
The Global Climate Change Regime: Taking Stock and Looking Ahead

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Introduction

Climate change may well be the biggest and most complex environment-related problem for international co-operation this century and beyond. In the last ten years, the issue has been the focus of intense and, given its complexity, remarkably successful global negotiations under the United Nations Framework Convention on Climate Change (UNFCCC).¹ These negotiations have concentrated on establishing a multilateral emission-mitigation regime. This ‘mitigation agenda’ found its culmination in the recently finalized Kyoto Protocol, which is likely to come into force by the time of the World Summit on Sustainable Development in Johannesburg in 2002, the tenth anniversary of the Framework Convention. This article argues that—notwithstanding some widespread Northern misconceptions—the UNFCCC regime is unlikely to succeed unless the key Southern (equity) concern of (sharing) human-impact burdens is put firmly on its agenda for the coming years. It also suggests that the forthcoming eighth Conference of the UNFCCC Parties, hosted by the Indian government in New Delhi, presents a unique opportunity to set such a process in motion.

The Phenomenon

Global climatic changes are nothing new. The last 500 millennia, for example, have seen regular cycles in the Earth’s climate, alternating between ice ages and interglacial periods (see Fig. 1). Indeed, everything else being equal, evidence suggests that we are at the peak of one of these main interglacial periods, which accounts for the worry in the late 1970s about the onset of another ice age.² Yet these worries were not particularly acute. After all, the main cycle—with a temperature variation of 12°C—has a cooling period of over 80,000 years. ‘Après nous le déluge’ becomes less problematic at these time-scales, both as a statement and as an attitude.

This situation, however, has since changed dramatically, as witnessed in the recent *Third Assessment Report* of the Intergovernmental Panel on Climate Change (IPCC).³ The global average surface temperature—having increased by about 0.6°C over the twentieth century—is projected to increase between 1.4 and 5.8°C over this century, at a rate

‘very likely [90 per cent] to be without precedent during at least the last 10,000 years’. The threat of an impending iceage has given way to concerns about much more immediate climatic changes in the ‘opposite direction’. The reason is that, in the course of the last century, mankind has unintentionally become a force to be reckoned with in influencing the Earth’s climatic system. It graduated—or blundered—from ‘climate taker’ to ‘climate maker’.

Fundamental Distinctions

The most general distinction between the causes of the current climatic changes is thus between ‘natural’, on the one hand, and ‘anthropogenic’ (‘human-induced’, ‘man-made’), on the other. A paradigm of natural climate variations are the ice-age cycles of geological time-scales, some of which prove to be closely correlated with anomalies in the terrestrial orbit.⁴ Yet there are other natural causes which can lead to changes in regional and global climates.

Take the phenomenon of ‘volcanic winters’. The sulphur-dioxide emissions of the volcanic eruption on the Aegean island of Thera (Santorini) in 1628 BC,⁵ for example, have been used to explain the average global cooling of 1.5°C over the following one hundred years,⁶ which, in turn, has been suggested as one of the key factors in the downfall of the Minoan civilization during the first half of the sixteenth century BC.⁷ Other natural climate-change events have been identified as having had equal, if not worse, social impacts—the 3 to 5°C cooling following the Toba (Indonesia) eruption of about 73,000 years ago apparently almost spelled the end of humankind.⁸

Anthropogenic causes, in turn, are based largely in human energy use and agricultural practices relating to the emission of greenhouse gases. Rice cultivated under flooded conditions generates methane emissions into the atmosphere as a result of the decomposition of organic matter. Deforestation reduces the absorption of carbon dioxide (CO₂) through vegetation growth. However, the biggest anthropogenic cause of climate change by a long way is not these agricultural practices, but the use of fossil carbon—coal, oil, and gas—as combustion fuels in all economic sectors: transport, domestic heating, industrial production, electricity generation, and so on.

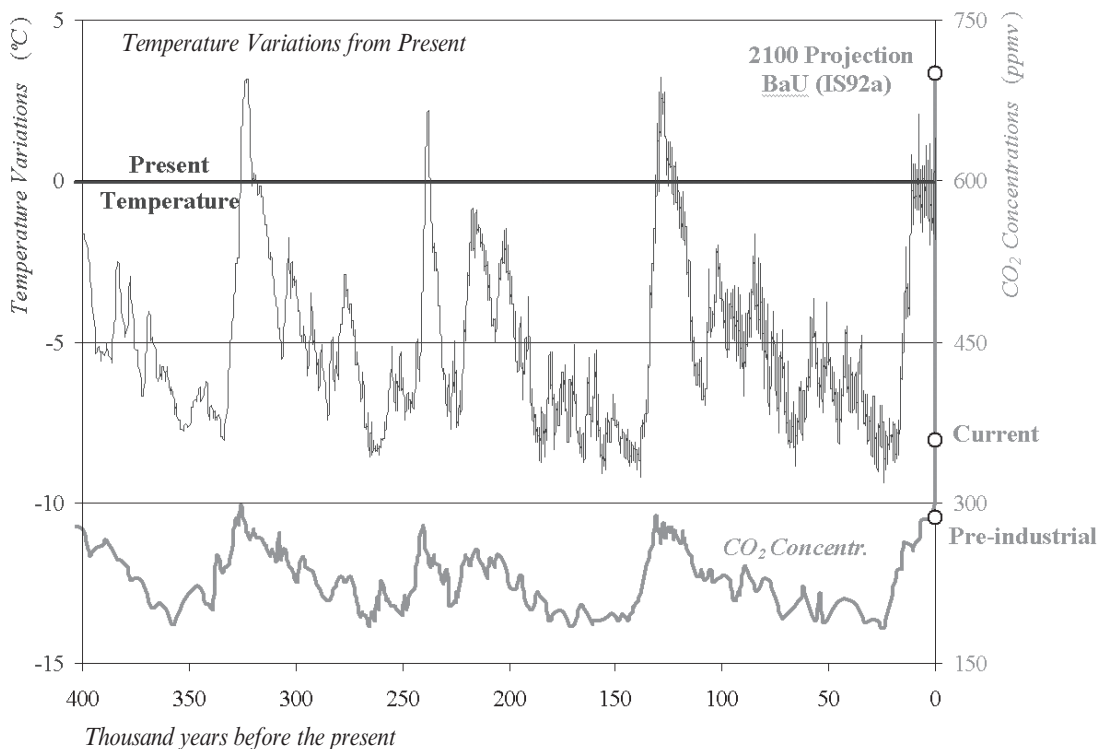


Figure 1. CO₂ Concentrations and Temperature Variations (from Present)

Sources: Pre-historic Temperature and CO₂ Concentrations: J. R. Petit, J. Jouzel, D. Raynaud, N. I. Barkov, J.-M. Barnola, I. Basile, M. Bender, J. Chappellaz, M. Davis, G. Delayque, M. Delmotte, V. M. Kotlyakov, M. Legrand, V. Y. Lipenkov, C. Lorius, L. Pepin, C. Ritz, E. Saltzman, and M. Stievenard (1999), 'Climate and Atmospheric History of the Past 420,000 Years from the Vostok Ice Core, Antarctica', *Nature*, 3: 429–36; CO₂ Concentrations: Pre-industrial (= 280 ppm), Current (1998 = 365 ppm), 2100 Projections (= 540–970 ppm, IS92a = 710 ppm), Intergovernmental Panel on Climate Change (IPCC) (2001), [TAR1] *Climate Change 2001: The Scientific Basis* (Cambridge: Cambridge University Press).

There will obviously be differences in the relative shares of CO₂ emissions for these sectors within a country, but arguably the most significant differences are not within but between countries. In 1998, for example, the CO₂ emissions per head of population ranged from the United States with 20,000 kg, at one end of the spectrum, to least developed countries such as Sierra Leone with 110 kg, at the other.⁹ Given the importance of energy in economic growth and the historic world-wide reliance on fossil energy sources, it will not be surprising to find (see Fig. 2) that, over the last century, industrialized countries (the North = OECD and the economies in transition of the former Soviet Union and Eastern Europe) have collectively discharged five times the emissions of the developing world (the South),¹⁰ a fact which gives some idea of the regional distribution of causal responsibilities for (potentially inevitable) anthropogenic climate-change impacts.¹¹

The reason for drawing the distinction between anthropogenic and natural causes lies in the possibility of attacking a root cause of the problem: while it is well within our ability to reduce greenhouse-gas emissions, it is unlikely

that our 'geo-engineering' skills will ever be able to control volcanic activity, let alone the terrestrial orbit around the Sun. However, humans must be singled out not only as causes but also as recipients of climate-change impacts. The fact of the matter is, climate change is only a problem because of adverse impacts on life-systems. And this is true regardless of whether the impacts are anthropogenic or not.

As it happens, climate-change impacts are divided not only with respect to their cause ('natural' versus 'anthropogenic'), but also relative to who or what they affect, namely 'social-' or 'human impacts' on human systems ('Society'), on the one hand, and 'ecological ones' on natural ecosystems ('Nature') on the other. One and the same cause can obviously give rise to a variety of impacts, both on different social systems—social groups, countries, or regions—and on different natural ecosystems—such as tropical rain forests or coral reefs. Many pollution problems give rise to both types of impact. What distinguishes climate change is the nature and potential seriousness of its human impacts, which transform the issue from a purely



Figure 2. CO₂ Emissions: Fossil-Fuel Burning, Cement Manufacture, and Gas Flaring, 1751–1998

‘Annex II’ ≈ 1990 OECD, ‘EIT’ = Economies in Transition (FSU and Eastern Europe).

Source: G. Marland, T. A. Boden, and R. J. Andres (2001), ‘Global, Regional, and National Annual CO₂ Emissions from Fossil-Fuel Burning, Cement Production, and Gas Flaring, 1751–1998 (revised July 2001)’, <<http://cdiac.ornl.gov/ftp/ndp030/region98.ems>>.

environmental problem into an environment- and development-related one. Moreover, the anthropogenic components of climate change additionally introduce issues of interpersonal justice between those who have been causing the impacts and those who suffer them.

The Story to Date: An Environmental(ist) Pollution Agenda

*The International Response: IPCC, UNFCCC, and the Kyoto Protocol*¹²

Knowledge of ‘greenhouse gases’ and a ‘greenhouse effect’ is, again, nothing new:

As early as 1827, the French scientist Fourier¹³ suggested that the earth’s atmosphere warms the surface by letting through high-energy solar radiation but trapping part of the longer-wave heat radiation coming back from the surface. ... At the end of the nineteenth century the Swedish scientist Arrhenius¹⁴ postulated that the growing volume of carbon dioxide emitted by the factories of the Industrial Revolution was changing the composition of the atmosphere, increasing the proportion of greenhouse gases, and that this would cause the earth’s surface temperature to rise.¹⁵

However, it took the international community until the late 1970s to become interested in the phenomenon, with the first World Climate Conference taking place in 1979 un-

der the aegis of the World Meteorological Organization (WMO). Driven by further rising public concern in developed countries about *industrial pollution*—smog, acid rain, toxic rivers, and lakes, etc.—a series of international meetings led in 1988 to the formation of the Intergovernmental Panel on Climate Change (IPCC) ‘to assess the scientific, technical, and socio-economic information relevant for the understanding of the risk of human-induced climate change’.¹⁶ To date, the IPCC has published three Assessment Reports—the latest in 2001—which have been extremely influential in shaping the global climate-change agenda. After considerable debate about the findings of the 1990 *First Assessment Report*, the ministerial segment of the Second World Climate Conference (1990) called for the initiation of progress towards negotiating a UN climate-change regime.

The initial phase of regime formation culminated very speedily at the 1992 Rio Earth Summit in the UN Framework Convention on Climate Change (UNFCCC). In light of the excellent and detailed exposition of this Convention and its related legal instruments in the Agreements section of the *Yearbook*, there is no need to introduce its detail here except for three of its key ‘architectural elements’.

- **Article 2** defines the ultimate objective of this Convention as: ‘to achieve ... stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.’
- **Article 3** (on Principles) stipulates in its first paragraph that: ‘The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof.’¹⁷

The equity-related differentiation principles regarding *responsibilities* and *capabilities* of Article 3 found their way into the architecture of the Convention primarily through the introduction of two lists of countries: *Annex I*, containing the industrialized countries with their significant historical emission records (Fig. 2), and *Annex II*, with the affluent industrialized countries. For example, the Parties included in Annex I commit themselves, in conformity with the degree of their responsibility in

- **Article 4.2**, to adopt policies and measures ‘with the aim of returning individually or jointly to their 1990 levels these anthropogenic emissions of carbon dioxide and other greenhouse gases not controlled by the Montreal Protocol’ by the end of the 1990s, thus demonstrating ‘that developed countries are taking the lead in modifying longer-term trends in anthropogenic emissions consistent with the objective of the Convention.’
- **Article 4.4**, in turn, demands that Annex II Parties should ‘assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects.’

To be clear, the target of returning to 1990 levels by the year 2000 was stated as an aspiration without legally binding status. On 15 October 1992, the United States of America—preceded only by three small island states—was the first major country, North or South, to ratify the Convention, which came into force on 21 March 1994.

In April 1995, the first session of the Conference of the

Parties (CoP1) in Berlin adopted what became known as the ‘Berlin Mandate’.¹⁸ In it, the Parties concluded that the Annex I commitments in Article 4 of the Convention were not adequate and agreed to begin a process ‘to take appropriate action for the period beyond 2000’. This process was, *inter alia*, meant ‘to set quantified limitation and reduction objectives within specified time-frames, such as 2005, 2010, and 2020’ for Annex I Parties, and ‘not introduce any new commitments for Parties not included in Annex I’, thus reaffirming the need for Annex I leadership in conformity with the demands on equity by the existing differences in causal responsibility.

The ensuing negotiations—carried out under the aegis of the ‘Ad Hoc Group on the Berlin Mandate’ (AGBM)—found their culmination in the morning of 11 December 1997 at the third session of the CoP in Kyoto, when the chairman of the negotiations, Ambassador Estrada-Oyuela, declared the Kyoto Protocol to be unanimously agreed.¹⁹ The Protocol’s key response to the Berlin Mandate was set down in two Annexes—listing greenhouse gases (Annex A) and *legally binding* percentage reduction figures (Annex B)—and in **Article 3**:

- 3.1 The Parties included in Annex I shall, individually or jointly, ensure that their aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases listed in Annex A do not exceed their assigned amounts, calculated pursuant to their quantified emission limitation and reduction commitments inscribed in Annex B and in accordance with the provisions of this Article, with a view to reducing their overall emissions of such gases by at least 5 per cent below 1990 levels in the commitment period 2008 to 2012.
- 3.2 Each Party included in Annex I shall, by 2005, have made demonstrable progress in achieving its commitments under this Protocol.

In keeping with the Berlin Mandate, the Protocol did not introduce emission targets—or ‘QELRCs’ (Quantified Emission Limitation and Reduction Commitments)—for developing countries. And, while it fell short of providing Annex I targets for the year 2020 mentioned in the mandate, it did provide for additional, post-2012 commitment periods:²⁰

- 3.9 Commitments for subsequent periods for Parties included in Annex I shall be established in amendments to Annex B to this Protocol, ... The Conference of the Parties ... shall initiate the consideration of such commitments at least seven years before the end of the first commitment period.

The *Yearbook* UNFCCC reference entry is witness to the fact that there is much more to the architecture of the emission mitigation regime introduced by the Protocol than just these targets and timetables enshrined in Article 3. And while it is not possible to characterize these features in more detail in the present context, some of the most recent achievements cannot be left completely unmentioned. Having achieved a political breakthrough at the extraordinary CoP6-bis session in Bonn in July 2001, the negotiators reconvened for the seventh regular CoP session in November at Marrakech, where they succeeded in specifying the operational details of the Protocol sufficiently for it to become technically ratifiable.

The negotiations at Bonn and Marrakech were dominated by four distinct yet related problem areas, three of which concern the ‘flexibilities’ built into the Kyoto mitigation regime. Their success became manifest, for example, in the adoption of eligibility criteria for the three ‘Kyoto mechanisms’—emissions trading, joint implementation, and the clean development mechanism (CDM)(see the *Yearbook* UNFCCC entry)—and in the election of a CDM Executive Board to facilitate a prompt start of CDM transactions. A second flexibility issue dominating the debate was the nature and volume of permissible greenhouse-gas ‘sinks’ through land-use (change) and forestry activities. A compromise on how much of the carbon absorbed from the atmosphere could be counted against the Kyoto emission targets was reached with the intention of enabling the ratification of some key countries, such as Japan and Russia. The third mitigation issue which exercised people’s minds during the negotiations was the Kyoto target compliance. The compliance regime proposed under the Kyoto Protocol is one of the strongest of any multilateral treaty, and its institutional structure was sufficiently clarified for the language to become ratifiable, notwithstanding a postponement of a decision on its legal nature to after its entry into force.

The fourth key issue area raised during the negotiations at Bonn and Marrakech was capacity building, technology transfer, and adverse climate-change effects on developing countries as described, in particular, in Articles 4.8 and 4.9 of the UNFCCC. The CoP decided to establish a Climate Change Fund and a Least Developed Country Fund under the Convention to complement the Adaptation Fund established in Bonn under the Kyoto Protocol.

There are quite a number of detailed studies readily available of what has become known as the Marrakech Accord and its socio-economic and environmental implications.²¹ For the purposes of this paper, the overall conclusion to be drawn is that the task of finalizing the operational details of the Protocol has been completed, which puts the question of ‘adequacy of commitments’ again at centre stage, particularly in the run up to the ‘second commitment

period’ negotiations scheduled in Article 3.9 to start not later than 2005.

National Implementation

The issue of adequacy of commitments is not new and, while negotiators felt themselves bound by the remit of the Berlin Mandate, other stakeholders did not. In July 1997—five months before the Kyoto Conference—the US Senate, for example, passed the ‘Byrd–Hagel’ Resolution (S.R. 98) stipulating that the United States should not be a signatory to any UNFCCC protocol which would ‘mandate new commitments to limit or reduce greenhouse gas emissions for the Annex I Parties, unless the protocol ... also mandates new specific scheduled commitments to limit or reduce greenhouse gas emissions for Developing Country Parties *within the same compliance period*’.²²

On 13 March 2001, US President Bush withdrew from the Kyoto process for precisely such adequacy of commitments reasons. Indeed, his specific opposition to the Protocol was ‘because it exempts 80 percent of the world, including major population centers such as China and India, from compliance, and would cause serious harm to the U.S. economy. ... there is a clear consensus that the Kyoto Protocol is an unfair and ineffective means of addressing global climate change concerns.’²³

What is the current state of Parties’ emissions relative to the objectives set in the Convention and the Kyoto Protocol? As it happens, collectively, developed countries have already met their (implied) Kyoto target of a 5 per cent reduction in 1990 greenhouse-gas emissions by 2008–

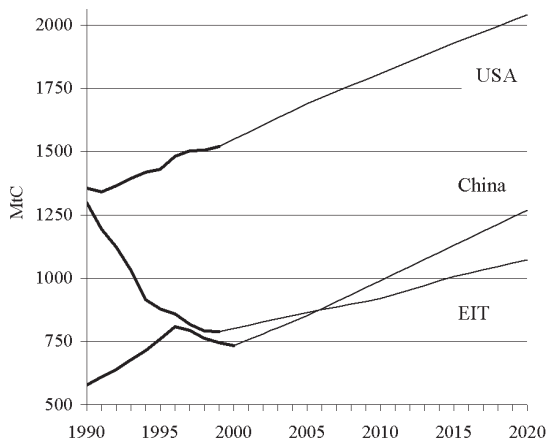


Figure 3. Carbon Dioxide Emissions, 1990–2020

Source: Benito Müller (2001), ‘Fatally Flawed Inequity: Kyoto’s Unfair Burden on the United States & the Chinese Challenge to American Emission Dominance’, <www.wolfson.ox.ac.uk/~mueller>.

2012.²⁴ This may seem curious, in particular since the United States—the world's single largest greenhouse-gas emitter—has not made any particular headway in complying with the objective stated in Article 4.2 of the Framework Convention (let alone with its Kyoto commitment): far from having returned to their 1990 target level, US emissions at the end of the last decade overshot this level by around 12 per cent,²⁵ and the predicted trend (see Fig. 3) will hardly satisfy the Convention's stipulation that industrialized-country 'policies and measures will demonstrate that developed countries are taking the lead in modifying longer-term trends in anthropogenic emissions.'²⁶

The reason why, collectively, Annex I still manages to be below the implied Kyoto mitigation requirement is the (unintentional) overachievement of the so-called economies in transition (EITs), i.e. the countries of Eastern Europe and the former Soviet Union. In industrialized countries, economic collapse is more often than not correlated with a reduction in greenhouse-gas emissions. Between 1990 and 1999, the Russian Federation, for example, experienced a drop in real GDP of 45 per cent,²⁷ with a concomitant reduction of CO₂ emissions of 36 per cent. The EITs collectively reduced their emissions over the same period by 39 per cent, from 1300 MtC to 790 MtC (Fig. 3),²⁸ at a 'cost' to the economies of \$US420 billion—or, as it were, \$US823/tC.²⁹

In light of the overwhelming majority of studies predicting a traded carbon permit price of less than \$US100/tC,³⁰ this has been a costly way to abate. By contrast, China, having turned around its emissions in 1996, thereafter mirrored the EIT reductions (Fig. 3) while continuing to enjoy an annual economic growth of between 7 and 9 per cent.³¹ More precisely, unlike most Annex I countries, China managed (under no obligation) to reverse its emissions, leaving them by the end of the decade 9 per cent lower than their 1996 peak and 27 per cent up on the 1990 benchmark—less than half the previously predicted 67 per cent increase³²—without prejudice to its remarkable economic growth.

The economic collapse of the EITs, obviously, was not due to a climate-change policy. And yet it is worth mentioning this 'carbon cost', if only to highlight that the resulting surplus permits—often referred to as 'hot air'—have not been some free windfall to the countries involved. Or, put differently, that this 'hot air' is not necessarily the sort of ill-gotten gain as is sometimes portrayed in arguments defending the environmental integrity of the regime.

Nonetheless, the collective return of Annex I emissions to 1990 levels can hardly be claimed to be the result of policies and measures demonstrating that developed countries are taking the lead in modifying longer-term trends in anthropogenic emissions, as demanded in Article 4.2 of the Convention. The conclusion thus has to be that the

Convention's aspirational ('voluntary') target setting has not been a success.

As for the Kyoto Protocol, it is obviously too early to judge compliance with its legally binding targets. Moreover—due to its international flexibility mechanisms—the issue could not be discussed in terms of these simple domestic emissions. And yet since countries are not generally inclined to sign, let alone ratify, an international treaty without some confidence in their being able to comply with legally binding provisions, it seems that most of the Annex I Parties bar the United States consider compliance possible, given their declared intention to ratify by WSSD.

Equity: The Northern Perspective

Concerning equity, one issue has dominated the debate to date, namely quantified developing-country emission targets—the issue of 'meaningful developing country participation', as it has somewhat euphemistically become known in the US context. Developing countries have had some success in demanding, on grounds of differentiated responsibilities, that industrialized countries take the lead in adopting legally binding emission targets. However, this has by no means been universally accepted. As a matter of fact, a rejection on grounds of (1) unfair cost distribution and (2) environmental ineffectiveness has—as mentioned above—led to arguably the greatest set-back to the global climate-change effort to date: the US administration's withdrawal from the Kyoto regime.

Ad (1) above: The (perceived) 'enormity' of any cost is inevitably in the eye of the beholder. In the case of the United States, a study supported by the American Petroleum Institute, which had a considerable impact on American perceptions of the Kyoto Protocol,³³ predicted what has become accepted as a 'worst-case' estimate for US mitigation costs under the Kyoto Protocol, namely a 2 per cent reduction of gross domestic product from 'Business as Usual' (BaU). Whether such a change in the way of life is bearable or not is one thing, but it is and remains a matter of *life-style*. And it is difficult to see how even this sort of maximum life-style impact could turn the absence of developing-country targets into an unfair competitive disadvantage, given the projected increase in the North–South welfare gap for the period (see Fig. 4).

Ad (2) above: It is thus not surprising that the Bush administration's rejection of the Kyoto Protocol on grounds of imposing these 'unfair costs' has not found a great deal of empathy in the rest of the world. The environmental integrity point, however, has had more of a following. Indeed, the fact that the Kyoto Protocol is unable to deliver the objective of the Convention is universally accepted. Yet most people involved in the debate also realize that it was never meant to be more than a first, albeit important, step in this direction.

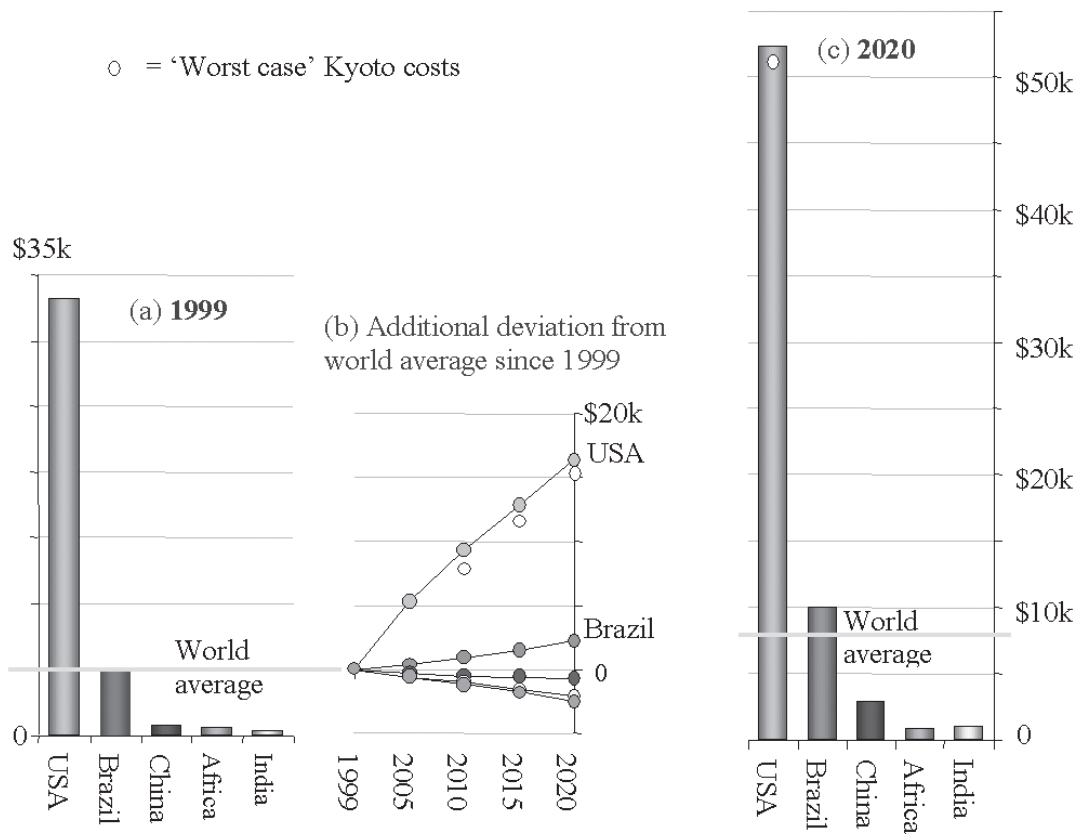


Figure 4. Per Capita GDP Projections: BaU and Kyoto Costs, 1999–2020 ('000 US 1997 \$)

Source: Benito Müller, Axel Michaelowa, and Christiaan Vrolijk (2001), *Rejecting Kyoto: A Study of Proposed Alternatives to the Kyoto Protocol* (London: Climate Strategies), 4; <<http://www.climate-strategies.org/rejectingkyoto2.pdf>>.

Outside the Bush administration, concern about the environmental integrity of the multilateral regime has led to a focus on designing the mitigation regime of the envisaged second commitment period (2013–17) and beyond. In particular—seemingly unaware of recent developments in China³⁴ and the possibility that, with sufficient momentum, the decarbonization of industrialized country economies is likely to spill over to the rest of the world (whether they want it or not, with or without targets)³⁵—many environmentally concerned protagonists have exercised their minds about including *developing* countries in a second commitment period target system in order to ensure the environmental integrity of the regime.

There is a large number of proposals as to how this might be achieved, many of which deal explicitly with the issue of distributive justice (often forcefully raised by developing-country stakeholders). Some of them are based on *ex ante* allocations of country quotas ('assigned amounts'), such as the 'grandfathering'³⁶ and 'per capita'³⁷ propos-

als, and their mixtures of both diachronic (e.g. 'contraction and convergence'³⁸) and synchronic (e.g. 'preference score'³⁹) varieties. Others involve more 'flexible' targets based, for example, on 'emission intensities'⁴⁰ or 'price caps'.⁴¹ Studies and publications on the merits and shortcomings of these and many other proposals for introducing developing-country mitigation targets are too numerous to be presented, let alone properly discussed, within the confines of this article. However, information is readily available,⁴² which is why we shall now turn to an issue which appears to be less appreciated but arguably as important, namely the question why emission *mitigation* has managed to dominate the multilateral climate-change debate to this date.

Environmental Protection and the Concept of 'Sustainable Development'

The dominance of emission mitigation in the international climate-change debate is reflected in the proportion of text

afforded to this issue in the language of the international treaties. While there are some articles in both the Convention and the Protocol which are concerned with other matters, the majority deal with mitigation issues, such as international transfers of emission quotas ('flexibility mechanisms'), land use and land-use change ('sinks'), the regime for complying with the quantified emission targets, and the compilation of national emission data ('National Communications'), to name just some of the issues which have exercised many a mind in the past couple of years.

The agenda to date has been about the emission-mitigation burdens for a variety of reasons, some more pragmatic, others more philosophical. At the pragmatic end of the spectrum is the fact that greenhouse-gas emissions can readily be fitted into an existing paradigm in the industrialized North: air and atmospheric pollution. This has been recognized as a problem (smog, acid rain, etc.) by governments in industrialized countries for many decades, and most of them have introduced elaborate institutional structures (environment protection agencies, etc.) to deal with it. While it is not altogether clear whether the problem of mitigating greenhouse-gas emissions is best served by a subsumption under the air-pollution paradigm, the fact remains that in most countries—particularly in the North—climate change has been handed over to institutions dealing primarily with the protection of the natural environment.

Another pragmatic reason—with 'philosophical undertones', as it were—lies in the possibility of attacking the problem (anthropogenic climate change) at its root cause. While there have been voices suggesting that it might be better to spend the effort and money on improving adaptive capacities rather than reducing emissions,⁴³ the majority view by far is that, since it is possible to attack the root cause of the problem, it is better to do so than to deal solely with the effects—particularly if the cause is people, who, after all, can be held responsible for their actions.

Yet, arguably the most fundamental reason for the focus on mitigation in the current regime is to be found at the philosophical end of the spectrum: the perceptions of the very nature of climate change, the views of 'what it is really all about'. More specifically, the focus on mitigation is the result of a dominant Northern perception of things. To understand the nature of this perception and the way it arose, it may be useful to turn briefly to the nature and history of the closely related concepts of 'sustainability' and 'sustainable development'.

It is rare that the creation of a concept is precisely dated. 'Sustainable development', according to Ashok Khosla,⁴⁴ was launched on 5 March 1980 in the *World Conservation Strategy*, prepared jointly by IUCN - The World Conservation Union, WWF (formerly the World Wildlife Fund),

and the UN Environment Programme (UNEP). Two things are worth highlighting in the present context. For one there is the notion's impeccable ecological parentage, exemplified in the IUCN's declared mission: 'to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.'⁴⁵

And then there is the date itself: predating the Rio Earth Summit (1992) as well as the Brundtland Commission's report on *Our Common Future* (1987), it marked the end of a decade of intense public concern about industrial pollution. Almost by definition, the public concerned was that of the industrialized North. Significantly, the decade began with the Conference on the Human Environment (UNCHE, Stockholm, 1972), the first UN forum concerned with global environment and development needs. Although UNCHE 'indicated that "industrialised" environmental problems, such as habitat degradation, toxicity, and acid rain, were not necessarily relevant issues for all countries. ... it was the pending environmental problems that dominated the meeting and led to wider public environmental awareness.'⁴⁶ It thus seems safe to say that in the 1980s 'sustainable development' was about environmental or ecological sustainability. It was about living (consuming) 'within one's ecological means'. Or, to use a health metaphor, it was appropriate to obesity clinics, but not to famine relief.

Returning to the climate-change concerns of the developed North, it stands to reason that their emergence in the late 1970s and early 1980s at the height of popular concerns about industrial pollution of the local environment is responsible for the 'ecological view' of the problem. As a typical example of this (still prevailing) view, take the most recent edition of *Social Trends*, a flagship survey of the UK Office for National Statistics. Climate change is

Table 1. Environmental Concerns, England and Wales, 2001 (percentage of 'personally very worried')

Disposal of hazardous waste	66%
Effects of livestock methods	59%
Pollution in rivers and seas	55%
Pollution in bathing waters and on beaches	52%
Traffic exhaust fumes and urban smog	52%
Loss of plants and animals in the UK	50%
Ozone-layer depletion	49%
Tropical forest destruction	48%
Climate change/global warming	46%

Source: Table 11.1 in Jill Matheson and Penny Babb (eds.), (2002), 'National Statistics', *Social Trends*, 32 (London: The Stationary Office), p. 180.

given some prominence, namely under the *Air and Atmospheric Pollution (sic)* section of Chapter 11 on *The Environment*. Table 1 shows the population's degree of 'worriedness' about the issue, but, more importantly in the present context, it clearly demonstrates with its juxtapositions what sort of problem climate change is perceived to be. Indeed, according to this official survey, 'climate change is recognised as one of the greatest threats to our environment.'⁴⁷

The most recent *Annual Report* of the US Council of Economic Advisers—just to give a non-Eurocentric example—characterizes climate change as a 'potential problem [which] spans both generations and countries, implicating simultaneously the environment, on the one hand, and the world's fundamental economic reliance on fossil fuels ... on the other.'⁴⁸

Climate change in the industrial world is thus perceived mainly as a problem of polluting the environment, of degrading ecosystems. As such, its essence is seen to be that of a wrongful act against 'Nature'. Accordingly, environmental effectiveness—the capacity to 'make good' the human-inflicted harm on Nature—becomes a key criterion in assessments of climate-change measures. The chief victim from this perspective is Nature; mankind's role is primarily that of culprit. And while climate impacts on human welfare are regarded as potentially life-style-threatening, they are taken to be self-inflicted and hence largely 'deserved'. Environmental integrity ('to do justice to Nature') is the overriding moral objective.

To be sure, these views are by no means inappropriate—to the *Northern* context. Industrialized countries still have to learn how to live sustainably, in the original environmental meaning of the term. And this lesson must include a drastic reduction of greenhouse-gas emissions as the uppermost objective. Yet, this real need for emission mitigation in the industrial context should not blind one to the possibility that, for others, the 'climate change reality' may be fundamentally different.

Looking Ahead: A Human(ist) Impact Agenda?

Equity: A North-South Divide

While there has been some technological progress since the Minoan late bronze age—with a concomitant increase in adaptive capacity—the fact that a mere 1.5°C change may have been sufficient to precipitate the collapse of one of the most advanced civilizations of the time might provide food for thought, given the range of 1.4 to 5.8°C projected for this century. The Summary for Policy Makers of the IPCC's recent *Synthesis Report* reinforces such unease, not only about impacts but also about their distribution.

The reality of climate change for the South (see Box 1: *Southern Realities*) is quite different from the one experi-

enced in the North (see above). For many, if not most, developing countries the phenomenon of climate change—like volcanic eruptions, floods, and earthquakes—is *not* really a problem of sustainable development (in the technical sense of learning 'to live within one's environmental means'); it is primarily a matter of natural-disaster management. The only difference between climate-change impacts and other natural disasters is the possibility of anthropogenic attribution, the issue of human causal responsibility. As such, the phenomenon—unlike, say, earthquakes—comes arguably within the remit of corrective interpersonal justice regarding damages and restitution.

Box 1. The Third Assessment Report: Synthesis Summary for Policy Makers

Southern Realities

Recent regional changes in climate, particularly increases in temperature, have already affected hydrological systems and terrestrial and marine ecosystems in many parts of the world. ... Preliminary indications suggest that some social and economic systems have been affected by recent increases in floods and droughts, with increases in economic losses for catastrophic weather events. [Question 2]

Reductions of greenhouse gas emissions, even stabilization of their concentrations in the atmosphere at a low level, will neither altogether prevent climate change or sea-level rise nor altogether prevent their impacts. [Question 6]

When considered by region, adverse effects are projected to predominate for much of the world, particularly in the tropics and subtropics. [Question 3]

A Question of Equity

The impacts of climate change will fall disproportionately upon developing countries and the poor persons within all countries, and thereby exacerbate inequities in health status and access to adequate food, clean water, and other resources. Populations in developing countries are generally exposed to relatively high risks of adverse impacts from climate change. In addition, poverty and other factors create conditions of low adaptive capacity in most developing countries. [Question 3]

The impact of climate change is projected to have different effects within and between countries. The challenge of addressing climate change raises an important issue of equity. [Question 6]

A Question of Responsibility?

Mitigation and adaptation actions can, if appropriately designed, advance sustainable development and

equity both within and across countries and between generations. Reducing the projected increase in climate extremes is expected to benefit all countries, particularly developing countries, which are considered to be more vulnerable to climate change than developed countries. Mitigating climate change would also lessen the risks to future generations from the actions of the present generation. [Question 6]

[T]he development of planned adaptation strategies to address risks and utilize opportunities can complement mitigation actions to lessen climate change impacts. However, adaptation would entail costs and cannot prevent all damages. The costs of adaptation can be lessened by mitigation actions that will reduce and slow the climate changes to which systems would otherwise be exposed.[Question 6]

Source: Intergovernmental Panel on Climate Change (IPCC) (2002), *Climate Change 2001: Synthesis Report – Summary for Policy Makers*, Question 2, <<http://www.ipcc.ch/pub/tar/syr/index.htm>>.

Given its governmental approval,⁴⁹ it is significant that the *Synthesis Report Summary for Policy Makers* does mention disproportionate impacts on developing countries (Box 1: *A Question of Equity*). However, it is equally telling of the Summary to stop short of referring to the problem in terms of ‘responsibilities’, and focus instead on the fact that additional mitigation may reduce the severity of impacts (Box 1: *A Question of Responsibility?*). There can be no doubt that the need to adapt must be minimized—at the very least for those parties who are largely innocent—and that the effort required to do so must be carried by those who are, if not guilty, then at least largely causally responsible. And yet, as we are beyond the point of being able to prevent impacts altogether, one question can no longer be avoided: who is going to bear the burden of the residual, unavoided impacts?

Given the expected distribution of these impact burdens and its discrepancy with causal responsibilities, it should not be surprising that a recent study⁵⁰ found this to be the one key equity concern of developing-country governments. In contrast to the perception in the North, climate change in the South has come to be seen primarily as a problem of harm to human beings, harm which is largely *other-inflicted*, and not *life-style-*, but *life-threatening*, in character.

What may be more of a surprise is the finding that, in the Northern hemisphere—where discussions on equity have been spearheaded largely by non-government

stakeholders (academic, NGO)—the main equity problem is regarded to be the issue of allocating emission-mitigation targets. Moreover, this is often taken to be a problem mainly because it is seen to be a *sine qua non* for an expansion of the mitigation regime to developing countries, itself viewed as necessary to guarantee the environmental integrity of the regime.

For the South, the issue of sharing their impact burdens equitably is much closer to home than injuries to coral reefs or other non-human life systems: it is an issue of interpersonal justice, an issue of human perpetrators and human victims. The Southern view has been succinctly summarized by Sokona, Najam, and Huq:

The third assessment report of the Intergovernmental Panel on Climate Change has made it abundantly clear that even if the Kyoto Protocol is implemented in full, the impacts of global climate change will start being felt within the next few decades and that the most vulnerable communities and countries are those which are already the poorest and least able to adapt to these changes. The threat is especially pressing for the least developed countries and the small island developing countries, where any economic development they may be able to achieve in the next few decades is in real danger of literally being swept away due to human induced climate change. In the past, climatic disasters such as floods, cyclones, and droughts may have been attributable to nature alone; in the future they will definitely have a component that is human induced. More importantly, it is also clear that the contribution of these countries to the climate change problem is minuscule. The result is that those who have been least responsible for creating the crisis are most at risk from its ravages.⁵¹

If the Northern protagonists are prepared to ‘do justice to Nature’, then they should also be prepared to do the same for their fellow human beings in the South. In other words, the environmentalist agenda which has so far dominated the international climate-change regime has to be complemented by a humanist⁵² agenda, addressing the very real concerns of climate-change impacts on human beings. What we need is a regime with not just environmental integrity but also *human integrity*.

A New Delhi Mandate

Even though the dominant Northern environmentalist agenda has left its mark at the very heart of the multilateral framework,⁵³ there are some articles of the Framework Convention which would seem to permit redressing the balance:

UNFCCC Article 3 (Principles).2. The specific needs and special circumstances of developing country Parties, especially those that are particularly vulnerable to the adverse effects of climate change ... should be given full consideration.

UNFCCC Article 4 (Commitments).4. The developed country Parties and other developed Parties included in Annex II shall also assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects.⁵⁴

To be perfectly clear, the need to redress the balance regarding human impacts does not supplant the need for further emission reductions in the second commitment period and beyond! And while the bulk of these will have to remain in the industrialized world, the view that developing-country emissions need to be addressed cannot be ignored. However, there are other ways of addressing these emissions in the first decades of this century than a simplistic transferral of the Northern model by asking developing countries to take on quantified emission limitation and reduction commitments.

For one, as mentioned earlier, sufficiently strong Annex I commitments could have technology spillover effects which could deal with the issue of developing country emissions without the need for quantified constraints. Even if industrialized countries should feel worried about their capacity to generate such spillovers, there are ways of introducing quantified developing-country targets which do not impose disproportionate obligations on them. For example, the North could accept a quantity of ‘Certified Emission Reduction Obligations’ (CEROs)—to be undertaken in developing countries under the existing Clean Development Mechanism, one of the Kyoto flexibilities (see UNFCCC *Yearbook* entry)—as part of *Annex I commitments*. For the sake of economic efficiency and North–North equity, these CEROs could be tradable and grandfathered. Indeed, to avoid South–South inequities, a number of tradable ‘CER permits’ (CERPs)—permits to generate CERs—greater or equal to the total of CEROs for the commitment period could be distributed among developing countries on a per capita basis. While it is not certain whether such a scheme would be acceptable, the fact remains that there are ways of addressing developing-country emissions without imposing obligations disproportionate with their responsibilities.

During the high-level segment at CoP7 in Marrakech, Thiru T. R. Baalu, India’s Minister for Environment and Forests, left no doubt about his government’s view on these matters:

The efforts so far have been focussed on mitigation. In the coming decades, adaptation needs to be given much greater attention. The next decade, Mr. President, therefore should see concrete implementation of existing mitigation commitments and active consideration and action on adaptation to the adverse impacts of climate change.

Given India’s offer to host CoP8 in New Delhi following the WSSD, and the focus on the role of developing countries which this CoP will inevitably attract (in particular if the Kyoto Protocol should come into force by the WSSD, as planned), there seems to be an unique chance for India to take the lead and have her capital associated with a mandate which could catalyze the formation of a proper

human-impacts regime in the same way in which the mandate associated with the German capital managed to catalyze the formation of the emissions-mitigation regime.

It may be questionable whether the feat of the Ad Hoc Group on the Berlin Mandate in finishing negotiations in less than three years could be emulated in this context, so as to conclude an ‘Impacts Protocol’ by 2005, when negotiations on the second commitment period are officially meant to begin. But there can be little doubt that substantive progress on such a protocol would facilitate these Kyoto successor negotiations. Whether India will wish to grab this opportunity and take such a lead, and whether the rest of the world would be willing to follow, remains to be seen. The fact remains that the international climate-change regime under the Framework Convention can hope to achieve its objective only if it addresses these humanist concerns by being as much about innocent humans as it is about healthy ecosystems.

Notes and References

The author is grateful to Brian Buck, Joanna Depledge, Sebastian Oberthür, and Olav Schram Stokke for their help and critical review.

1. See Agreements section in this *Yearbook*.
2. See, for example, Fred Hoyle (1981), *Ice* (London: Hutchinson).
3. See, for example, Joanna Depledge (2002), *The Third Assessment Report of the IPCC*, Royal Institute of International Affairs Briefing Paper (London: Royal Institute of International Affairs).
4. See, for example, John Imbrie and Katherine Palmer Imbrie (1997), *Ice Ages: Solving the Mystery* (Cambridge, MA: Harvard University Press); or Richard B. Alley (2000), *The Two-Mile Time Machine: Ice Cores, Abrupt Climate Change and our Future* (Princeton, NJ: Princeton University Press).
5. Sturt W. Manning (1999), *A Test of Time: The Volcano of Thera and the Chronology and History of the Aegean and East Mediterranean in the Mid Second Millennium BC* (Oxford: Oxbow Books); <www.rdg.ac.uk/~lasmann/testoftime.html>.
6. 1647 BC: +0.65°C, 1559 BC: –0.9°C, relative to present. J. R. Petit, J. Jouzel, D. Raynaud, N. I. Barkov, J.-M. Barnola, I. Basile, M. Bender, J. Chappellaz, M. Davis, G. Delayque, M. Delmotte, V. M. Kotlyakov, M. Legrand, V. Y. Lipenkov, C. Lorius, L. Pepin, C. Ritz, E. Saltzman, and M. Stevenard (1999), ‘Climate and Atmospheric History of the Past 420,000 Years from the Vostok Ice Core, Antarctica’, *Nature*, 3, 429–36; Data Source: ‘Historical Isotopic Temperature Record from the Vostok Ice Core’, <<http://cdiac.esd.ornl.gov/ftp/trends/temp/vostok/vostok.1999.temp.dat>>.
7. ‘... the eruption on Thera could have lowered annual average temperatures by 1 to 2 degrees across Europe, Asia and North America. ... the summer temperatures would have dropped more—suggesting years of cold, wet summers and ruined harvests’: Jessica Cecil (2001), ‘Ancient Apocalypse: The Fall of the Minoan Civilisation’, <http://www.bbc.co.uk/history/ancient/apocalypse_minoan1.shtml>. For more details on the eruption, see Chapter 5 of Floyd W. McCoy and Grant Heiken (2000), *Volcanic Hazards and Disasters in Human Antiquity*, Special Paper 345 (Boulder, CO: Geological Society of America).
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- Heiken, *Volcanic Hazards and Disasters in Human Antiquity*, 71–82, at 71.
9. Gregg Marland, Thomas A. Boden, and Robert J. Andres (2002), 'Global, Regional, and National Fossil Fuel CO₂ Emissions', Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, <http://cdiac.esd.ornl.gov/trends/emis/em_cont.htm>.
 10. Source: World Resources Institute (WRI), 'Contributions to Global Warming Map', <http://www.wri.org/climate/contributions_map.html>.
 11. However, caution should be taken when interpreting such figures. If, for example, like the author, one is of the opinion that these responsibilities need to be compared in terms of average yearly per capita emissions, the Northern responsibility increases to fifteen times that of the South.
 12. For more details on the institutional structure and the procedural rules, see, for example, Joanna Depledge (2002), *A Guide to the Climate Change Process* (Bonn: Climate Change Secretariat).
 13. Baron Jean-Baptiste Joseph Fourier (1768–1830), French mathematician, physicist, and Egyptologist.
 14. Svante August Arrhenius (1859–1927), Swedish physical chemist.
 15. Michael Grubb with Christiaan Vrolijk and Duncan Brack (1999), *The Kyoto Protocol: A Guide and Assessment* (London: Royal Institute of International Affairs), 4.
 16. Intergovernmental Panel on Climate Change, 'About IPCC', <<http://www.ipcc.ch/about/about.htm>>.
 17. 'Adverse effects of climate change' means changes in the physical environment or biota resulting from climate change which have significant deleterious effects on the composition, resilience, or productivity of natural and managed ecosystems or on the operation of socio-economic systems or on human health and welfare (UNFCCC, Article 1, Definitions).
 18. United Nations Framework Convention on Climate Change (UNFCCC) (1995), *The Berlin Mandate: Decision 1/CP.1*; <unfccc.int/resource/docs/cop1/07a01.htm>.
 19. Grubb (1999), *The Kyoto Protocol*, 111.
 20. Indeed, according to Article 9, a review of the Kyoto Protocol 'in the light of the best available scientific information and assessments on climate change and its impacts, as well as relevant technical, social and economic information' might have to be undertaken as early as 2003, assuming entry into force by WSSD.
 21. Suraje Dessai (2001), *The Climate Regime from The Hague to Marrakech: Saving or Sinking the Kyoto Protocol*, Working Paper 12 (Norwich: Tyndall), <http://www.tyndall.ac.uk/publications/working_papers/working_papers.shtml>; Thomas Legge and Christian Egenhofer (2001), *After Marrakech: the Regionalisation of the Kyoto Protocol*, CEPS Commentary (Brussels: Centre for European Policy Studies), <<http://www.ceps.be/Commentary/Nov01/Marrakech.htm>>; Asbjørn Torvanger (2001), *An Evaluation of Business Implications of the Kyoto Protocol*, Report 2001–05 (Oslo: Center for International Climate and Environmental Research–Oslo), <www.cicero.uio.no/publications/detail.asp?1690>; Odile Blanchard, Patrick Criqui, and Alban Kitous (2002), *After The Hague, Bonn and Marrakech: the Future International Market for Emissions Permits and the Issue of Hot Air* (Grenoble: Institut D'Economie et de Politique de L'Energie), <<http://www.upmf-grenoble.fr/iepe/textes/Cahier27Angl.pdf>>; Michel G. J. den Elzen and André P. G. de Moor (2002), *The Bonn Agreement and Marrakesh Accords: An Updated Analysis*, RIVM report 728001017/2001 (Bilthoven: National Institute of Public Health and the Environment (RIVM)), <http://www.rivm.nl/ieweb/ieweb/Reports/rep728001017_marrakech.pdf>; Donald Goldberg and Katherine Silverthorne (2002), 'The Marrakech Accords', *ABA Newsletter* [American Bar Association], 5: 2, <<http://www.abanet.org/enviro/committees/climatechange/newsletter/jan02/goldberg.html>>; Andreas Löschel and ZhongXiang Zhang (2002), 'The Economic and Environmental Implications of the US Repudiation of the Kyoto Protocol and the Subsequent Deals in Bonn and Marrakech', <<http://papers.ssrn.com/abstract=299463>>; Christiaan Vrolijk (2001), *The Marrakesh Accords*, RIIA Meeting Report (London: Royal Institute of International Affairs), <<http://www.riia.org/Research/eep/cop7meeting.pdf>>; Tata Energy Research Institute (2001), Review of CoP7, <<http://www.teriin.org/climate/cop7.htm>>; Christiaan Vrolijk (2002), *A New Interpretation of Kyoto: The Hague, Bonn and Marrakesh*, RIIA Briefing Paper (London: Royal Institute of International Affairs) forthcoming; Christiaan Vrolijk (2002), 'The Marrakesh Accords: A Brief Point by Point Description and Comments', Annex to Vrolijk (2002), *A New Interpretation of Kyoto*, forthcoming.
 22. Emphasis added.
 23. <<http://www.whitehouse.gov/news/releases/2001/03/20010314.html>>.
 24. See, for example, Sebastian Oberthür and Hermann E. Ott, with Richard G. Tarasofsky (1999), *The Kyoto Protocol: International Climate Policy for the 21st Century* (Berlin: Springer), 273.
 25. 1990: 1355 MtC; 1999: 1520 MtC.
 26. UNFCCC, Article 4.2 (a).
 27. Measured in local currency units. Source: International Monetary Fund (IMF) (2001), *World Economic Outlook 2001*, Real Gross Domestic Product, local currency (LCU bn), <<http://www.imf.org/external/pubs/ft/weo/2001/01/data/index.htm>>.
 28. MtC = Million ('Mega') tonnes of Carbon. 1 unit C = 3.67 units CO₂. Data Source: Energy Information Administration (EIA), World Carbon Dioxide Emissions from the Consumption and Flaring of Fossil Fuels, 1980–1999, <<http://www.eia.doe.gov/emeu/international/enviro.html#IntlCarbon>>.
 29. 1997 \$US. Source: Energy Information Administration (EIA) (2001), International Energy Outlook 2001, <<http://www.eia.doe.gov/oiaf/ieo/appendixes.html#appen>>. Table A3. World Gross Domestic Product (GDP) by Region, Reference Case, 1990–2020 (billion 1997 dollars).
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 32. International Energy Agency (2000), *World Energy Outlook*.
 33. Benito Müller (2000), 'Congressional Climate Change Hearings: Comedy or Tragedy?', <<http://www.wolfson.ox.ac.uk/~mueller>>.
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 35. Michael Grubb, Chris Hope, and Roger Fouquet (2002), 'The Climatic Implications of the Kyoto Protocol: The Contribution of International Spillover', *Climatic Change* (forthcoming).
 36. Allocation in proportion to baseline (benchmark) emission figures.
 37. Allocation in proportion to baseline (benchmark) population figures.
 38. See, for example, Aubrey Meyer (2000), *Contraction & Convergence: The Global Solution to Climate Change* (Dartington: Green Books); or Anil Agarwal and Sunita Narain (2000), 'Addressing the Challenge of Climate Change: Equity, Sustainability and Economic Effectiveness', in Mohan Munasinghe and Rob Swart (eds.), *Climate Change and its Linkage with Development, Equity, and Sustainability* (Geneva: Intergovernmental Panel on Climate Change).

39. Benito Müller (1999), *Justice in Global Warming Negotiations: How to Obtain a Procedurally Fair Compromise* (Oxford: Oxford Institute for Energy Studies).
40. See, for example, Kevin A. Baumert, Ruchi Bhandari, and Nancy Kete (1999), 'What Might a Developing Country Climate Commitment Look Like?', *Climate Notes* (Washington, DC: World Resources Institute).
41. See, for example, William Pizer (1999), 'Choosing Price or Quantity Controls for Greenhouse Gases', *Climate Issues Brief 17* (Washington, DC: Resources for the Future).
42. See, for example, Intergovernmental Panel on Climate Change (IPCC) (2001), [TAR3] *Climate Change 2001: Mitigation* (Cambridge: Cambridge University Press); Munasinghe and Swart (eds.) (2000), *Climate Change and its Linkage with Development, Equity, and Sustainability*; Benito Müller, Axel Michaelowa, and Christiaan Vrolijk (2001), *Rejecting Kyoto: A Study of Proposed Alternatives to the Kyoto Protocol* (London: Climate Strategies), <<http://www.climate-strategies.org/rejectingkyoto2.pdf>>; Jos Sijm, Jaap Jansen, and Asbjørn Torvanger (2001), 'Differentiation of Mitigation Commitments: The Multi-Sector Convergence Approach', *Climate Policy*, 1, 481–97; Lasse Ringius, Asbjørn Torvanger, and Bjart Holtsmark (1998), 'Can Multi-Criteria Rules Fairly Distribute Climate Burdens? OECD Results from Three Burden Sharing Rules', *Energy Policy*, 26, 777–93; or Cédric Philibert and Jonathan Pershing (2001), 'Considering the Options: Climate Targets for All Countries', *Climate Policy*, 1, 211–27.
43. Thomas C. Schelling (1997), 'The Cost of Combating Global Warming', *Foreign Affairs* (November/ December).
44. Ashok Khosla (2001), 'The Road from Rio to Johannesburg', *Millennium Papers*, 4 (London: UNED Forum).
45. World Conservation Union (IUCN) (2000), 'About IUCN', <<http://www.iucn.org/2000/about/content/index.html>>.
46. Rosalie Gardiner (2001), 'Earth Summit 2002 Explained', *Earth Summit 2002 Briefing Paper* (London: UNED Forum), 1; <<http://www.earthsummit2002.org/Es2002.PDF>>.
47. Jill Matheson and Penny Babb (eds.) (2002), 'National Statistics', *Social Trends*, 32 (London: HM Stationery Office), 183. To be sure, not all of the concerns listed in Table 1 are merely about natural ecosystems, and it would be simplistic to expect them to be, given the complex interactions involved. Nevertheless, the issues listed are overall significantly closer to the ecological paradigm than they are to the natural disaster one.
48. Council of Economic Advisers (2002), *Annual Report* (Washington, DC: US Government Printing Office), 244; <<http://w3.access.gpo.gov/eop/index.html>>.
49. 'This summary, approved in detail at IPCC Plenary XVIII (Wembley, United Kingdom, 24–29 September 2001), represents the formally agreed statement of the IPCC concerning key findings and uncertainties contained in the Working Group contributions to the Third Assessment Report.' Intergovernmental Panel on Climate Change (IPCC) (2002), [TAR-SRa] *Climate Change 2001: Synthesis Report – Summary for Policy Makers*, <<http://www.ipcc.ch/pub/tar/syr/index.htm>>.
50. Benito Müller (forthcoming August 2002), *Equity in Climate Change: The Great Divide* (Oxford: Oxford Institute for Energy Studies).
51. Youba Sokona, Adil Najam, and Saleemul Huq (2002), *Climate Change and Sustainable Development: Views from the South* (London: International Institute for Environment and Development), 2.
52. Apart from designating a philosophical and literary movement which originated in northern Italy in the second half of the fourteenth century, the term 'humanism' is used to describe 'any philosophy which recognizes the value or dignity of man'. Paul Edwards (ed.) (1967), *The Encyclopedia of Philosophy*, 4 (London: Collier Macmillan Publishers), 69–70.
53. For example, while both human and ecological impacts are mentioned in the central passages from the Convention mentioned earlier, there seems to be an (unconscious) ranking which puts the latter before the former.
54. Article 4.4, interestingly, is a commitment not on Annex I (large emitters) but on Annex II (affluent) Parties, which arguably means that it is based on the principle of the ability to pay ('solidarity'), thus not dependent on the ability to separate anthropogenic from natural impacts.

