon accounting, which measures all exchange of greenhouse gases into and out of the atmosphere, there is a danger that carbon markets may simply move emissions around. Thus, for example, companies in industrialized countries might benefit from carbon credits for burning biofuels even if the crops they are made from are grown on former peat swamps or tropical forests.[125]

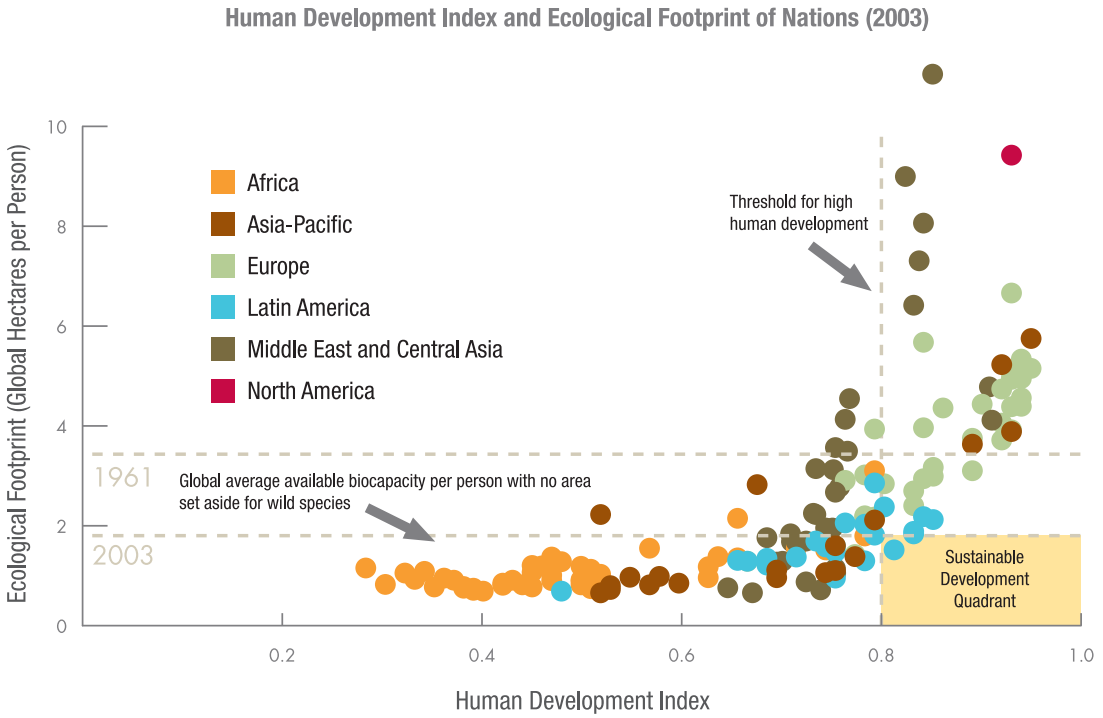
Sustainability metrics

We need to devise metrics to make the economy 'tell the ecological truth',[126] especially about the externalities of industrial, economic and social processes. For this, we need new metrics, arising from a new consensus about aims and means, and new debates about human goals.

The concept of 'ecological footprint', first conceived by William Rees and Mathis Wackernagel in 1990,[127] is now widely used as a sustainability metric. The footprint concept is a measurement tool to make the reality of planetary limits relevant to decision makers.[128] The Global Footprint Network aims to make the metric as prominent as GDP: it holds a database of National Footprint Accounts on 150 countries since 1961.[129] The ecological footprint represents the area of biologically productive land and water a population (an individual, city, country, or all of humanity) requires to provide the resources it consumes and to absorb its waste, using prevailing technology. Due to world trade, individual footprints have global impacts.[130]

Ecological footprints are usually measured in global hectares per person (gha). The Global Footprint Network calculates that there are only 1.8gha of biologically productive land per person available on the planet. Yet the average person's ecological footprint is 2.2 global hectares. Humanity's footprint exceeded the earth's capacity in about 1986. In 2007 humanity consumed more than 30% of the earth's capacity. Yet many high-income countries exceed this global average by as much as 500% (Figure 9.1).

Figure 9.1 Global Footprint: combining overshoot with Human Development Index



Source: Hails et al (see note 19)

The ecological footprint concept helps integrate social justice issues into questions of sustainability by linking individual or group demands to ecological capacity.

For example, the average footprint per person in Europe is calculated to be more than twice Earth's available biocapacity per person, and about eight times that of low-income countries such as Mozambique or Pakistan. In 2003 Europe's biocapacity was 1.06 billion gha, or 2.2gha per person. Europe's footprint was 2.26 billion gha, or 4.7gha per person. In other words, if all the world's citizens lived as Europeans, we would need more than two planets to provide the necessary resources, absorb our waste and leave some for wild species.

According to the Global Footprint Network, sustainable development can be assessed using the Human Development Index (HDI) as an indicator of socio-economic development, and the Ecological Footprint as a measure of human demand on the biosphere. The United Nations considers an HDI of over 0.8 to be 'high human development.' An Ecological Footprint less than 1.8 global hectares per person makes a country's resource demands globally replicable. Despite growing adoption of sustainable development as an explicit policy goal, most countries do not meet both minimum requirements (see figure 9.1).

One Planet Living

A major application of the Global Footprint Network's ecological footprinting approach is WWF and BioRegional's work on *One Planet Living*.[131] This uses ecological footprinting as its key indicator of sustainability. WWF and its partners apply both ecological footprinting and the ten principles outlined in Box 9.2, in projects which demonstrate 'One Planet Living' in action.

Box 9.2 One Planet Living

The One Planet Living (OPL) vision is a world in which people everywhere can lead happy, healthy lives within their fair share of the earth's resources and leave space for nature

Global challenge	*One Planet Living principle*	*One Planet Living goal*	*One Planet Living strategy*
Climate change due to human-induced build up of carbon dioxide (CO2) in the atmosphere	Zero carbon	Achieve net CO2 emissions of zero from OPL developments	Implement energy efficiency in buildings and infrastructure; supply energy from on-site renewable sources, topped up by new off-site renewable supply where necessary.
Waste from discarded products and packaging create a huge disposal challenge while squandering valuable resources	Zero waste	Eliminate waste flows to landfill and for incineration	Reduce waste generation through improved design; encourage re-use, recycling and composting; generate energy from waste cleanly; eliminate the concept of waste as part of a resource-efficient society.
Travel by car and airplane can cause climate change, air and noise pollution, and congestion	Sustainable transport Local and sustainable materials	Reduce reliance on private vehicles and achieve major reductions of CO2 emissions from transport. Provide transport systems and infrastructure that reduce dependence on fossil fuel use, e.g., by cars and airplanes. Offset carbon emissions from air travel and perhaps car travel.	Provide transport systems and infrastructure that reduce dependence on fossil fuel use, e.g., by cars and airplanes. Offset carbon emissions from air travel and perhaps car travel.

Global challenge	*One Planet Living principle*	*One Planet Living goal*	*One Planet Living strategy*
Destructive patterns of resource exploitation and use of non-local materials in construction and manufacture increase environmental harm and reduce gains to the local economy	Local and sustainable materials	Transform materials supply to the point where it has a net positive impact on the environment and local economy	Where possible, use local, reclaimed, renewable and recycled materials in construction and products, which minimizes transport emissions, spurs investment in local natural resource stocks and boosts the local economy.
Industrial agriculture produces food of uncertain quality and harms local ecosystems, while consumption of non-local food imposes high transport impacts	Local and sustainable food	Transform food supply to the point where it has a net positive impact on the environment, local economy and people's wellbeing	Support local and low-impact food production that provides healthy, quality food while boosting the local economy in an environmentally beneficial manner; showcase examples of low-impact packaging, processing and disposal; highlight benefits of a low-impact diet.
Local supplies of fresh water are often insufficient to meet human needs due to pollution, disruption of hydrological cycles and depletion of existing stocks	Sustainable water	Achieve a positive impact on local water resources and supply	Implement water use efficiency measures, re-use and recycling; minimize water extraction and pollution; foster sustainable water and sewage management in the landscape; restore natural water cycles.
Loss of biodiversity and habitats due to development in natural areas and overexploitation of natural resources	Natural habitats and wildlife	Regenerate degraded environments and halt biodiversity loss	Protect or regenerate existing natural environments and the habitats they provide to fauna and flora; create new habitats.
Local cultural heritage is being lost throughout the world due to globalization, resulting in a loss of local identity and wisdom	Culture and heritage	Protect and build on local cultural heritage and diversity	Celebrate and revive cultural heritage and the sense of local and regional identity; choose structures and systems that build on this heritage; foster a new culture of sustainability

Global challenge	*One Planet Living principle*	*One Planet Living goal*	*One Planet Living strategy*
Some in the industrialized world live in relative poverty, while many in the developing world cannot meet their basic needs from what they produce or sell	Equity and fair trade	Ensure that the OPL community's impact on other communities is positive	Promote equity and fair trading relationships to ensure the OPL community has a beneficial impact on other communities both locally and globally, notably disadvantaged communities.
Rising wealth and greater health and happiness increasingly diverge, raising questions about the true basis of wellbeing and contentment	Health and happiness	Increase health and quality of life of OPL community members and others	Promote healthy lifestyles and physical, mental and spiritual wellbeing through well designed structures and community engagement measures, as well as by delivering on social and environmental targets.

Source: http://www.panda.org/about_wwf/what_we_do/policy/one_planet_living/index.cfm

Technology and efficiency

Currently, there is little visible trend towards a "dematerialization" of the economy in absolute terms. On the contrary, the material intensity (tons/GDP) in some large economies is still increasing. Nonetheless, at the level of the individual firm or enterprise, it is accepted that there are competitive gains to be made by improving resource use and energy efficiency (and hence reduced costs), particularly in the face of tightening regulatory frameworks and rapid technological change. Such commercial 'win-win' scenarios give courage to those who would see a transition to sustainability led by radical improvements in technical efficiency.

Contraction and convergence need to be achieved in ways that are technologically clever, not by 'turning the clock back' to some pre-industrial state of endless human want, but moving to choose between technologies and forms of organization that allow two critical transitions:

- Decarbonization: separation of energy use from the release of CO2;
- Dematerialization: separation of economic growth from energy and material use, so rising economic growth is achieved with falling energy and material use.

Technology is critical to the transition from the old economy (fossil fuel, automobile throw-away) to the new economy (reuse, recycle, new energy).[132] Technological advance is at the core of the movement for radical improvements in resource productivity, notably the 'Factor 10 Club' founded in France in 1994 by Friedrich Schmidt-Bleek, whose goal is to dematerialize the economies of the industrialized countries tenfold on average within 30 to 50 years (Hawken et al., 1999).[133]

Technologies exist that can enable a start to decarbonization. The question is, how do we create the leverage that will drive a process of change to adopt and mainstream them? The challenge is to put together chains of debate and action to link citizen, government and business; consumer, regulator and producer. It is important to find new and innovative ways to finance the transition to the low-carbon economy and to maintain the essential metabolism of the world economy. Private-state partnerships and novel forms of social ownership of production are likely to be important. Carbon taxation has a major role to play, both nationally and potentially internationally, so that the costs of production come to reflect the carbon density of manufacture, transport and sale.

The area of 'sustainable design' is attracting huge attention. Concepts such as 'Natural Step', 'Biomimicry', 'Natural Capitalism', 'Cradle to Cradle' design and 'Industrial Ecology' draw on insights from nature to accelerate progress towards a low-carbon economy.[134] Thus Janine Benyus argues that evolution can be seen as 3.8 billion years of research and development that has 'solved' the problem of how to live sustainably on the planet.[135] Nature can therefore provide clues to help address today's human sustainability problems. Unlike the 'take, make and waste' models of our current industrial systems, nature manufactures biodegradable products, on site, using only small quantities of chemicals at ambient temperatures, which are extraordinary energy-efficient.



The ‘Cradle to Cradle’ concept (C2C) is based on the premise that ‘waste = food’, and that unlike the current ‘cradle to grave’ way of making things, systems could be designed in which waste products became resources for future generation of products and living organisms, thus eliminating toxic materials and waste products.[136] So rather than consuming less, or less badly, it would be possible to rethink the way things are made and create products, buildings and cities that enhance the life process itself. C2C principles are being applied to projects with financial and environmental success worldwide.[137]

New technologies may be the key to substantial improvements in material and energy intensity. They may also pose risks to health, welfare and environment. New institutions may be needed to manage these transitions.

The velocity of global change in 2008 gives a singular urgency to the need for a rapid transition to sustainability. So much is obvious. Yet we need to avoid short-term knee-jerk reactions to crises. Urgency itself brings a risk of short-termism. Solutions to problems can create problems of their own. Many development projects do that, trading hopes for economic growth against real environmental and social costs. So too do many new technologies, their Promethean promise marred by unforeseen side-effects. There are many examples of knee-jerk policy responses to problems such as climate change: expanded nuclear power programmes, biofuels, wide spectrum Genetic Modification (GM), nanotechnologies, the deployment of reflective devices in space, or seeding the ocean to enhance carbon storage. There are reasoned cases to be made for many of these, but panic makes for poor policy. Many seeming solutions treat symptoms not diseases. Many bring environmental problems in their wake. There are no ‘magic bullets’ to slay the villain of unsustainability.



10. Rejuvenate the Global Environmental Movement

A social movement for change

Transition to sustainability requires more than developing the right markets, institutions and metrics. It requires social momentum – a social movement for change.

The extent and rapidity of change now required to tip the world back towards sustainability is greater than can be achieved by existing institutions at global and national levels. Governments, corporations and international organizations have much to contribute in major ways. However, it is only the behaviour of billions of people as citizens and consumers that can give our institutions the mandate and means to lead the changes needed.



The kinds of innovation required to solve complex problems are generally of the kind that are best first achieved by smaller and more flexible groups of people – whether innovating in technology and industry at the scale of a family garage, or in building or asserting new social and environmental values around a sacred place or university campus. Civic society and social movements are crucial to the transition to sustainability, and we need strategies to rejuvenate, nurture and unite their creativity and determination. The energy bubbling up from below could foster the positive tipping point needed for systemic change.

In terms of organized grassroots institutions the world has never been stronger, or at least has never had so many. In his book '*The Blessed Unrest'*, Paul Hawken argues that there may be over one million such organizations worldwide, and that while they are often little conscious of each other and broadly divided into three movements working separately – for social justice, indigenous people and the environment – they are nevertheless usefully coming together.[138]

Only the third of these currently lies within the sustainability mainstream. Many organizations dedicated to environmental justice are not active members of the conventional 'global environment and conservation movement' (epitomised for example by membership of IUCN). If grassroots civil society organizations (social justice organizations, feminist groups, indigenous groups) formed an alliance with the mainstream environmental movement, they might together create the social forces and institutions to push for sustainability and justice. The complementarities and differences between these movements could become a strength, and revitalize as well as deeply inform the struggle for sustainability.

‘civic society and social movements are crucial to the transition to sustainability’

The challenges are huge. A rejuvenated and united movement needs to be intelligent, responsive, resilient and bold. It will have to do most of its work under deteriorating conditions, if what is projected here about the declining capacity of the earth to sustain people comes to pass. Rising energy and food prices have had dramatic impacts on people and landscapes. We need to base the process of securing a transition towards sustainability on institutions resilient enough to traverse the process.

Importantly, local and grassroots organizations are not dependent in the same way on centralized funding and organization. The extraordinarily rapid growth of global environmental institutions has only been possible because of the financial investments that the public, new wealthy elites, some governments and now some corporations have been prepared and able to make in this field. It is not a given that we will be able to rely on such institutional infrastructure in the future, or move tens of thousands of professional conservationists or development planners around the world for conferences and consultations. Furthermore the groups with the capacity to provide the multi-billion dollar funding that such institutions and methods require may not be ready for the kinds of changes that a shift to sustainability will require.

We therefore need to balance the development of our major institutions with the nurturing of the grassroots. And we need to remember how recently the environmental movement became institutionalized, and how informal activism is our oxygen. Furthermore, such organizations are likely to prove far more resilient in the face of future challenges to funding streams and political economies. They are a bulwark against future disruption, and possibilities like a ‘fortress world’ where force is used to secure scarce resources. The environmental movement of the poor has historically not been part of the mainstream of the global sustainability industry.[139] It now needs to move to centre stage.

The environmental movement needs reconfigure itself to be both global and local: a global network positioned to understand and respond in locally and globally connected ways. Large environmental organizations need to embrace and reconnect with social movements and activists in groups struggling for a different world order, and those whose work contributes to sustainability even if they don't emphasise the word 'environment' in framing it. The movement must find and seek to link together those people who are seeking and finding practical solutions to problems, people building sustainable livelihoods, landscapes and food systems, or living with more happiness and lower material flows.

Global Action Networks

One way of understanding the possibilities of a new architecture of the environmental movement is as a Global Action Network (GAN).[140] GANs address global issues at a scale that traditional approaches by governments working through international agreements and intergovernmental organizations like the United Nations and the World Bank fail to solve.[141] GANs consist of diverse stakeholders working together on a common issue by creating consensual knowledge and action among diverse stakeholders (see for example Box 10.1).

The concept of GANs derives from Oran Young's notion of 'regimes',[142] but unlike inter-governmental organizations, GANs often deliberately exclude government organizations. Unlike the 'global public policy networks' described by Wolfgang Reinicke,[143] GANs focus on creating change, with public policy being one of the products, rather than being networks that are themselves agents of public policy.[144]

Strategies adopted by GANs tend to be global and multi-level in scale (across and beyond the local, national, regional and international levels of governance). Their work involves interdisciplinary action-learning and reflective action (to produce synergies between knowledge development and practice). They build multi-stakeholder and cross sectoral, inter-organizational networks (linking international agencies, governments, businesses, civil society organizations and other actors while still using hierarchies or markets as appropriate). GANs aim to generate systemic change through a range of non-violent, boundary-crossing and diversity-embracing activities (agenda setting, knowledge generation, capacity building, resource mobilization, conflict resolution, education, certification, etc.). The GAN movement recognises the public good in areas of global sustainability and security (while ensuring the empowerment of marginalized groups and harnessing the energy of potentially divergent private interests).

‘sustainability is about a cultural change’

Box10.1 A Covenant for Life in Mesoamerica

The Covenant for Life (El Pacto por la Vida) is an IUCN initiative that aspires to construct a new dynamic between networks of public and private actors to revitalize the environmental agenda of Mesoamerica. In this region, the combined challenges of increased poverty, environmental degradation and climate change have greatly exceeded the capacities of market schemes and institutions to confront them. *The Covenant for Life* states that the social and economic problems encountered in the region are inseparable from the environmental issues and that the solution requires profound institutional and governance changes.

The Covenant for Life is an advocacy strategy for political change founded in the dialogue between various sectors, actors and institutions, previously isolated and marginalized from sustainable development agendas. Since its launch in 2007, this initiative has been a social movement for change with an integrative and participatory approach.

Construction of a new model of development in Mesoamerica that is inclusive and sustainable requires new focuses and unifying themes. The objective is to stimulate changes not only at the level of industry, institutions and environmental policies, but also at the individual level, so that everyone is committed to change for a future that is more just and sustainable for all Mesoamericans. This commitment involves the integration of moral and ethic principles and values necessary to make the required decisions that will forge a new model of development.

At the practical and operative level, *The Covenant for Life* implicates involvement of the different sectors and actors, based upon a theory of collective development, in formulating agendas in which environmental and social commitments, sector goals and advocacy strategies for political change are established.

A preliminary round of consultations with social organizations, environmental NGO’s, local governments and private companies, identified a series of themes as fundamental issues for a sustainable future in Mesoamerica, around which *The Covenant for Life i*s being constructed: food security; diversification of energy sources; hydrological resources; climate change.

Source: proyecto.incidencia@iucn.org

Cultural change for sustainability

The environmental movement has developed from a marginal concern into a multi-billion dollar institutional complex in just fifty years. This has enabled extraordinary achievements in understanding and policy. But these are not going to be enough to achieve the transition to sustainability. We need methods to relate that strength to a new generation of change by enabling our powerful environmental organizations to get in touch with the groundswell of change that is happening at the grassroots.

At the heart of this alliance will be a recognition that the shift to sustainability is about a cultural change, one that both looks forwards and backwards around the industrial age and the materialism and homogenization of the Great Acceleration of the late twentieth century for values and inspiration.

We must acquire much greater capacity to celebrate cultural difference, protect different cultures (particularly indigenous cultures), and welcome the creation of difference, for example in urban areas and among young people.

There is huge potential in the amazing human capacity to see these things differently. New elements within the environmental movement will bring new creativity and energy, and new practical ideas. Environmental organizations must connect with musicians, sculptors, painters, digital artists and poets, and through them connect with more and more people. Human culture must be joyously embraced for its role in celebrating and engaging with nature. This means taking on everything from indigenous knowledge to new explorations in technology and entrepreneurship that are inspired by biological systems.

The environmental movement must engage more effectively across educational campuses: not just through conventional curricula, but across the universe of knowledge. We must break down the barriers between disciplines, the tawdry trade in academic prestige and the sterile politics of establishment thinkers and their routine-bound ideas. We must embrace informal as well as formal learning, oral as well as written knowledge, poetry as well as mathematics, natural history as well as economics, ethics as well as engineering.

‘the environmental movement must also improve its capacity to develop a coherent political strategy for change’

The movement must develop its capacity to drive consumers to consume differently and to consume less. This is not an agenda that business can lead, although it can respond to new consumer demands with new products, or indeed lead demand by innovation (for example in the revolutionary impact of mobile phones in Africa and South Asia). The transition to sustainability has to come up from below: through the decisions of consumers and the demands of citizens. There is no blueprint for sustainable living. The necessary transition demands experimentation, and the most fertile source of new innovations lies in practical citizens’ initiatives. There we can look for new sets of values, and new and old reasons for being on the planet to make the shift back from consumption to stewardship. This kind of engagement will enable the environmental movement to stimulate the green economy (sustainable production and consumption) more effectively.

The environmental movement must also dramatically improve its capacity to develop a coherent political strategy for change: to help citizens engage effectively with local governments and municipalities, with politicians (through the ballot box and other peaceful expressions of public will), and to influence changes at an international level. Crucial here will be the cross-scale capacities: linking the global with the local and vice versa.

Strategies and technologies for effective communication from grassroots to grassroots will be essential. Strategies must be developed to get consensus and build trust. A widely diverse network of organizations is the best defence against authoritarianism, but to be effective, it needs to be connected and intelligent. An increasing number of initiatives provide this connectivity (Box 10.2). Thus the founders of the organization WiserEarth saw the potential to connect perhaps a million organizations and over 100 million people working actively towards ecological sustainability, economic justice, human rights, and political accountability.[145]

Lack of a collective awareness, duplication of effort, and poor connectivity limited the impact of their work: the solution was to create a map and directory of this network, and provide resources for communication and cooperation: in essence, an infrastructure through which to coordinate their efforts (Box 10.2).

The availability of technologies of long-distance communication is vitally important, including bottom-of-pyramid technologies such as mobile phones and cheap computers.[146] Much is promised from Web 2.0, but bandwidths and speeds remain a problem: as the developing world slowly starts to connect to the web, rich countries connected by information super-highways race away to new levels of data exchange. How many international environmental organizations design their websites to download speeds attainable in a developing world village? We need to open up our communications widely and break out of the science-government-business circuit of expert debate about sustainability.

One criticism of loose networks is that they are not good at driving forwards decisive action in a coherent way. A shift to a broader, more plural and bottom-up form of global environmentalism might therefore seem to risk losing the strategic gains of past more corporate action, whether at the level of individual powerful conservation organizations, or high-level formal relations with businesses or governments. There is a key task here for established organizations (such as IUCN) to convene and gather grassroots groups together, and help convey what they mean to powerful institutions (and perhaps especially corporations). Networks may be slightly chaotic, but they can also be enduring and fertile.

‘effective communication from grassroots to grassroots will be essential’



Box 10.2 Web 2.0 for sustainability

WiserEarth, launched in 2007, is a community directory and networking forum that maps and connects non-governmental organizations and individuals addressing the issues of climate change, poverty, the environment, peace, water, hunger, social justice, conservation, human rights and more. It allows people to find each other, make connections, build alliances and share resources. WISER stands for World Index for Social and Environmental Responsibility. Its database currently contains over 100,000 organizations based in 243 countries, territories and sovereign islands, making it the largest, freely accessible, international directory of NGOs.

Source: http://www.wiserearth.org/

Connect2earth is a community platform launched in 2008, supported by WWF International, IUCN and powered by Nokia. This provides a platform for the community to share images, texts and video on environmental and sustainability issues via computers and mobile phones. It also runs a monthly competition where participants rank and vote on submissions, and the winners receive prizes. Finalists will present their messages to leaders and decision makers at the World Conservation Congress in 2008.

Source: www.connect2earth.org



11. Build the Wider Architecture of Change

Existing institutional mindsets and governance frameworks are struggling to keep up with and adapt to the environmental challenges of the twenty-first century. We need to build more robust, equitable and dynamic systems to respond to and support the transition to sustainability.

Uncertainty and resilience

In the next 30 years, biodiversity declines are likely to accelerate, geochemical changes will accelerate in unexpected ways, and ecosystems will be increasingly disrupted and less able to provide the services people need. The world will be deeply uncertain and unpredictable. Global economic and ecological systems will degrade and expected and unexpected disruptions will occur.

Resilience is essential to cope with the future.[147] A global immune system is needed that builds resilience. This needs different strategies: top-down strategies (within the current architecture), and bottom-up strategies that comprise a new architecture. Top-down strategies involve government (at all scales from local, city, to national and supra-national) and business. Bottom-up strategies demand the renewal of the environmental movement.

Resilience is emerging as a key concept in planning for a sustainable future. Resilience is the capacity to absorb disturbances, the attribute of ecosystems (and some social systems) to undergo change and then reorganization while retaining core functions and identity. Basic concepts underpinning a resilience approach to policy and management include the non-linear behaviour of socio-ecological systems and the importance of thresholds and cross-scale effects.

‘resilience is essential to cope with the future’

Change in economic, ecological and social systems is complex. Slow and gradual change overlaps with rapidly unfolding processes and episodic change at many scales from local to global. A new term ‘panarchy’ has been coined to describe this interplay between change and persistence, between the predictable and unpredictable.[148] The aim of resilience management is to keep a system within a particular configuration of states that will continue to deliver desired ecosystem goods and services, or to move from a less desirable to a more desirable regime.

Rather than being pre-occupied with increased production, yields and returns, pursued through increased efficiency, a resilience approach embraces the dynamic nature of the world and values the role of biological and cultural diversity in sustaining options for the future.[149] This is a challenging concept for conventional ecosystem management, and indeed for many approaches to sustainability which still tend to assume that the goal of management is to enhance efficiency.

Working from the ‘inside’

The environmental movement keeps changing, and expanding. One analysis suggests we are in a phase of ‘third generation environmentalism’.[150] First generation environmentalism focused on the conservation of species and spaces; second generation environmentalism widened that focus to include pollution, sustainable use of natural resources, and the conservation and development agenda. Third generation environmentalism recognises that current organizations, institutions and political processes are part of the sustainability problem, and seeks to mainstream the environment within the existing matrices of power, and influence domestic and international public policy agendas.

This suggests that the environmental movement has itself moved, inside government and business organizations it formerly addressed from the outside. Third generation environmentalists are 'insiders', found at all levels within corporations, governments, and a wide range of other organizations far beyond the immediate environmental field (e.g., universities, trades unions, professional associations).

This wider structure of organizations and institutions is vital to the delivery of transition to sustainability. What is the architecture of these new structures that can deliver sustainability in ways that can transform the world system?

Businesses for the biosphere

There is no doubt of the importance of businesses to any transition to sustainability. Markets drive more decisions than governments. Especially since the establishment of the WBCSD, businesses have started to develop strategies that take explicit account of sustainability.[151] Moreover, businesses meet together, both at global events such as the World Economic Forum at Davos, and in sectoral organizations. Such common action by corporate non-state actors could obviously contain threats to the environment and even human rights, but they also represent an enormous opportunity for a transition to sustainability.

The great potential is that in the business universe, everything tends to be viewed as an opportunity. Businesses look forwards, to imagine the world they wish to create, while environmentalists tend to look back, to the world that is being lost. Both perspectives are needed. The challenge is how to maximize the complementarity. Of course, businesses do not look very far ahead – a ten-year vision seems a long way in a corporate boardroom, whereas a transition to sustainability needs to be imagined over three to six decades. Nonetheless, they do look forwards.

And businesses unlock the power of consumption, which is the great driver of environmental change. In the past, capitalism and consumption have driven destruction almost everywhere. Is dematerial capitalism possible? Can businesses thrive offering consumers dematerialized choices?

There are clearly opportunities: in bottom-of-pyramid businesses,[152] in markets for renewable energy, in novel products that are competitive because they do more with less, in new forms of social ownership, in effective links between technology and human need.

‘the environmental movement needs to engage much more effectively with the business sector’

Social businesses are an interesting and important innovation. As the Grameen businesses demonstrate, social enterprise can be a powerful force for positive change, far outstripping the capacity of government because of its capacity to harness individual human enterprise and self-interest. Such viral, bottom-of-pyramid solutions to sustainability challenges are in their infancy.

It will not be an easy transition to shift from weapons to bicycles, or caviar to carrots, or aeroplanes to airships, or any one of the billions of transformations in consumption needed. But corporations are interested in strategies to manage transitions. Moreover, only the market can transform the social, economic and environmental relations that it has created, and which have such dysfunctional features.

Of course, if the market is to drive a transition to sustainability, and not a race to the bottom, it will need strong regulation. This is not necessarily anathema to business, whatever the sterile mantra of free trade might argue. Most of all, business needs a fair and predictable playing field. If it gets that, it can start to bring its alchemy to bear. The design of that regulatory framework is critically important – and not easy in a globalized world of footloose capital.

The environmental movement needs to engage much more effectively with the business sector. They will need to bring some positive ideas to the table. Stories of doom and gloom will not work: the only thing that business can do is to look forwards, to plan, to invest. The environmental movement – the renewed environmental movement, with all the extra burden that a serious engagement with the fiercely anti-business grassroots sector brings – has to brave the Dragon’s Den with some solid imaginative and practical ideas.[153]

Box 11.1 Tools and training for sustainability

Innovative models of engaging with the private sector have been launched by environmental leaders to provide the private sector with tools and training for sustainable enterprises

The Climate Group

http://www.theclimategroup.org/

The Climate Group is an international, independent, not-for-profit organization that works with government and business leaders to advance climate change solutions and accelerate a low-carbon economy. It was founded in 2004 and has offices in the UK, USA, China, India and Australia. The group has demonstrated that emissions reductions, essential to slow climate change, can be achieved while boosting profitability and competitiveness. Over 40 member companies have elected to join the growing coalition from HSBC, Tesco, Sky, M&S and BP, to Virgin, BT, Dell and Google. The Climate Group launched the Voluntary Carbon Standard (VCS) in 2007, a global offset standard, guaranteeing carbon offsets that businesses and consumers buy can be trusted and have real environmental benefits. It runs campaigns, such as Together *(www.together.com)*, which inspires consumers to reduce CO2 and save on household bills.

One Planet Leaders

http://www.panda.org/about_wwf/how_we_work/businesses/training/index.cfm/

WWF International launched One Planet Leaders in 2007, a part-time three-month course for senior executives and business managers in positions to catalyse change within their own company. The course involves three learning phases: Explore, Challenge, and Apply. The first phase includes exploring the key sustainability issues, the business case for sustainability, transformations for sustainability and concludes with use of management tools to analyse and develop bespoke strategies for change within companies represented. The course is conducted in collaboration with the University of Exeter in the UK, generates credits for a Postgraduate Certificate in Sustainable Development, which itself counts towards a MSc in Sustainable Development.

Chronos

http://www.sdchronos.org/

An initiative of the WBCSD and the University of Cambridge Programme for Industry. Chronos is an e-learning tutorial on the business case for sustainable development. It is available via the Internet and on CD-ROM, and is now used by almost 200 organizations throughout the world, with a total of around 80,000 user licences.



The need for leadership

Political leaders of all sorts have a key role to play in a transition to sustainability. However, like business leaders, they are severely constrained. Governments were once thought of as led by statesmen, but now we only speak of them as politicians. And politicians, like business leaders, do not look very far into the future: in their case classically only as far as the next election – at best five or six years ahead. The key need is to create political space to allow politicians to raise their sights and take a long-term perspective.



Transitions to sustainability are deeply problematic to politicians. In a speech in Japan in March 2008, Tony Blair commented *'If the average person in the US is, say, to emit per capita one-tenth of what they do today and those in Japan and the UK one-fifth, we're not talking of adjustment, we're talking about a revolution'*. Yet transition is not an option: he went on 'failure to act now would be deeply and unforgivably irresponsible'.[154]

Political sustainability is a critical factor. Politicians often run scared of voters, and many of the changes needed are likely to be unpopular in the short term: politicians pay lip-service to reducing carbon while building roads and airport runways, and fighting shy of taxing carbon consumption. The story is only too familiar: short-term considerations of electoral unpopularity trump longer-term considerations of sustainability. As discussed in Chapter 10, only with strong social movements will politicians be able to provide the leadership needed.

Politicians ask how things can be done. The environmental movement therefore needs to be able to answer that question. Politicians need clear processes, so environmentalists need to be able to set out clear paths for forward action. The relative success of the UNFCCC lay in its use of the precautionary principle (Articles 3 and 4). New post-Kyoto climate change initiatives involve an active programme of political action around a shift to the Polluter Pays Principle. These approaches are far from perfect, but they have allowed political movement forwards.

Politicians also need help to handle complexity. The specialized language of sustainability and environmental reform, thick with acronyms and jargon, is not necessarily intelligible to politicians, or indeed ordinary people. The transition to sustainability must therefore be made comprehensible. Few politicians are trained in environmental science. Efforts must be made to make complex statistics politically relevant. We need to work out how to use the various metrics of sustainability (e.g., footprints or material flow measures) to have greater political relevance. The problem is not that suitable metrics do not exist, but that they do not have significant impact.

‘sustainability must be incorporated into economic planning, not tacked on’

A transition to sustainability will not happen without political leadership. Politicians must lead this transition, not follow. Political leaders must not be allowed to hide behind the conservative fears of voters or the self-interest of businesses. We must demand transformative leadership from our leaders: actions that start at home (in the Ministerial car fleet and the international travel programme), and move out to provide clear leadership for civil society and business corporations. Where leaders make a stand on the environment or poverty (Al Gore, Tony Blair, Angela Merkel, Arnold Schwarzenegger), they mobilize their peers and their publics. A transition to sustainability will be led by carbon-neutral leaders: if the richest and most powerful people on the planet regard their own portfolio and lifestyles as off-limits, their rhetoric about sustainability will amount to very little.

Green governments?

Prior to the 1992 Rio Conference, few governments had a designated Environment Minister. Now most do. Yet, Environment Ministers often have a lowly position in government decision making, and they tend to have relatively small budgets. As Nicholas Stern said at Bali, *‘climate change is too important to leave to environment ministers’*.

Environmental responsibilities need to be spread across government, to Ministries of Finance. Sustainability must be incorporated into economic planning, not tacked on. Governments need to adopt green accounts, and use them in allocating budgets and raising taxes (as South Africa has done). Governments, like banks and donors, need to become more intelligent about discount rates and rates of return.

Sustainability also needs to be made a fundamental part of the work of all government departments: defence, transport, agriculture, trade and diplomacy. Of course, there is a danger that handing the sustainability agenda over to ministers in these departments will bury it. But the alternative is to see the sustainability agenda sidelined to a *'green ghetto'*, a thin layer of corporate greenwash over fundamentally unsustainable government decisions. One possible solution is being tried in France.

A 'super' ministry covering ecology, energy, sustainable development and spatial planning was launched in 2007, along with a visionary participatory initiative *'Le Grenelle de l'Environnement'* that drew together all major French stakeholders in the field of economy, society and environment to design a vision for environment and development in France for the coming decades.[155] Other models, such as Thailand's *'Sufficiency Economy'*, as described in its 9th National Economic and Social Development Plan (2002–2006), offer alternative development pathways which integrate ideas of sustainable livelihoods, moderation, and ecological resilience for a sustainable future.[156]

The international dimension

Many environmental issues need to be debated above the level of national governments. The oceans and the atmosphere are effectively open-access resources, beyond national government jurisdiction. Since the Second World War, a dense and expensive network of international organizations has grown up around the United Nations, and resulted in a succession of environmental conventions (particularly the UNFCCC and the CBD).

This roaring institutional jungle is success of a sort, and although the shortcomings of the Kyoto Protocol are glaring, the UNFCCC has been far more successful than many expected in 1992. The United Nations is increasingly recognising the political importance of climate change – in October 2007 the issue took over the whole UN headquarters in New York, while the Secretary General's leadership at the 2007 Climate Change Conference was critical in what was (finally) achieved in Bali.

Yet the IPCC took the issue of climate change out of the hands of individual governments, and the issue has become a genuinely global grassroots concern. The call to action has been so broadly expressed that both politicians and international environmental bureaucrats have had to bend before it.

‘much of the progress in sustainability is being achieved by local and city governments’

International environmental governance is fragmented and arguably approaching a state of paralysis. Despite all the high-powered meetings, and international agreements, environmental trends are getting worse not better, and financial resources for addressing the challenges are not materializing.[157] While many are urging greater coherence between the United Nations treaty bodies, there are underlying concerns about inequity, lack of transparency and accountability, and lack of a civil society voice within existing multilateral arrangements.

An attempt to establish a more effective institutional architecture for sustainability must include the multilateral organizations, particularly UNEP. There is an urgent need to re-connect international governance with grassroots environmental concerns, and the needs and interests of citizens across the globe. As Paul Hawken points out, a new era of sustainability is actually being organized from the bottom up.[158]

The power of local government

Much of the progress in sustainability is being achieved by local and city governments. It is California that is progressive on sustainability, not the US Federal Government. It is London that is trying to avoid gridlock by politically bold strategies of charging for road use, not the UK Government. Cities are central to any sustainability transition. They are concentrations of political, military and economic power. Their citizens are numerous and potentially well coordinated.

William Cobbett famously called nineteenth century London the ‘great wen’: a disfiguring cyst on the face of England.[159] London has improved, somewhat, but cities all over the world are where the transition to sustainability must work if it is to be effective. Neither the slum nor the suburb offers a model for a sustainable city. In the developing world, many urban people live in poor environmental conditions and profound poverty, although with remarkably low material and energy consumption.

In the developed world, and in rapidly industrializing countries like Brazil, India and China, cities are the nerve centres of global capital accumulation, epicentres of enormous wealth and sophisticated manufactured spaces and services. The futuristic architecture of high-rise city centres and the gated extravagance of plush suburbs offer lifestyles insulated from concerns about sustainability, global environmental change and the realities of poverty. Moreover, the citizens of even the most salubrious and ancient cities in developed countries take it as a human right to escape on holiday, burning precious carbon flying to the imagined naturalness of the countryside, tramping some fragment of wilderness, or gawping at the poor in some picturesque developing world tourist destination.

Local and city government has a vital role to play in the transition to sustainability. Quite simply, cities need to be re-imagined as islands of sanity and sustainability, centres of civility and humanity. Cities can provide high-quality living and working conditions with low levels of resource use and waste. If well planned and managed, cities can reduce per capita consumption and impacts on natural systems and the transfer of environmental costs to other places and the future. There are many examples of innovation and good environmental policies in cities in the developing world, for example in Latin America.[160] Urban innovation ranges from the design of high-density low-rise housing, public open spaces, public transport, to arts and culture (music, theatre, dance, sculpture).

Local initiatives, perhaps around cities and their hinterlands, may be part of robust solutions. Much depends on city governments that are accountable to their citizens, competent and prepared to take on environmental challenges. They need to address agendas that go beyond the immediate concerns about the supply of the city’s material needs to address environmental health, quality of life and questions of sustainability across a much wider world.

12. Inspire Sustainability Transitions

The environmental movement is not short of ideas. What we are short of is effective ways to communicate them. Curiously, we are often not well served by our own expertise. We have to learn to communicate with ordinary people without degrees in ecology, chemistry or environmental philosophy.

‘reflect intrinsic values clearly’

This is starting to happen – the Bollywood actor Aamir Khan, for example, is just one global star who has spoken out on the environment, and given public support to Narmada Bachao Andolan’s opposition to dams on the Narmada river in 2006.[161] Issues of sustainability appear, intermittently, on the pages of business, food and even fashion magazines. We need better ways to communicate, especially with young people: working out how to explain the issues in the dystopian world of Grand Theft Auto[162], to the networked ‘friends’ of Myspace or Facebook, or the perfected avatars that stalk the virtual world of Second Life.[163]

Recent work by WWF-UK claims that the established approaches used by environmentalists to persuade people to change their behaviour, which appeal to individualistic and materialistic values, don’t work.[164] In contrast, it is intrinsic values that stimulate lasting pro-environment behaviour. Research suggests that people have an inclusive sense of self-identity – one that includes closer identity with other people and nature – and even people who can’t be neatly pigeon-holed as environmentalists are radically changing their behaviour. Environmental campaigns therefore need to be reframed to reflect intrinsic values clearly.[165]

Table 12.1 The sustainability transition in seven words

There are a host of problems ahead – the environmental movement recognises this, and so, increasingly, does the wider public in many countries (Table 12.1). We recognise that we need more action and on a larger scale. So how do we inspire action at that pace and at that scale? How can we persuade ourselves to take nasty medicine? How do we move the machine of world economy – surely not by standing in front of it?

Urgency	The need for a transition is an absolute priority if there is to be a humane human future beyond the twenty-first century.
Uncertainty	The future is likely to present serious problems, not all of which we can foresee.
Discomfort	We know we need to change, but we neither know how to do it, nor do we have the courage to make changes that hurt more than a tiny bit.
Resilience	This is the key to a transition to sustainability. We need to be able to roll with the shocks, take advantage of new opportunities, and help the rest of the natural world to endure the consequences of our actions.
Diversity	There is no magic bullet. Seeking diverse solutions is our best hope. We need to draw in a more diverse range of partners to help find them.
Coherence	The flip side of a diverse movement and strategy is that they lose coherence and fail to move forwards. The clever thing is to avoid fragmentation and get all the pieces to move together.
Imagination	We need to imagine new futures, better than today, richer, more diverse, more equal.

‘we need to offer hope’

Fear can be a great motivator, and it is one that environmentalists have long cherished. Since the 1970s (indeed for centuries before that) environmentalists have preached doom and gloom. We fear that, unless we talk the language of crisis, we will not be able to bring about the changes needed. Whether it is pesticides in songbirds or polar bears marooned on melting ice flows, we are used to selling fear of disaster to the media, public and politicians. Yet, if Martin Luther King had started *‘I have a nightmare…’* would his speech be remembered and have inspired a civil rights movement?[166] We must accept responsibility for moving beyond protest, but without losing our passion for the living world and the future.

The recent past is a poor guide to what is to come. Despite two world wars, and much unfinished business, the twentieth century saw the progressive advance of technological, bureaucratic and democratic capacity to cushion humanity from shocks. Famine began to be eradicated, many killer diseases were controlled, and the problem of poverty began to be addressed for the first time. The conditions that gave rise to these achievements cannot be assumed for the twenty-first century.

Our technocratic planning systems are quite good at dealing with risk from problems of known identity and probability. However, the problems of the next 100 years are only partly visible at the present time, and their dimensions, timing and future evolution are impossible to predict accurately. We know problems such as climate change exist, and that biodiversity is being lost at a rapid rate.

But we do not know the implications of such changes, or how or what complex future interactions will occur. We are much less good at dealing with this kind of uncertainty and indeterminacy. The possible non-linear interactions in areas like climate change are recognised, but we cannot predict their outcomes.

We also know very little about the way people will respond to the prospect of rapid (and perhaps disastrous) future change, or uncertainty about such outcomes. This is itself a major source of complex and non-linear behaviour. Rational self-protective behaviour at one level can have disastrous implications at another.

People are complex and clever: science-based predictions of the future need to take the implications of these characteristics seriously. Films like *The Day After Tomorrow* lead us to assume that solutions will be found.[167] The history of evolution suggests few Hollywood endings for planet-dominating species.

We need to offer hope for what promises to be a highly dysfunctional future. David Orr draws an important distinction between optimism and hope. Optimism recognises that odds are in our favour. Optimism *'leans back, puts its feet up, and wears a confident look knowing that the deck is stacked'*.[167] But there are perhaps few reasons to feel very optimistic about the human future. At best in our pursuit of sustainability to date, we are walking north on a southbound train.[168]

Hope is different from optimism: hope is about defying the odds. It is the faith that things will work out whatever the odds. Orr writes: *'Hope, authentic hope, can be found only in our capacity to discern the truth about ourselves and our situation and summon the fortitude to act accordingly'*.[170] That is the ultimate challenge for the environmental movement in the twenty-first century.

Annex 1. The Future of Sustainability Initiative

In 2006, the President and Council members of the World Conservation Union (IUCN) launched an initiative entitled the Future of Sustainability. Its objective was "to review the conceptualization of conservation and sustainable development as it stands today, and to help set the direction of the evolution of the field and serve as a clarion call for the Union, the environmental movement and society at large".[171]

This builds on the strengths and traditions of the Union, which has over 1000 member organizations in 140 countries, including governmental and non-governmental organizations.[172] IUCN involves over 10,000 voluntary scientists in six Commissions. It has played a leading role in shaping new eras of sustainable development policy and practice for almost 60 years, not least in co-publishing with one of its members (WWF) and the United Nations Environment Programme, the World Conservation Strategy in 1980[173] and Caring for the Earth in 1991.[174]

As a first step in its review process, the Union convened an international meeting of distinguished thinkers and practitioners in 2006 which reviewed society's progress towards sustainability and the main challenges facing humanity at the beginning of the twenty-first century. This generated a base document entitled "The Future of Sustainability: Rethinking Environment and Development in the Twenty-first Century" which was discussed by Council in May 2006. This document is available on-line in French, Spanish and Arabic.[175]

The Union subsequently hosted a global e-discussion on the main themes of this report, for all its Members, Commissions, staff as well as the general public in 2006. These discussions, with 460 participants from over 70 countries, generated over 200 pages of comments. There was a great deal of support for the Union in providing a platform for this worldwide debate, which critically reflected upon the success of the international environmental movement, and explored innovations in sustainable development thinking and practice. A summary of this debate is available on-line.[176]

The ideas generated through these debates were shared and reviewed with IUCN members through a series of 10 regional Members' and Commission meetings in 2007 which helped raise awareness of new perspectives as well as integrate local and regional perspectives within a new era of sustainability thinking and practice.[177] A summary of the first phases of this initiative is available on-line.[178]

A second global meeting with sustainability and conservation leaders, was held early in 2008, which helped to consolidate these discussions in the light of new scientific information on and public awareness about climate change, and to identify innovations and the next step-change for the conservation community. It emphasised the challenges of decarbonizing the world economy, of committing to justice and equity, and of collaborating for change whilst protecting life and the biosphere. The summary of this meeting is on-line.[179]

The outputs generated by this review process will help inform the long-term direction of IUCN; its medium-term strategy: "A 2020 Vision for IUCN"; and the new IUCN Intersessional Programme 2009–2012 entitled "Shaping a Sustainable Future". Ideas from the first phase of the Initiative will be discussed at the World Conservation Congress in Barcelona in October 2008, and will help inform the Congress commitments.

Endnotes

[1] Orr, D.W. (2007). 'Optimism and hope in a hotter time'. *Conservation Biology* **21(6)**: 1392–5 (p.1392).

[2] Boulding, K.E. (1965). 'Earth as a Space Ship'. Washington State University, Committee on Space Sciences, May 10, (www.colorado.edu/econ/Kenneth.Boulding/spaceship-earth.html).

[3] Ward, B. (1966). *Spaceship Earth*. New York, NY: University of Columbia Press; Boulding, K.E. (1966). 'The economics of the coming spaceship earth'. In: Jarrett, H. (Ed.), *Environmental Quality in a Growing Economy*, pp.3–14. Baltimore, MD: Resources for the Future/Johns Hopkins University Press.

[4] This phrase is from James Taylor (1981) 'Sugar Trade' from *Dad Loves His Work*, Columbia. See Oates, D. (1989). *Earth Rising: Ecological belief in an age of science.* Oregon State University Press, Corvallis, Oregon.

[5] Boulding, *op. cit.*, see note 3, (p.3).

[6] Redclift, M. (2005). 'Sustainable development (1987–2005) – an oxymoron comes of age'. *Sustainable Development* **13**: 212–27.

[7] On Peak Oil, see: http://www.hubbertpeak.com/

[8] Boulding, *op. cit.*, see note 2.

[9] '…development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (Brundtland, H. 1987. *Our Common Future,* Oxford University Press, Oxford, p.43).

[10] www.forumforthefuture.org.uk/default.aspx; 20 October 2006.

[11] Millennium Ecosystem Assessment. (2005). *Ecosystems and Human Well-Being: Synthesis*. Washington, DC: Island Press.

[12] This phrase is inspired (and justified) by Susan Strange, (1986). *Casino Capitalism*, Oxford: Blackwell.

[13] Lenton, T.M., Held, H., Hall, J.W., Lucht, W., Rahmstorf, S. and Schellnhuber, H.J. (2008). 'Tipping elements in the earth's climate system'. *Proceedings of the National Academy of Sciences* **105**: 1786–1793.

[14] For accounts of these events, see Chatterjee, P. and Finger, M. (1994). *The Earth Brokers: power, politics and world development*. London: Routledge; Dresner, S. (2002). *The Principles of Sustainability*. London: Earthscan; Adams, W.M. (2008). *Green Development: environment and sustainability in a developing world*. London: Routledge.

[15] See for example Low, N. and Gleeson, B. (1998). *Justice, Nature and Society: an exploration of political ecology*. London: Routledge; Mol, A.P.J. (2001). *Globalization and Environmental Reform: the ecological modernization of the global economy*. Cambridge, MA: MIT Press; Hajer, M.A. (1995). *The Politics of Environmental Discourse: ecological modernization and the policy process*. Oxford: Oxford University Press.

[16] Harry Callahan, Dirty Harry, 1971. (Warner Brothers, director Don Siegel).

[17] For recent examples, see UNEP (2000) *Global Environment Outlook 2000*, Earthscan, London, for the United Nations Environment Programme. Also, Jenkins, M., Green, R. E. and Madden, J. (2003) 'The challenge of measuring global change in wild nature: are things getting better or worse?' *Conservation Biology* 17: 65–86. Also, Kennedy, D. and the Editors of Science (eds.) (2006) *Science Magazine's State of the Planet 2006–7*, Island Press, for the American Association for the Advancement of Science, Washington. Also, Millennium Ecosystem Assessment, *op. cit.*, see note 11.

[18] And no lack of controversy over their claims, e.g., Lomborg, B. (2001). *The Skeptical Environmentalist*. Cambridge: Cambridge University Press.

[19] Loh, J., Randers, J., MacGillivray, A., Kapos, V., Jenkins, M., Groombridge, B., Cox, N. and Warren, B. (1999) *Living Planet Report*, WWF, Gland, Switzerland. Also, Hails, C., Loh, J. and Goldfinger, S. (2006) (eds) *Living Planet Report 2006*, WWF International, Zoological Society of London and Global Footprint Network, Gland, Switzerland. This tracks global populations of 1313 species. All of these are vertebrates (fish, amphibians, reptiles, birds, mammals), and although vertebrates represent only a fraction of known species, it is assumed that trends in their populations are typical of biodiversity overall. Separate indices are produced for terrestrial, marine and freshwater species, and then averaged to create an aggregated index.

[20] The Anthropocene refers to the current geological epoch of extensive human modification of ecological and geological processes (starting *c.* 1800 of the Common Era). See Crutzen, P.J. (2002). 'Geology of mankind: the anthropocene'. *Nature* **415**: 23; Steffen, W., Crutzen, P.J. and McNeill, J.R. (2007). 'The Anthropocene: are humans now overwhelming the great forces of nature?' *Ambio* **36(8)**: 614–21.

[21] Steffen *et al.*, *op. cit.*, see note 20.

[22] Vitousek, P.M., Mooney, H.A., Lubchenco, J. and Melillo, J.M. (1997). 'Human Domination of Earth's Ecosystems'. *Science* 25 July 1997: **277 (5325)**: 494–499.

[23] IPCC. (2007). *Summary for Policy Makers*. Working Group III Contribution to the Intergovernmental Panel on Climate Change Fourth Assessment Report. WMO and UNEP.

[24] Hannah, L., Lohse, D., Hutchinson, C., Carr, J.L. and Lankerani, A. (1994). 'A preliminary inventory of human disturbance of world ecosystems'. *Ambio* **23(4–5)**: 246–50.

[25] Rojstaczer, S., Sterling, S.M. and Moore, N.J. (2001). 'Human appropriation of the products of photosynthesis'. *Bioscience* **294**: 25490–2552.

[26] Imhoff, M.L., Bounoua, L., Ricketts, T., Loucks, C., Harriss, R. and Lawrence, W.T. (2004). 'Global patterns in human consumption of net primary production'. *Nature* **429**: 870–73.

[27] Fryzuk, M.D. (2004). 'Ammonia transformed'. *Nature* **427**: 498–9.

[28] Palumbi, S.R. (2001). 'Humans as the World's Greatest Evolutionary Force'. Science **293(5536)**: 1786–90.

[29] Wilson, E.O. (1992). *The Diversity of Life*. Harmondsworth: Penguin Books. See also Prance, G. T. (1991) 'Rates of loss of biological diversity', pp. 27–44 in I. F. Spellerberg, F. B. Goldsmith and M. G. Morris (eds), *The Scientific Management of Temperate Communities for Conservation*, Blackwell, Oxford. Also Smith, F. M., May, R. M., Pellew, R., Johnson, T. H. and Walter, K. S. (1993) Estimating extinction rates', *Nature* **364** (5 August): 494–6. Also, Hails et al. ref footnote 19. Also Secretariat of the Convention on Biological Diversity, 2006.

[30] Heywood, V.H. (Ed.) (1995). *Global Biodiversity Assessment*. UNEP/Cambridge University Press.

[31] Hails *et al.* (2006): ref endnote 19 http://www.panda.org/news_facts/publications/living_planet_report/index.cfm; 11 July 2007.

[32] Millennium Ecosystem Assessment, *op. cit.*, see note 11.

[33] Myers, R.A. and Worm, B. (2003). 'Rapid worldwide depletion of predatory fish communities'. *Nature* **423**: 280–83; see also Pauley, D., Alder, J., Bennett, E., Christensen, V., Tyedmers, P. and Watson, R. (2003). 'The future for fisheries'. *Science* **302**: 1359–61; Roberts, C.M. (2007). *The Unnatural History of the Sea*. Washington, DC: Island Press.

[34] UNEP. (2007). *Global Environment Outlook: environment for development (GEO-4)*. Nairobi: EarthPrint, UNEP. http://www.unep.org/geo/geo4/media/

[35] UNEP, *op. cit.*, see note 34.

[36] Wilson, *op. cit.*, see note 29, (p.268).

[37] Pac-Man is a classic Japanese arcade or video game released in 1980, arguably 'a landmark in video game history', and 'among the most famous arcade games of all time' (*Wikipedia* 16 May 2008, http://en.wikipedia.org/wiki/Pac-Man) (see http/www.freepacman.org/welcome.html).

[38] Crutzen, *op. cit.*, see note 20.

[39] IPCC, *op. cit.*, see note 23.

[40] Stern, N.H. (2006). *The Economics of Climate Change: the Stern Review*. Cambridge: Cambridge University Press.

[41] Web 2.0 is a term coined by a second generation of web-based communities (e.g., social networking sites, wikis, blogs) that seek to promote creativity, collaboration and sharing among web users. The term became widely used following Tim O'Reilly's Web 2.0 conference in 2004.

[42] McKie, R. (2006). 'Dumped mobiles cause waste crisis'. *Observer* 25 March 2006 (www.guardian.co.uk/news/2006/mar/26/mobilephones.theobserversuknewspages). See also http://news.bbc.co.uk/1/hi/sci/tech/6174422.stm

[43] The idea of 'lift off' is most associated with Walt Rostow (for example in Rostow, W.W. (1960). *The Stages of Economic Growth: A Non-Communist Manifesto*. Cambridge: Cambridge University Press). For a critique, see Sachs, W. (Ed.) (1992). *The Development Dictionary: a guide to knowledge as power*. Johannesburg: Witwatersrand University Press and London: Zed Books.

[44] World Bank. (2000). *Entering the 21st Century: World Development Report 1999/2000*. Oxford: Oxford University Press.

[45] Hausa proverb: literally '[if you] refuse another, [you] refuse yourself' (i.e., meanness rebounds on the miser).

[46] Wolfensohn, J.D. and Bourguignon, F. (2004). *Development and Poverty Reduction: looking back, looking ahead*. Washington, DC: The World Bank.

[47] Chen, S. and Ravallion, M. (2007). 'Absolute poverty measures for the developing world, 1981–2004'. *Proceedings of the National Academy of Sciences* **104**: 16757–16762.

[48] World Bank. (2007). *World Development Indicators 2007*. Washington, DC: World Bank. http://siteresources.worldbank.org/DATASTATISTICS/Resources/WDI07section1-intro.pdf

[49] World Bank, *op. cit.*, see note 48.

[50] Sen, A. (1999). *Development as Freedom*. Oxford: Oxford University Press.

[51] Chambers, R. (1995). 'Poverty and livelihoods; whose reality counts?' *Environment and Urbanization* **7(1)**: 173–204.

[52] Jane Weru of Shack Dwellers International, speaking at the UN Millennium Summit, 2005, S. Bass, *pers. comm.*

[53] http://web.worldbank.org

[54] World Bank, *op. cit.*, see note 48.

[55] Holdren, J.P. (2008). 'Science and technology for sustainable wellbeing'. *Science* **319**: 424–34 (25 January 2008).

[56] Monbiot, G. (2007). *Heat: how we can stop the planet burning*, (p.xvii). Penguin Books. London: Allen Lane

[57] Bass, S. (2007). *'A New Era in Sustainable Development: an IIED Briefing'*. London: IIED.

[58] Orr, *op. cit.*, see note 1, (p.1393).

[59] http://www.princeton.edu/wedges/index.xml

[60] See for example Hawken, P., Lovins, A.B. and Lovins, L.H. (2002). *Natural Capitalism: the next industrial revolution*. London: Earthscan.

[61] Heinberg, R. (2004). *Powerdown: Options and Actions for a Post-Carbon World*. Gabriola Island, British Columbia: New Society Publishers; Heinberg, R. (2006). *The Oil Depletion Protocol: A Plan to Avert Oil Wars, Terrorism and Economic Collapse*. Gabriola Island, BC: New Society Publishers, (see also http://www.oildepletionprotocol.org/, and the Post Carbon Institute http://postcarbon.org/).

[62] Monbiot, G. (2006). *Heat: How to Stop the Planet Burning*, Allen Lane, London.

[63] Princeton University Carbon Mitigation Initiative (http://www.princeton.edu/wedges/index.xml).

[64] J. Walsh, pers. comm. Using data from the BP *Statistical Review of World Energy* (http//www.bp.com) and the *CIA World Factbook* (http//www.cia.gov/publications/the-world-factbook/index.html) it is calculated that the Canadian consumption of oil was 25.18 barrels per person per year; while Indian consumption was 0.89 barrels per person per year.

[65] F. Sullivan, *pers. comm.*

[66] M. King Hubbert used a logistic model in 1956 to predict that oil production in the USA would peak between 1965 and 1970. The Hubbert model is widely used in debates of global oil supplies. Pessimists believe that the peak has already occurred, or is close (http://www.hubbertpeak.com/). See Heinberg, R. (2007). *Peak Everything: Waking Up to the Century of Declines*. Gabriola Island, British Columbia: New Society Publishers.

[67] Pearce, F. and Aldhous, P. (2007). 'Death of the biofuel dream?' *New Scientist* **2634**: 6–7.

[68] Barnham, K.W.J., Mazzer, M. and Clive, B. (2006). 'Resolving the energy crisis: nuclear or photovoltaics?' *Nature Materials* **5**: 161–164. (doi:10.1038/nmat1604 <http://www.nature.com/nmat/journal/v5/n3/full/nmat1604.html>).

[69] Daviss, B. (2007) 'Solar power: the future's bright', *New Scientist* 8 December 2007: 32-7.

[70] Monbiot, *op. cit.*, see note 62.
[71] For example the houses developed by Biodiversity Conservation (India) Limited (BCIL) at Whitefield in Bangalore (Sudhindra, A.B. (2005). 'Dwellings that help in preserving nature'. *The Hindu* October 8 2005) (http://www.thehindu.com/pp/2005/10/08/stories/2005100801070400.htm).
[72] See for example http://www.saiqsst.com/
[73] See for example Monbiot, *op. cit.*, see note 62.
[74] Pacala, S. and Socolow, R. (2007). 'Stabilization wedges: solving the climate problem for the next 50 years with current technologies'. *Science* **305**: 468–72; see http://www.princeton.edu/wedges/index.xml
[75] http://www.tarsandswatch.org/
[76] Nuclear power never went out of policy fashion for electricity generation in countries such as France, but elsewhere the risks and benefits are being re-assessed (notably in the UK Government's U-turn in 2007).
[77] Orr, D. (2006). 'Framing sustainability'. Conservation Biology **20**: 265–6, (p.266).
[78] www.undp.org/pei/aboutpep.html
[79] http://unfccc.int/files/press/backgrounders/application/pdf/fact_sheet_reducing_emissions_from_deforestation.pdf
[80] Fanelli, D. (2007). 'World failing on sustainable development'. *New Scientist* **2624**: 10. It is likely that repressed consumer demand will express itself in large increases in energy use and consumption if markets liberalize and incomes rise. The Ecological Footprint, first conceived by William Rees and Mathis Wackernagel in 1990 at the University of British Colombia, is now widely used as a sustainability metric. It represents the area of biologically productive land and water a population (an individual, city, country, or all of humanity) requires to provide the resources it consumes and absorb its waste, using prevailing technology. See www.footprintnetwork.org and Global Footprint Network. (2007). *Ecological Footprint Accounting: Building a Winning Hand*. Oakland, CA: Global Footprint Network.
[81] Maslow, A.H. (1943). 'A Theory of Human Motivation'. *Psychological Review* **50**: 370–96.
[82] See Thompson, S., Abdallah, S., Main, N., Simms, A. and Johnson, V. (2007). *The European Happy Planet Index: an index of carbon efficiency and wellbeing in the EU*. London: The New Economics Foundation; and Simms, A. and Smith, J. (2008). (Eds) *Do Good Lives Have to Cost the Earth?* London: Constable.
[83] Guha, R. and Martinez-Alier, J. (1997). *Varieties of Environmentalism: essays North and South*. London: Earthscan; Guha, R. (2000). *Environmentalism: a global history*. Delhi: Oxford University Press.
[84] http://www.oilwatch.org/index.php?lang=en
[85] http://www.minesandcommunities.org/
[86] http://www.internationalrivers.org/
[87] http://www.mangroveactionproject.org/
[88] http://www.wrm.org.uy/
[89] http://www.toxicslink.org/
[90] http://viacampesina.org/main_en/index.php
[91] De Graaf, J., Wann, D. and Naylor, T.H. (2001). *Affluenza: The All-Consuming Epidemic*. San Francisco, CA: Berrett-Koehler.
[92] Scudder, T. (2005). *The Future of Large Dams: Dealing with the social, environmental and political costs*. London: Earthscan.
[93] The phrase 'conservation movement' is used here to refer to organizations in whole or in part committed to wildlife or biodiversity conservation.
[94] This phrase is from Wilson, *op. cit.*, see note 29.
[95] And it implies that ecosystems 'work' until they collapse, whereas in reality their structure and function change with every species loss.
[96] Adams, W.M. (2004). *Against Extinction: the story of conservation*. London: Earthscan.
[97] IUCN. (2005). *Benefits Beyond Boundaries. Proceedings of the Vth World Parks Congress*. Cambridge and Gland: IUCN, (p. 220).
[98] Adams, *op. cit.*, see note 96.
[99] See the IUCN World Commission on Protected Areas (www.iucn.org/themes/wcpa), and the database on protected areas: www.wcmc.org.uk/protected_areas/data/cnppa.html
[100] http://ec.europa.eu/environment/pdf/flash_eurobarometer_2007_biodiversity_summary.pdf

[101] Heinberg, R. (2008).'Foreword'. In: Hopkins, R., *The Transition Handbook: from oil dependency to local resilience*, p.10. Devon: Green Books.

[102] Brown, L.R. (2006). *Plan B. 2.0: rescuing a planet under stress and a civilization in trouble*. New York, NY: W.W. Norton, for the Earth Policy Institute.

[103] Rostow, *op. cit.*, see note 43.

[104] Paehlke, R. (2005). 'Sustainability as a bridging concept'. *Conservation Biology* **19**: 36–8.

[105] Newton, J.L. and Freyfogle, E.T. (2004). 'Sustainability: a dissent'. *Conservation Biology* **19**: 23–32.

[106] Bradsher, K. (2008). 'In China, car blazes path to respect'. *New York Times* in the *Observer* 4 May 2006, pp.1 and 4.

[107] Latouche, S. (2004). 'Degrowth economics: Why less should be so much more'. *Le Monde Diplomatique*, November 2004 (http://mondediplo.com/2004/11/14latouche).

[108] Daly, H.E. (Ed.) (1973). *Towards a Steady-State Economy*. New York, NY: W.H. Freeman; Daly, H.E. (1977). *Steady-State Economics: the economics of biophysical equilibrium and moral growth*. New York, NY: W.H. Freeman.

[109] See Daly, H. (2007). *Ecological Economics and Sustainable Development; selected essays of Herman Daly*. London: Edward Elgar Publishing.

[110] Sen, *op. cit.*, see note 50.

[111] See http://www.environment.yale.edu/newconsciousness/. The meeting, 'Towards a New Consciousness: Creating a Society in Harmony with Nature', concluded that we lack knowledge about the role of human values in sustainable development, and that we need to renew an understanding of the human relationship with nature through new stories and narratives, and move from 'a life of riches to a richer life'.

[112] Jeanrenaud, S. (2008). *The Future of Sustainability: Have Your Say! Summary of the IUCN E-Discussion Forum 2006*. Gland: IUCN. See http://cmsdata.iucn.org/downloads/iucn___have_your_say_.pdf

[113] Jeanrenaud, S. (2007). *"The Future isn't what it used to be". A New Era of Sustainability & The International Union for Conservation of Nature (IUCN)*. Gland: IUCN. See http://cmsdata.iucn.org/downloads/the_future_isn_t_what__it_used_to_be_2007__4.pdf

[114] Paehlke, *op. cit.*, see note 104, (p.36).

[115] See http://www.beyond-GDP.eu

[116] Stern, N. (2007). *The Economics of Climate Change: the Stern Review*. Cambridge: Cambridge University Press.

[117] Sukhdev, P. (2008). *The Economics of Ecosystems and Biodiversity*. Interim Report. Presented to the CBD COP 9, Bonn, Germany, 29 May 2008 (http://www.bmu.de/files/pdfs/allgemein/application/pdf/sukhdev_interim_report.pdf). The first draft of the final report will be available in mid 2009.

[118] See http://www.eurekalert.org/pub_releases/2008-05/haog-teo052908.php

[119] See http://www.bmu.de/files/pdfs/allgemein/application/pdf/sukhdev_interim_report.pdf

[120] Quoted in Jowit, J. (2008). 'California's burning ambition'. *The Observer Business and Media*, 17 February 2008, p.11.

[121] Jowit, *op. cit.*, see note 120.

[122] Worldwatch Institute. (2008). *State of the World 2008: Innovations for a Sustainable Economy*. Washington, DC: Worldwatch Institute.

[123] Worldwatch Institute, *op. cit.*, see note 122.

[124] New Scientist. (2008). 'the only game in town'. *New Scientist* **198(2652)**: 3 (19 April 2008).

[125] Pearce, F. (2008). 'Dirty, sexy money'. *New Scientist* **198(2652)**: 38–41 (19 April 2008).

[126] Lester Brown, pers comm.

[127] Wackernagel, M. and Rees, W. (1996). *Our Ecological Footprint: Reducing Human Impact on the Earth*. Gabriola Island, BC: New Society Publishers. See also note 80.

[128] WWF. (2007). *Europe 2007. Gross Domestic Product and Ecological Footprint.* Brussels: WWF European Policy Office (EPO).

[129] For more details on methodologies of calculating footprint and national footprint accounts see www.footprintnetwork.org

[130] Ecological footprint methodology has been critiqued on several grounds. There are questions as to how sea areas should be counted, and how fossil fuel and CO2 should be accounted for. To some, footprint analysis seems to underestimate the value of biodiversity and original ecosystems, or to deny the benefit of trade.

Footprint methodologies are evolving all the time, and as different approaches emerge, footprint standards are helping create consistent measures and comparable results around the world.

[131] http://www.panda.org/about_wwf/what_we_do/policy/one_planet_living/index.cfm

[132] Brown, *op. cit.*, see note 102.

[133] <http://www.factor10-institute.org/index.htm>: the Factor 10 Club.

[134] Links to Natural Step: http://www.naturalstep.org/com/nyStart/
Biomimicry: http://www.biomimicryinstitute.org/
Natural Capitalism: http://www.natcap.org/
Cradle to Cradle:
http://www.mcdonough.com/cradle_to_cradle.htm
Industrial Ecology: http://en.wikipedia.org/wiki/Industrial_ecology

[135] Benyus, J.M. (1997). *Biomimicry. Innovation Inspired by Nature*. New York, NY: Quill, William Morrow & Company.

[136] McDonough, W. and Braungart, M. (2002). *Cradle to Cradle. Remaking the Way We Make Things*. New York, NY: North Point Press.

[137] http://www.mcdonough.com/cradle_to_cradle.htm

[138] Hawken, P. (2007). *The Blessed Unrest*. Penguin Books.

[139] Martinez-Alier, J. (2005). *The Environmentalism of the Poor: A Study of Ecological Conflicts and Valuation*. Delhi: Oxford University Press.

[140] www.gan-net.net/about/

[141] Existing GANs address a range of issues, including provision of water; climate change; corporate reporting and performance standards; corporate performance; sustainable fishing or forestry; youth employment; nutrition; HIV/AIDS, tuberculosis and malaria; corruption; micro enterprise (www.gan-net).

[142] Young, O.R. (1999a). *The Effectiveness of International Environmental Regimes*. Cambridge, MA: Massachusetts Institute of Technology Press; (1999b). *Governance in World Affairs*. Ithaca, NY: Cornell University Press.

[143] Reinicke, W.H. (1999–2000). 'The Other World Wide Web: Global Public Policy Networks'. Foreign Policy: 44–57.

[144] Like this one.

[145] http://www.wiserearth.org/

[146] For example, initiatives such as 'One Laptop per Child', http://laptop.org/

[147] http://www.resalliance.org/1.php

[148] Gunderson, L., and Holling, C.S. (Eds) (2002). Panarchy: understanding transformations in human and natural systems. Washington, DC: Island Press (see also http://www.resalliance.org/593.php)

[149] Walker, B. and Salt, D. (2006). *Resilience Thinking. Sustaining Ecosystems and People in a Changing World*. Washington, DC: Island Press.

[150] See http://www.e3g.org/index.php

[151] The World Business Council for Sustainable Development, a coalition of 140 international companies, was formed in January 1995, 'to provide business leadership as a catalyst for change toward sustainable development', http://www.wbcsd.ch/; see also Mason, M. (2005). *The New Accountability: environmental responsibility across borders*. London: Earthscan.

[152] The 'bottom of the pyramid' refers to the approximately four billion people living on less than US$2 per day, first defined in Prahalad, C.K. and Hart, S.L. (1998). 'The Fortune at the Bottom of the Pyramid'. *Strategy + Business* **26**: 54–67.

[153] *Dragons' Den* is a television programme that originated with the Sony Corporation in Japan, but has now spread across the globe. In the programme, entrepreneurs pitch ideas to business experts to obtain investment. The show is famous for the trenchant criticism that weak ideas receive.

[154] Speech in Chiba, Japan, reported by Juliette Jowitt and Robin McKie, *Observer* 16 March 2008, p.8.

[155] Arnaud Collin, pers. comm.; web site on 'Le Grenelle de l'Environnement': www.developpement-durable.gouv.fr

[156] See for example http://www.grossinternationalhappiness.org/gnh.html

[157] El-Ashry, M., (2007), quoted in Swart, L. and Perry, E. (2007). *Global Environmental Governance: Perspectives on the Current Debate*. New York, NY: Center for UN Reform Education. See http://www.centerforunreform.org/node/251

[158] Hawken, *op. cit.*, see note 138.

[159] In Rural Rides (1830) he wrote: "what is to be the fate of the great wen of all? The monster, called, by the silly coxcombs of the press, 'the metropolis of the empire'?"

[160] For example UN-Habitat Sustainable Cities Programme: http://hq.unhabitat.org/

[161] http://www.bollywoodstars.com/2008/03/31/latest-interview-of-aamir-khan/ (14 May 2008); http://www.liveindia.com/news/zzg.html (14 May 2008).

[162] In 2005, Hilary Clinton, US Congress Member, described the computer game *Grand Theft Auto* as a 'major' moral threat to Americans http://www.guardian.co.uk/commentisfree/2008/may/04/games.usa (14 May 2008).

[163] See for example the work of the Second Life Environmental Council: http://earthdayinsecondlife.wikispaces.com/Environmental+Council (14 May 2008); see also Tim Adams 'Goodbye, cruel world', *Observer* 29 October 2006 (http://www.guardian.co.uk/technology/2006/oct/29/games.observerreview; accessed 14 May 2008).

[164] Crompton, T. (2008). *Weathercocks and Signposts. The environmental movement at a crossroads*. Godalming: WWF-UK.

[165] www.wwf.org.uk/strategiesforchange

[166] Shellenberger, M. and Nordhaus, T. (2004). 'The death of environmentalism: global warming politics in a post-environmental world'. http://www.thebreakthrough.org/images/Death_of_Environmentalism.pdf

[167] *The Day After Tomorrow* (2004), a Twentieth Century Fox film, grossing US$542,771,772.

[168] Orr, *op. cit.*, see note 1.

[169] Orr, *op. cit.*, see note 1, (quoting Peter Montague).

[170] Orr, *op. cit.*, see note 1, (p.1395).

[171] The 63rd IUCN Council 2006. Decision C/63/16.

[172] See http://cms.iucn.org

[173] *The World Conservation Strategy*, (Geneva and Gland: UNEP, IUCN and WWF).

[174] *Caring for the Earth*, (Geneva and Gland: UNEP, IUCN and WWF).

[175] Adams, W.M. (2006). *The Future of Sustainability: Rethinking Environment and Development in the Twenty-first Century*. Gland: IUCN. http://cmsdata.iucn.org/downloads/iucn_future_of_sustanability.pdf

[176] http://cmsdata.iucn.org/downloads/iucn___have_your_say_.pdf

[177] Meetings were held at : South American Regional Membership Meeting, Ecuador: March 2007 (SUR); Peace and Sustainability Conference, Netherlands: March 2007 (CEESP); Regional Members Meeting, Iran: May 2007 (WESCANA); Regional Membership Meeting, South Africa: May 2007 (ROSA); 10th Anniversary of West Africa Office, July 2007 (BRAO); Regional Membership Meeting, Costa Rica, August 2007 (ORMA); Regional Membership Meeting, Congo, September 2007 (BRAC); Ethics Workshop, USA September 2007 (CEL); Regional Members Forum, Nepal, September 2007 (ARO);
2nd Latin American Parks Congress, Bariloche, Argentina: September 2007 (WCPA).

[178] Jeanrenaud, *op. cit.*, see note 113. http://cmsdata.iucn.org/downloads/the_future_isn_t_what__it_used_to_be_2007__4.pdf

[179] http://cmsdata.iucn.org/downloads/summary_of_the_iucn_sustainability_forum_2008.pdf

Acronyms

CBD	Convention on Biological Diversity
CMI	Carbon Mitigation Initiative
CSR	Corporate Social Responsibility
CO2	Carbon Dioxide
C2C	Cradle to Cradle
GAN	Global Action Network
GDP	Gross Domestic Product
GNP	Gross National Product
IPCC	Intergovernmental Panel on Climate Change
HDI	Human Development Index
IUCN	International Union for Conservation of Nature
LED	Light-Emitting Diaodes
LPI	Living Planet Index
MAP	Mangrove Action Project
MDGs	Millennium Development Goals
NGO	Non Government Organization
OPL	One Planet Living
REDD	Reduced Emissions from Deforestation and Degradation
WCED	World Commission on Environment and Development
SUV	Sports Utility Vehicle
TEEB	The Economics of Ecosystems and Biodiversity
UNFCCC	United Nations Framework Convention on Climate Change
WBCSD	World Business Council for Sustainable Development

Photo credits

Front Cover. Sea over Rocks and Sun. Sébastien Pérez-Duarte, http://flickr.com/sbprzd ; p.7. Earth 1972. Apollo 17 mission. nssdc.gsfc.nasa.gov; p.11. Angkor Wat, Cambodia. Vincent Thevenon; p.19. Girl in oil field. David Turnley. CORBIS; p.27. Sustainable Development. Are you sure? rustam.vania@gmail.com; p.33. Traffic Jam. China Daily Information Corp – CDIC. REUTERS; p.39. Geothermal pipes. Arctic-Images. CORBIS; p.44. North, South & Ecological Space. rustam.vania@gmail.com; p.49. *Phyllomedusa tomopterna*. REUTERS/Stringer Afghanistan; p.53. Marine plankton community — bottom of marin food chain. Image Quest Marine; p.57. Plans for Masdar ecocity, Abu Dhabi. Foster and Partners; p.61. Giant footprint on the beach at Zeebrugge, Belgium. Bart Musschoot. VRT. WWF-Belgium; p.73. Concert in support of IUCN Covenant for Life project, San Carlos, Nicaragua. Grettel Montero; p.81. Corn Diversity. Peru. Gleb Raygorodetsky; IUCN; p.87. New York Skyline. Megan J. Happ. Flickr.com.



INTERNATIONAL UNION
FOR CONSERVATION OF NATURE

WORLD HEADQUARTERS
Rue Mauverney 28
1196 Gland, Switzerland
mail@iucn.org
tel +41 22 999 0000
fax +41 22 999 0002
www.iucn.org





FORD FOUNDATION



