HARVARD UNIVERSITY

JOHN F. KENNEDY SCHOOL OF GOVERNMENT

# Science as Power in International Environmental Negotiations: Global Environmental Assessments Between North and South

Frank Biermann

Global Environment Assessment Project

Environment and Natural Resources Program

Belfer Center for Science
and International Affairs

2000-17

SEPTEMBER 2000

# Belfer Center for Science & International Affairs

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# CITATION, CONTEXT, AND PROJECT ACKNOWLEDGEMENTS

This paper may be cited as: Biermann, Frank. "Science as Power in International Environmental Negotiations: Global Environmental Assessments Between North and South." Belfer Center for Science and International Affairs (BCSIA) Discussion Paper 2000-17, Environment and Natural Resources Program, Kennedy School of Government, Harvard University, 2000. Available at http://environment.harvard.edu/gea. No further citation is allowed without permission of the author. Comments are welcome and may be directed to the author at the Belfer Center for Science and International Affairs, John F. Kennedy School of Government, Harvard University, 79 John F. Kennedy Street, Cambridge, MA 02138. Dr. Frank Biermann is a research scientist with the Potsdam Institute for Climate Impact Research, P.O. Box 601203, 14412 Potsdam, Germany (http://www.pik-potsdam.de). E-mail: biermann@pik-potsdam.de

The Global Environmental Assessment project is a collaborative team study of global environmental assessment as a link between science and policy. The Team is based at Harvard University. The project has two principal objectives. The first is to develop a more realistic and synoptic model of the actual relationships among science, assessment, and management in social responses to global change, and to use that model to understand, critique, and improve current practice of assessment as a bridge between science and policy making. The second is to elucidate a strategy of adaptive assessment and policy for global environmental problems, along with the methods and institutions to implement such a strategy in the real world.

The Global Environmental Assessment (GEA) Project is supported by a core grant from the National Science Foundation (Award No. BCS-9521910) for the "Global Environmental Assessment Team." Supplemental support to the GEA Team is provided by the National Oceanic and Atmospheric Administration, the Department of Energy, the National Aeronautics and Space Administration, the National Science Foundation, and the National Institute for Global Environmental Change. Additional support has been provided by the Department of Energy (Award No. DE-FG02-95ER62122) for the project, "Assessment Strategies for Global Environmental Change," the National Institute for Global Environmental Change (Awards No. 901214-HAR, LWT 62-123-06518) for the project "Towards Useful Integrated Assessments," the Center for Integrated Study of the Human Dimensions of Global Change at Carnegie Mellon University (NSF Award No. SBR-9521914) for the project "The Use of Global Environmental Assessments," the Belfer Center for Science and International Affairs at Harvard University's Kennedy School of Government, the International Human Dimensions Programme on Global Environmental Change, Harvard's Weatherhead Center for International Affairs, Harvard's Environmental Information Center, the International Institute for Applied Systems Analysis, The Center for International Earth Science Information Network, the German Academic Exchange Service, the Heinrich Boll Foundation in Germany, the Heinz Family Foundation, the Heinz Center for Science, Economics and the Environment, the Massachusetts Institute of Technology's Center for Environmental Initiatives, a National Science Foundation Career Grant to Professor Daniel Schrag, the National Center for Environmental Decisionmaking Research, Yale's Department of Forestry and Environmental Studies, the University of Amsterdam's Department of Science Dynamics, the University of California at Irvine's School of Social Ecology, the University of California at Santa Cruz' Institute for Global Conflict and Cooperation, and the World Health Organization's Global Forum for Health Research. The views expressed in this paper are those of the author and do not imply endorsement by any of the supporting institutions.

Publication abstracts of the GEA Project can be found on the GEA Web Page at http://environment.harvard.edu/gea. Further information on the Global Environmental Assessment project can be obtained from the Project Associate Director, Nancy Dickson, Belfer Center for Science and International Affairs, Kennedy School of Government, Harvard University, 79 JFK Street, Cambridge, MA 02138, telephone (617) 496-9469, telefax (617) 495-8963, Email nancy_dickson@harvard.edu.

# FOREWORD

This paper was written as part of the Global Environmental Assessment Project, a collaborative, interdisciplinary effort to explore how assessment activities can better link scientific understanding with effective action on issues arising in the context of global environmental change. The Project seeks to understand the special problems, challenges and opportunities that arise in efforts to develop common scientific assessments that are relevant and credible across multiple national circumstances and political cultures. It takes a long-term perspective focused on the interactions of science, assessment and management over periods of a decade or more, rather than concentrating on specific studies or negotiating sessions. Global environmental change is viewed broadly to include not only climate and other atmospheric issues, but also transboundary movements of organisms and chemical toxins. (To learn more about the GEA Project visit the web page at http://environment.harvard.edu/gea/.)

The Project seeks to achieve progress towards three goals: deepening the critical understanding of the relationships among research, assessment and management in the global environmental arena; enhancing the communication among scholars and practitioners of global environmental assessments; and illuminating the contemporary choices facing the designers of global environmental assessments. It pursues these goals through a three-pronged strategy of competitively awarded fellowships that bring advanced doctoral and post-doctoral students to Harvard; an interdisciplinary training and research program involving faculty and fellows; and annual meetings bringing together scholars and practitioners of assessment.

The core of the Project is its Research Fellows. Fellows spend the year working with one another and project faculty as a Research Group exploring histories, processes and effects of global environmental assessment. These papers look across a range of particular assessments to examine variation and changes in what has been assessed, explore assessment as a part of a broader pattern of communication, and focus on the dynamics of assessment. The contributions these papers provide has been fundamental to the development of the GEA venture. I look forward to seeing revised versions published in appropriate journals.

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# ABSTRACT

Global environmental policy-making can be equated with the art of taking difficult decisions in the face of insufficient knowledge of the underlying issues. To help decision-makers cope with such uncertainty, transnational networks of experts have recently offered comprehensive assessments of the state of knowledge in a number of environmental issue-areas, such as climate change, ozone depletion and the conservation of biological diversity. These assessments are intended to represent the consensus of "international science." However, many experts from developing countries argue that this claim of a "global consensual knowledge" is misleading since Southern views and perspectives are not always adequately represented. This paper shows that although many components of global environmental assessments do not seem to be biased in favor of one side or the other, there are yet a number of instances when assessments have been to the disadvantage of or oblivious to the interests of the South. This occurred in a number of ways, such as through excluding certain information from an assessment, framing the problem in a way that supports specific views about the state of the world, or through adopting certain assessment methodologies instead of others. Even if limited, such avenues for biased assessments can have significant impact on North-South relations and on global environmental negotiations, insofar as they fuel the general perception of many actors in the South that the "international science" offered by expert networks cannot be accepted at face value. In concluding, the paper notes the urgent need to enhance participation of developing country experts in global environmental assessments as the first step in enhancing the legitimacy and utility of these international compilations of expert knowledge.

## AUTHOR'S ACKNOWLEDGMENT

This paper has benefited from valuable comments on earlier versions from William C. Clark, Carsten Helm, Jill Jäger, Milind Kandlikar, Robert O. Keohane, Ambuj Sagar, Eileen Shea, Bernd Siebenhüner, Udo E. Simonis, and the 1998/1999 Research Fellows of the Global Environmental Assessment Project, Harvard University. The study would not have been possible without financial support from the German Academic Exchange Service (DAAD) and from the Belfer Center for Science and International Affairs, Harvard University, as well as institutional support from Jawaharlal Nehru University, New Delhi.

# ABBREVIATIONS

| | |
|---|---|
| CFC | Chlorofluorocarbon(s) |
| CSE | Centre for Science and Environment, New Delhi, India |
| EPA | Environmental Protection Agency, United States of America |
| GBA | Global Biodiversity Assessment (1995) |
| GEF | Global Environment Facility (UNDP, UNEP and World Bank) |
| IPCC | Intergovernmental Panel on Climate Change |
| OECD | Organisation for Economic Co-operation and Development |
| SBSTTA | Subsidiary Body on Scientific, Technical, and Technological Advice to the Conference of the Parties to the Convention on Biological Diversity |
| UN | United Nations |
| UNCED | United Nations Conference on Environment and Development (1992) |
| UNDP | United Nations Development Programme |
| UNEP | United Nations Environment Programme |
| WMO | World Meteorological Organization |
| WRI | World Resources Institute, Washington DC, USA |

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# INTRODUCTION

It has been said that policy-making is the art of taking difficult decisions in the face of insufficient understanding of the underlying issues. This is especially true for the global environmental problems facing humankind at the dawn of a new millennium. In 1987, for example, a number of states decided to reduce production and consumption of chlorofluorocarbons (CFC) at a time when understanding of the threats posed by these substances was still inconclusive. Governments also agreed on measures to protect the earth's biological diversity based on the faintest knowledge of the extent of this diversity (estimates of the total number of species still vary by a factor of ten). Likewise, governments negotiated a climate treaty based on research that continues to broach new questions with every preliminary answer reached. In short, global environmental governance is policy-making in the face of tremendous uncertainties, a balancing act between the Scylla that too much and the Charybdis that too little is done.

When faced with this need to take decisions under uncertainty, governments turn increasingly to scientific assessments of the nature and extent of the problem, on possible solutions, and on error margins. The indeterminateness of scientific knowledge, however, inevitably results in different claims to truth brought forward by different experts and actors in the political arena. A striking example are two early assessments on climate change, both undertaken in the same year in the same country (USA). While one predicted disaster and doom if no immediate action on climate change was taken (EPA, 1983), the other concluded that the best path to follow was "to wait and see" (NRC, 1983). What information is accepted or rejected and what weight is given to different and often contrary information: these questions are part of assessment processes meant to assist policy but are themselves highly political. They bear heavily on the political process by influencing decision-makers in governments and non-governmental groups, and decisions by individual actors.

The literature on science and technology studies speaks of an area of "trans-science"—a zone of knowledge that is not entirely political, since it is only partly based on political modes of interaction such as bargain; but that is also no longer entirely scientific because scientific claims to truth, such as empirical proof, do not suffice to solve the problem with which the policy-maker is faced. In the area of trans-science, science and politics inevitably intertwine (Jasanoff, 1987). Within states, governments authoritatively determine their way of coping with such uncertainty. Politicians set rules that determine boundaries between "science" and "policy" in different issue areas and assign competencies to different actors, including competence to delimit "accepted truth" from other claims. In the international realm, however, for lack of authoritative governmental power, competence and legitimacy are allocated in decentralized, non-hierarchical processes. Here, state and non-state actors establish mutually agreed procedures for determining the state of knowledge and for assigning competence on delimiting "accepted truth" from other claims. One such mechanism consists of the institutionalized networks of experts that have mushroomed in several areas of environmental policy in recent years.

The extent to which such networks of experts, as organizers of a consensus of epistemic communities, assist in creating environmental regimes has been extensively debated (Haas, 1990a, b, 1992; Peterson, 1992). Yet, less attention has been paid to asymmetries in the functioning of expert networks and to influences of such asymmetries on the policy outcome. If governments need to take decisions under uncertainty, thereby relying on interpretable scientific knowledge, those better able to structure, generate, support, maintain and use this information are likely to have a greater influence on the final decision. In some cases, dominating information-generation processes may significantly impact the interests and strategies of actors and finally the outcome of international bargaining processes.

If so, expert networks can no longer be considered purely scientific endeavors. Instead, they should be seen as a distinct source of political power in international relations. It has been argued elsewhere that developing countries have gained substantial issue-specific bargaining power in international environmental affairs, because differences in the political affectedness of governments in North and South *vis-à-vis* global environmental problems created an asymmetric interdependence between the hemispheres that developing countries could turn into bargaining chips in the negotiations on climate change, ozone depletion and biodiversity protection (Biermann, 1998). Such forms of power, which could be conceived of as "hard power" (Keohane and Nye, 1998), are well known to political scientists and have been analyzed for a wide array of issue areas (Hirschman, 1945; Keohane and Nye, 1977; Baldwin, 1989).

The power that is derived from expert networks, however, can be regarded as "soft power"[1]—a term which by no means implies that it has less impact on relations between societies. Ideas advanced and disseminated by expert networks may well, as suggested by Goldstein and Keohane (1993a: 3),

> influence policy when the principled or causal beliefs they embody provide road maps that increase actors' clarity about goals or ends-means relationships, when they affect outcomes of strategic situations in which there is no unique equilibrium, and when they become embedded in political situations.

A particularly illustrative example is the Iraqi invasion of Kuwait in 1990. As Keohane and Nye (1998: 91) argue, the fact that CNN was a US-based company helped to frame the issue worldwide as aggression. If an Arab company had been the world's dominant TV channel instead, "perhaps the issue would have been framed as a justified attempt to reverse colonial humiliation." As this comparison indicates, the question of "soft power" seems particularly relevant in the North-South context, where overwhelming disparities are present not only in media power but also in scientific knowledge and academic resources.

A decisive variable, I argue, is who is allowed and able to take part in these transnational expert networks. No expert network can function without defining external boundaries *vis-à-vis* non-experts, and participation needs to be restricted to some while barring others. Rules of access to expert networks vary, for example, in the degree to which they include or exclude state and non-state actors, governmental officials, and representatives from environmental groups and industry. Access rules also determine the scientific disciplines to be permitted and the type of knowledge that is accepted. The crucial role of access to, and participation in, expert networks has been analyzed for several national and sub-national networks. In these studies, broadening of participation in assessments is often seen as a way to increase its credibility for stakeholders (see, for example, Cash, 1998; Moser, 1998; Farrell and Keating, 1998; Keating and Farrell, 1998).

Access to transnational expert networks in the international realm has been a major source of friction especially between North and South. The history of scientific assessments on climate change, for example, can be characterized as a prolonged struggle by developing countries to gain influence. Early climate assessments were undertaken with almost no participation of developing countries. The international climate assessment that was compiled in 1985 in Villach and evolved into one of the most influential assessments of the 1980s, did not involve a single expert from a developing country. The 22 experts were drawn from merely seven industrialized countries, even though the assessment was conducted under the auspices of the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) (together with the International Council of Scientific Unions, ICSU) and could thus flaunt the banner of UN approval and support (Agrawala, 1998a and b). In the Intergovernmental Panel on Climate Change (IPCC), which was set up in 1988 by UNEP and WMO, governments of developing countries have also consistently sought to increase the participation of their

own experts. As they have pointed out, if developing countries do not have access to the IPCC, its very legitimacy would be jeopardized.

Similar conflicts are known from the scientific assessment of biological diversity. In 1992, UNEP had initiated a Global Biodiversity Assessment (GBA). When UNEP released the GBA in November 1995, it claimed in a press release that this report were the product of an independent assessment of "over 1,500 scientists and experts from all parts of the world" (UNEP, 1995). This statement is true insofar as indeed, experts from every continent and from most larger countries participated in one or more working groups of the Global Biodiversity Assessment. On the other hand, a short glance at the list of participants reveals that, the vast majority of participants came from industrialized countries. Taken together, in most expert networks on global environmental change, experts from developing countries have been outnumbered by experts from industrialized countries. The question arises whether this domination of expert networks by Northern experts has influenced the content of the information that was produced.

This paper argues that, while many parts of global environmental assessments do not appear to be biased toward one side or the other, there are a number of instances when information has tended to be to the disadvantage of or oblivious to the interests of the South: by eliminating certain pieces of information, by framing the problem in certain ways, by supporting specific views about the state of the world or by adopting certain methodologies and terminology. Limited and "anecdotal" as they are, these instances may have had a significant impact on North-South relations and on global environmental negotiations insofar as they fueled a general perception held by many actors in the South that the "international science" offered by expert networks is biased and is not to be accepted at face value (see, e.g., Biermann, 1999b). In the following, I will scrutinize some global assessment reports and outline a number of problem frames and definitions advanced by assessments that could often be conceived of as favoring industrialized countries. I will address, first, how assessments help set the stage for political bargaining and influence politics by selecting certain methods or the use of certain conceptual frames. Then, I will examine how some assessments have dealt with questions of technology, of equity, and of economic evaluation, before I turn to the more general question of what is being assessed in the first place. In the concluding section, I will offer some suggestions on how the design of assessments could be improved.

## ASSIGNING RESPONSIBILITY—SETTING THE STAGE FOR POLITICAL BARGAINING

Individual nations bear different responsibilities for global environmental problems, in particular for depleting global commons such as the atmosphere or oceans. Although the responsibility of nations is not necessarily linked to the outcome of political bargaining, high or low degrees of responsibility—if universally accepted—may well serve as potent arguments in international negotiations. Often, scientific assessments directly ascribe such responsibilities, though in variant degree and detail. Once this has been widely accepted in the political arena as "true" or "real" assignment of responsibility, it turns into bargaining power when the political obligations of nations and other actors are being negotiated. Thus, by linking science to political bargaining, science itself turns into a source of power, because the scientific assessment increases the likelihood that some actors can get others to do what they would refuse to do otherwise.

To ascribe responsibility for global warming, for example, numerous boundaries are to be negotiated, starting from ethical assumptions to more technical details of time horizons and sink capacities. To start with, it must be decided whether all emissions are considered equal or whether they need to be

differentiated by their value and use for humans. To illustrate this point, consider two statements, one from the North and one from the South, both exemplifying ethical judgments typical for either hemisphere. From a Northern perspective, it is typically suggested that the anthropogenic greenhouse effect is

> the result of normal, not aberrant, human behavior involving uncountable, independent decisions in daily life by individuals, by industry, and by governments all over the globe (Skolnikoff, 1993: 184).

From a Southern perspective, this "take" on the problem is problematic in at least two ways. First, the notion of "all over the globe" is seen by many Southern actors as obfuscating the fact that per capita emissions in industrialized countries are several times higher than in developing countries, since "the problem of global warming is caused not by emissions of greenhouse gases as such, but by excessive levels of per capita emissions of these gases" (Chandrasekhar Dasgupta, former Indian chief negotiator, in *The Statesman* of 23 June 1991). From a Southern perspective, "[t]he accumulation in the earth's atmosphere of [greenhouse] gases is mainly the result of the gargantuan consumption of the developed countries, particularly the United States" (Agarwal and Narain, 1991: 1). Southern experts argue that "[i]f all countries had the living standards similar to those in India and China, there would not have been concentrations accumulated as of today" (Parikh, 1994: 2943).

Second, the notion of "normal" behavior can also be different from the Southern perspective. If "normal" is understood empirically as "everybody does it," the term hides, in the Southern view, the fact that it is merely a minority of the world's population that has been emitting such high quantities of greenhouse gases that international action must now be taken. Second, if "normal behavior" is defined as "legitimate behavior" this provides a normative justification for greenhouse gas emissions in the North which are seen as "excessive" in the South. For example, some island developing states have declared, upon signing the 1992 Framework Convention on Climate Change, that they do not renounce by this act "any rights under international law concerning state responsibility for the adverse effects of climate change."[2] In legal terminology, state responsibility follows any international wrongful acts by a state[3]—in other words, by their legal deposition the small island states objected to the notion of "normal" behavior and recorded their perception that routine emission of greenhouse gases, even though no harm is intended, could be seen as very "aberrant" behavior indeed.

Some Southern experts and politicians, in their assessment of the causes of climate change, have framed this dichotomy in terms of "basic," "subsistence" or "survival" emissions—that is, normal and indispensable behavior—*vis-à-vis* "excessive" or "luxury" emissions, that is, superfluous and "aberrant" behavior (Agrawal, 1999; Narain, 1999; Agarwal and Narain, 1991; Parikh *et al.*, 1991; Chatterjee, 1999). This basic distinction has been supported by the Indian government and, recently, by China (Chatterjee, 1999; Earth Negotiations Bulletin 12: 66 of 3 November 1997).

How did international expert networks react to this clash of perspectives? When IPCC planned its first assessment, the Northern perspective prevailed. All emissions that are related to human activities were placed into one category of "anthropogenic" emissions with no further differentiation as to distinct human uses. In the technical summary of the 1995 IPCC report, it is stated that

> [t]here are other technical criteria which may help policy makers to decide, in the event of emissions reductions being deemed necessary, which gases should be considered. Does the gas contribute in a major way to current, and future, climate forcing? Does it have a long lifetime, so earlier reductions in emissions would be more effective than those made later? And are its sources and sinks well enough known to decide which could be controlled in practice? (IPCC, 1995a: xx).

Different *uses* and *values* of such emissions, however, which might have fit into this enumeration, are not considered. The IPCC perspective thus remains restricted to a Northern framing with a natural science and technical approach to social activities. Technically, IPCC could have easily differentiated further. Though computer models must include all gases to forecast future climate change and to evaluate policy options, this could be done by creating categories in addition to, or replacing, the simple dichotomy between "natural versus anthropogenic emissions" adopted by IPCC. It is not inevitable, for example, that emissions from rice plants or digestive systems of certain animals are defined as "anthropogenic" and that essential activities such as food production are placed on the same level as emissions from automobiles, airplanes or air-conditioners. If Southern views and interests had been given more consideration, IPCC could have chosen, for example, a threefold approach, defining (1) "natural emissions," (2) "emissions accruing from food production (rice and livestock)," and (3) "other (luxury) anthropogenic emissions." No further efforts would have been needed since data for single sources of emissions is available.

Yet IPCC did not distinguish different types of emissions and thus effectively ignored the discussion on "luxury" versus "survival" emissions advanced by Southern actors, by commingling instead Southern rice farmers and Northern suburbanites into one category of "human-caused climate change." The result is a more equal sharing of responsibility for global warming between North and South, between Northern high per capita levels of fossil fuel consumption and Southern subsistence emissions from rice and animal husbandry. This adoption of the Northern construction of the greenhouse problem correlates with the overwhelming participation of Northern experts, in particular natural scientists, in the IPCC process.

IPCC's way of framing emissions eventually had far-reaching consequences, because the approach of including all "anthropogenic" greenhouse gases, weighted only by their "global warming potential," has made its way into the climate regime and forms the basis for the Kyoto commitments of the North. If the South had any interest in claiming special treatment for its own basic or "survival" emissions, it may seem now too late for such strategy after IPCC has set the stage and the 1997 Kyoto Protocol has endorsed this framing. The specific frame or "boundary work" of IPCC might thus turn out to be its most crucial impact on the political process, at least with a view to North-South relations. The overwhelming participation of Northern experts in international networks has influenced the political bargaining outcome, by framing the climate issue in a way that includes subsistence farming and animal husbandry in a legally binding regime set up to solve a problem that has not been caused, as Southern experts would argue, by the subsistence farmers themselves. By influencing the way in which gains and losses are politically distributed, IPCC has thus evolved into a true source of "soft power" in international relations: the power of dominating international problem definition and assessment.

In a sense, a similar case could be made regarding ozone politics and the pertinent assessment frames, although in this case, *all* emissions are anthropogenic. However, as noted by Jasanoff (1996: 196), the early *de facto* restriction of ozone negotiations to industrialized countries could be seen as having

> ensured the early exclusion of countries that were relatively ill prepared to participate in epistemic networks based on shared expertise, shared framings of environmental problems, and a shared understanding of the "causes" of ozone depletion. Not surprisingly, the agreements that resulted were quite conventional in their attribution of causality: in common with the majority of Western environmental laws, they targeted *emissions*, flights of inanimate particles from activities deemed benign in themselves, and not the lifestyles of the rich and famous.

Admittedly, the "conventional attribution of causality" of the problem to the emissions helped eventually to solve the problem. However, many environmentalists argue that the "Montreal approach" to chemicals—regulating them on substance-by-substance basis according to some acceptable scientific evidence—is not appropriate for future problems, given the fact that many thousands of chemicals are

invented and brought into circulation every year, with uncertain and, as many environmentalists argue, doubtful uses. Since most chemicals are consumed in the rich North and a few middle-class homes in the South but would affect—if they turn out to be as harmful as CFCs—the rich and poor alike, it could be argued that the substance-by-substance approach typical for Northern environmental regulation is indeed a framing unfavorable to the poor, who do not benefit from the advantages but will suffer from the disadvantages of any new and potentially harmful chemical brought into circulation.

## NUMBERS ARE NOT NEUTRAL—DISTORTION BY SELECTING TECHNOLOGY AND METHODS

The negotiation of environmental obligations for individual nations is often linked to (though not determined by) the perception of their respective responsibilities *as individual nations*. International expert networks, including IPCC, often beg this question—for good reason, since numerous detailed and disputable methodological assumptions would need to be negotiated. Not so private research institutes, some of which have published influential assessments of global environmental problems that do indeed rank the responsibility of individual countries. I will briefly review two private assessments on climate change below, because these reveal the range of possibilities for framing environmental assessments in favor of North or South just through the use of creative methodologies.

The US-based World Resources Institute (WRI) assessed in 1990 the global warming impact of single nations in 1987 (WRI, 1990: 15ff; and chapter 24; Hammond, Rodenburg and Moomaw, 1991). On top of the list they produced were the USA and the (then) USSR, followed suprisingly by Brazil in third place and other developing countries such as China (no. 4), India (no. 5), Indonesia (no. 9), and Myanmar (no. 14). India scored higher than heavily industrialized countries such as West Germany (no. 7), Great Britain (no. 8), or France (no. 10). This result seemingly surprised the Northern researchers themselves, who admitted that their calculated Southern responsibility of 46 percent of total global warming was "a far larger proportion than generally has been recognized" (Hammond, Rodenburg and Moomaw, 1991: 13). They concluded that the blame for global warming was not upon the North alone, but evenly distributed among nations—as was the solution:

> The sources of these additions are spread widely among both industrialized and developing nations, among free-market and planned economies. Virtually all nations that are major sources of greenhouse gases will have to reduce their emissions if the heating potential of the atmosphere is to be reduced (Hammond, Rodenburg and Moomaw, 1991: 34).

Clearly, if this country ranking and climate change assessment had been accepted as legitimate and credible information in the international negotiation committee for the climate convention, the consequences for developing countries would have been severe, since they might have had to agree to costly programs to mitigate carbon dioxide and methane emissions while reducing public expenditures elsewhere. The then Indian Minister of Environment and Forests felt indeed increasingly pressurized by foreign non-governmental organizations and governments that used the WRI assessment as a bargaining chip during the UNCED preparations, arguing that developing countries too were to blame for the climate problem. The private Delhi-based Centre for Science and Environment (CSE) was asked by the Ministry to re-assess the Northern assessment (Jakobsen, 1998: 21), and shortly thereafter CSE published a corresponding study in which WRI was accused of "statistical bag-player-cheat" and, in the opening paragraph, of "environmental colonialism":

> [t]he idea that developing countries like India and China must share the blame for heating up the earth and destabilising its climate [...] is an excellent example of *environmental colonialism*. The report of the World Resources Institute [...] is based less on science and more on politically motivated and mathematical jugglery (Agarwal and Narain, 1991: 1, emphasis orig.).

This debate nicely illustrates that in any inquiry into the responsibility of nations for global warming, numerous answers are defensible. The scientific assessment of global warming is here part of the political process itself. In a sense, it is "negotiated science" (Jasanoff 1990).

In any such assessment, it is to be negotiated, for example, how greenhouse gas *sinks* are calculated, that is, the amount of greenhouse gas emissions that are believed to be sequestered in oceans and terrestrial biological systems. One way would be allocating these sinks proportional to a country's population, thus granting every human an equal part of the earth's terrestrial and marine sink capacity. Another way could be allotting sinks in proportion to emissions. This is possible if one subtracts the total amount of all absorbed gases from total emissions, so that the resulting global *net* emissions can be allotted to single nations in proportion to their emissions.[4] A country with twenty percent of global emissions would then be assigned twenty percent of the earth' sink capacity, a procedure that would, following Southern scientists Jyoti Parikh and colleagues (1991: 48), "reward the culprit and punish the well behaved." Yet it is precisely this method that WRI (1990: 14ff.) followed in its greenhouse gas ranking. Southern experts, on the other hand, advocated the first approach, i.e., offsetting the earth's sink capacity in proportion to a country's population instead of its emissions (Agarwal and Narain, 1991; see also McCully, 1991; Jasanoff, 1993).

This is not the only issue to be negotiated in such assessments. For example, the *types of gases* to be included are relevant too. When only current carbon dioxide emissions from fossil fuel burning are considered, developing countries will cause merely 28 percent of global emissions (Subak, 1993: 57ff). If deforestation is added, the Southern calculated contribution to global warming will increase. This has been another critique of the WRI assessment by Southern experts, since the surprisingly high values for some developing countries, such as Myanmar (no. 14), were strongly influenced by the method used by WRI to account for the depletion of rain forests—with the effect that Laos, one of the world's poorest countries, was construed as the nation with highest per capita net emissions of greenhouse gases (see WRI, 1990: 15ff; and chapter 24; on the critique, see Parikh *et al.*, 1991: 43-44; Agarwal and Narain, 1991: 4f.).[5]

Furthermore, the offsetting of *methane* versus *carbon dioxide* emissions bears on the assignment of responsibility in the North-South context. Calculating the relative contribution of methane to the total greenhouse effect depends on several assumptions, but it is fair to assume that relatively, developing countries emit more methane than carbon dioxide. Thus, the more methane is included in scientific assessments and in calculations of responsibility, the more developing countries will be blamed for global warming and the more pressure developing countries will face to join mitigation efforts by the North. Because these greenhouse gases have different lifetimes in the atmosphere, an assessment is influenced, too, by the weight given to different gases through the time horizon chosen for the analysis. Again, the Northern WRI selected the methodology most favorable for the North: a time horizon of zero years which places a heavy burden on developing countries that emit relatively more short-lived greenhouse gases, in particular methane.

A final important feature of the responsibility of nations for global warming is whether and how *past emissions* are accounted for. Current emissions of greenhouse gases would be no problem if the present concentration in the atmosphere were not far above pre-industrial levels. To include historic emissions in the assessment would shift the blame towards the North, since industrialized countries have contributed

more to the present greenhouse gas concentration than developing countries. Conversely, more emphasis on present emissions will highlight the role of developing countries. Again, WRI stands out with its concept of "greenhouse forcing contribution" that entirely ignores the past emissions of industrialized countries.[6] As Susan Subak has pointed out, "by estimating emissions for the current period only and by the immediate heating effect only, the [WRI] authors have introduced a bias in the time frame of their emissions calculations that may work to the disadvantage of developing countries" (Subak, 1991: 2). While WRI blamed the South for half of the entire enhanced greenhouse effect, this would be reduced to a mere 14 percent, if carbon dioxide emissions from fossil fuels from 1860 to 1986 would be considered (Subak, 1993: 55f., 59; see also IPCC, 1996b: 92ff.).

Taken together, any scientific assessment of the relative responsibility of nations for global warming will have to build upon numerous assumptions, some of which will favor the North, and some the South. The World Resources Institute, with predominantly Northern staff and funding, chose a particular methodology and set of assumptions that were in effect favorable for industrialized countries with high past emissions of carbon dioxide, high current per capita emissions, and low rates of deforestation.

On the other hand, IPCC did not try to rank countries by their contribution to global warming, despite overwhelming Northern participation. IPCC's intergovernmental character probably precludes such assignments, for the very reason that such assignments of responsibility to individual nations have a strong potential to structure and prejudice bargaining processes. Likewise, the extensive peer review system together with IPCC's standards of scientific validity are not likely to permit inclusion of greenhouse gases other than those from energy production for a country-specific ranking of responsibilities (or only with major ranges of error which would lower the credibility of an IPCC country-based greenhouse gas emissions ranking). Assigning responsibilities of nations is a minefield that the 2000 experts working within IPCC, contrary to the private WRI, did not dare to enter. Therefore, IPCC did not even suggest a single measure for "global warming potential" but stated that

> [i]t must be stressed that there is no universally accepted methodology for combining all the relevant factors into a single global warming potential for greenhouse gas emissions. In fact there may be no single approach which will represent all the needs of policy makers (IPCC, 1995a: 58).

As for the time horizon, IPCC acknowledges that "the choice of time horizon will depend on policy considerations" (IPCC, 1995a: 25), and offers its users different time horizons instead of selecting one only. The "global warming potential" of methane, for example, is 56 times that of carbon dioxide after twenty years, but only 6.5 times if a time horizon of 500 years is assumed (IPCC, 1995a: 26).

There is, however, another perspective on the assessment of responsibility. In climate policy, the WRI country-specific ranking of responsibility was heavily contested by Southern actors, and it had a strong impact on developing countries and influenced the perception of Northern dominated science in this arena. Country-specific ranking of responsibility need not have this outcome, though. An entirely different story emerges when climate assessment is compared to ozone politics. In the ozone case, again a private assessment by Northern experts (in 1987 by the Rand Corporation, USA) provided a list of CFC emissions and growth rates of developing countries, ranked by country (Kohler, Haaga and Camm, 1987), comparable in result, yet not in method to the later list of the World Resources Institute on climate change. Yet this assignment of (future) responsibility was not contested, in this context, by Southern governments but turned into a source of bargaining power, together with other estimates on future production and consumption of CFCs in the South. China, for example, quite openly circulated the forecast increase in refrigerator production as a bargaining chip (Stone, 1992: 458).

This variation in the political use of country rankings may be explained by examining the bargaining context in the issue area at the time of the assessment. In ozone politics, developing countries indisputably accounted only for a minor share of total CFC consumption, and in their political bargaining strategy, they aimed at further privileges granted to them, in particular the reimbursement of the full incremental costs incurred by the South in implementing the ozone regime (Biermann, 1997, 1998). Of the thirteen developing countries with the highest growth rates in CFC consumption in the Rand assessment,[7] only three had acceded to the Montreal Protocol at that time, so that the Rand assessment provided the South in this particular negotiation situation with a welcome bargaining chip: the threat to stay out of the regime building process.

This situation differs from the later climate change negotiations: notwithstanding different accounting methods, developing countries share here, in *absolute* emissions, more responsibility with the North than for the ozone problem. Second, while the protection of the ozone layer had virtually no lobby in the South in the late eighties when the treaties were negotiated, developing countries will suffer considerably from global warming. This makes it more difficult for them to use high emissions projections as a bargaining tool. Eventually, Southern actors thus attempted to downplay the Southern contribution to global warming instead of exaggerating it.

The distribution of responsibilities in the case of biodiversity conservation appears different again. While greenhouse gas emissions can be "shifted" from one country to the other by means of "creative" accounting and framing of the problem, no such leeway exists in the appraisal of biodiversity. Still, developing countries were generally careful not to allow for country-specific listing of biodiversity. Such lists had been proposed, during the pre-UNCED negotiations, by France and other industrialized countries which wanted the 1992 Convention on Biological Diversity to include "Global Lists" of ecosystems deemed to be especially valuable or especially threatened, not least to focus commitments of parties on these ecosystems. The French initiative was not unprecedented. Already the 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora, the 1972 World Heritage Convention and the 1971 Ramsar Convention had incorporated lists of particular threatened species, natural world heritage sites, and wetlands, respectively, all of which are relevant for developing countries, too. Yet comparable Global Lists under the Biodiversity Convention were strongly opposed by developing countries, given the threat to their sovereign right to exploit and use their natural resources according to their priorities, should their forests or coastal areas be included in such Global List. The French proposal was thus merely carried forward in diplomatic square brackets indicating continuing disagreement, until eventually the Global Lists approach faded away (Henne, 1997a, 1997b).

The GBA mirrors these conflicts. Some methods of prioritization and ranking of biodiversity are reviewed fairly positively (e.g., GBA, 1995: 938), yet the GBA itself stops short of proposing any prioritization method (GBA, 1995: 940). Instead, GBA posits that

> [t]here is no single formula for developing effective biodiversity conservation priorities. The process of setting priorities will vary between countries according to available information, local perceptions and development objectives (GBA, 1995: 941).

On the other hand, it is striking how freely GBA still operates with country lists. It does not synthesize data as such but quotes frequently from the literature, e.g., percentages of losses of "original wildlife habitat" exclusively in developing countries without offering comparable historic data for industrialized countries (GBA, 1995: 752); percentages of desertified range land of total dryland (GBA, 1995: 754); or the continent-specific status of land degradation in drylands of the world (GBA, 1995: 755), among others. These lists may be perfectly sound, and yet it seems that in legal treaties and diplomatic documents, developing countries would have rejected them or at least have battled for a more balanced

perspective. And again it is striking how grossly underrepresented experts from developing countries were, in a field in which long assessment traditions exist in many Southern countries: only eight percent of contributing authors for Chapter 11, in which these country lists are found, came from the developing world.[8]

## DEFINING NEGOTIATING POSITIONS—THE POWER OF METAPHORS

Scientific assessments also structure bargaining processes and outcomes by selecting and promoting specific methodologies, terminology, and analytical approaches. Once certain frames of negotiations have become widespread, they have powerful influences on the mindsets of negotiators and, more crucially, on the general public that will exercise pressure on their decision-makers. Such frames and ideas effectively limit negotiation options of governments, in particular of less powerful nations. A case in point is the 1995 IPCC Report in which the authors used game theory and neo-classical economic analysis in a way that could help frame negotiations to the disadvantage of developing countries. However valuable economic cooperation theory may be for investigating unionization or oligopolies, its application to North-South relations encounters fundamental difficulties. It needs careful reflection, for example, how the "environmental problem" is defined in the first place, how factual inequalities of actors are addressed in rational choice modeling (often equality is assumed), and, related to that, how "environmental problems" are isolated from other legitimate policy concerns, such as eradicating poverty and raising health standards.

Mainstream economic theory conceptualizes, in essence, global environmental degradation as a problem of collective (state) action, based on Hardin's (1968) widely cited metaphor of the "tragedy of the commons" and owing substantially to Mancur Olson's (1965) work. An agreeable state of the environment is thus framed as a collective good that all actors provide and maintain by means of cooperation. In certain situations some actors may refuse to cooperate, which is understood as unilaterally seeking benefits from collective goods provided by others, without contributing themselves. In analogy to daily life situations, these non-cooperating actors are usually referred to as "free riding," that is, as defined in Merriam Webster's Collegiate Dictionary, "obtaining a benefit at another's expense or without the usual cost or efforts": a behavior unacceptable and even unlawful in many circumstances.

When such methods and paradigms are utilized in the IPCC reports, it is naturally advanced as tool for understanding and analyzing the present negotiations on climate change. Here, as well as in ozone depletion, the problem was initially defined by the North, and industrialized countries were first to take collective action by accepting emission reductions (in the 1987 Montreal Protocol and in article 4 paragraph 2 of the 1992 Climate Convention respectively), while developing countries were still catching up to emission levels that the North had reached decades ago. There are legitimate reasons for this differentiation of duties between North and South: differences in historic emission patterns, differences in per capita emissions, or differences in wealth between people in the North and South. In the 1995 IPCC report, however, such political bargaining situations are framed in the terminology of economic cooperation literature: Nations are divided into "cooperating states," on the one hand, and "non-cooperating states" or "free riding states" on the other (IPCC, 1996c: 423f. *et passim*). The IPCC authors refrained from exemplifying which countries they considered as "non-cooperating" and "free riding," but given the political negotiation situation at that time, in which (some) Northern countries pushed for agreements and the South objected (at least to its own commitments), reading the IPCC text one feels inclined to identify those countries that were classified as "obtaining a benefit at another's expense" as the countries from the South. The theoretical argument thus builds first on a specific idea of what constitutes a global collective good. This leads to a specific concept of which behavior of states would be desirable.

Then, "non-cooperative" behavior can be defined in almost legal reasoning—with far-reaching effects on public problem perception.

While preparing the present study, it was for example suggested by a Northern reviewer that India was "not cooperating in the climate change issue."[9] In a sense, this may seem surprising, because India has ratified the 1992 Climate Convention, is in compliance with the treaty and might ratify the 1997 Kyoto Protocol ahead of major industrialized countries. Moreover, India has increased, since ratifying the convention, its capacity of windfarms by the factor 18, almost doubled the number of solar cookers, and extended the use of biomass power and other renewable energies (period 1993-1997, Pachauri and Sharma, 1998; see also Jakobsen, 1998: 13). The suggestion that India is "not cooperating" rather stems from the prevailing issue framing advanced by the North and implicitly accepted by IPCC: that those who first define the problem, course of action and acceptable sharing of burdens in their own terms, are conceived of as "cooperating" or "pushers" while others that "lag behind" in legal commitments since they wish to opt for different definitions of the problem, different courses of action and different sharing of burdens, are conceived of as "non-cooperating."

This is not to suggest rejecting cooperation theory as such. First, there is a vast and valuable literature in political science, for example, which inquires into the conditions for "cooperation under anarchy" (Keohane, 1982, 1984; Axelrod and Keohane, 1986; Oye, 1986; on environmental problems Haas, Keohane and Levy, 1993; Young, 1989). Second, economic theory and cooperation theory in itself is neutral. For example, the discourse on "free-riding" could be re-framed within economic theory: Jyoti Parikh (1994: 2954) argues for instance that "it is important to stop free-riding [...] by the North." However, such an explicit Southern frame of cooperation theory—where the North is conceived of as free-riding—has not gained wider dissemination in the North, and rarely is the Northern discourse on free-riders applied to the lack of action by North American and European countries, which are perceived in the South as overexploiting the earth's sink capacity at the expense of developing countries. Cooperation analysis thus needs to keep in mind a political context characterized by gross inequalities and differences of interests amongst cooperating actors. Thus, IPCC's usage of terms and framing of bargaining situations may lead to conclusions that are unfavorable to Southern interests—that is, conclusions that blame developing countries as non-cooperating free-riders—if the analysis is not linked to a political examination of inequalities of actors and differences of interests.

This is important because such academic discourse may lead to, and justify, political action. In cases of "non-cooperative behavior," economic theory suggests certain policies to increase the incentive for "cooperation" and the costs of "free riding": sanctions. Policy tools of first choice would be, for example, restrictions of trade with "free-riding" states. The political science literature on "power and interdependence" (Hirschman, 1945; Keohane and Nye, 1977) provides ample theoretical background and empirical evidence for the necessary conditions for trade restrictions to work, such as the degree of interconnectedness, sensitivity, and vulnerability of actors in a given interdependence situation. It can safely be assumed that most developing countries have become more vulnerable to trade restrictions enacted by industrialized countries, especially if those are combined with conditionalities related to bilateral assistance and development bank loans. Trade restrictions, as "negative incentives" *vis-à-vis* "free-riders" and "non-cooperating" states, are therefore an issue which developing country governments now generally view with concern (Parikh *et al.*, 1994). The South Centre, a major developing countries' think tank, observes

> the expressed intention of powerful economies of the North to press for international rules which, in the interests of so-called "fair trade," would impose new domestic policies on developing countries relating to [...] environmental standards (South Centre, 1996: 162).

As for climate change, trade restrictions seem hardly feasible in view of a problem too complex to single out particular products or processes for different treatment. Even so, the economic literature on "non-cooperating" and "free riding" states that IPCC authors followed may well influence bargaining outcomes, insofar as certain negotiation positions were "scientifically" determined as more legitimate than others. Though it is impossible to isolate the influence of IPCC from the background noise of economic cooperation literature, yet the significant congruence of both is remarkable, since there are voices of the South that contest Northern ideas of "global" and of "global cooperation"[10]—voices from the South, however, that have not been heard in the 1995 IPCC assessment of the socioeconomic causes and consequences of climate change. It is fair to assume that again, overwhelming Northern participation in IPCC largely explains this *de facto* North-favored use of economic science.

## SHAPING FUTURE MARKETS—PROMOTING BIOTECHNOLOGY

Global environmental assessments do not assess only environmental problems. Often, they also evaluate technologies, thereby, in quite a few cases, simultaneously shaping markets, creating supply and demand structures, and indirectly distributing revenues. This is obvious, for example, in statements about "research priorities," which influence the direction of research funds to institutes, research programs and certain methodologies. Less obvious is the indirect impact of assessments in shaping technology policy, markets, and technology trade. As for North-South relations, chapter 10 of the UN-sponsored Global Biodiversity Assessment, assessing "Biotechnology," is particularly noteworthy.

Participation in this chapter was selective in several ways. First, as can be deduced from the lack of any critical discussion, no outspoken critics of biotechnology were involved (on conflicts over use of biotechnology, see Gupta, 1999, 2000). It is also fair to assume that the chapter has been highly dominated by natural scientists who were familiar with, and supportive of, biotechnology. One of the two coordinators, who also acted as lead author in four subchapters, was affiliated with the Institute of Plant Production and Processing in Canberra, Australia; the other was a Greek citizen and affiliated with a comparable division of UNIDO. Representatives of developing countries were almost absent from the assessment of biotechnology. All ten lead authors, including the highly active coordinators, came from industrialized countries, from Australia, Belgium, Denmark, the UK and USA. There were two more "contributors," both from Belgium. It is fair to assume that work on this chapter resembled more a closed shop than an international debate on the pros and cons of biotechnology. Like the drafts, also the peer review was done almost exclusively in the North: of 22 peer reviewers, only three (13.6 percent) came from developing countries. Considering this lack of participation of the South, it is hardly surprising that particular Southern concerns are not addressed in the GBA appraisal of biotechnology.

First, it is astounding how uncritically biotechnology is perceived by this chapter's authors in such a disputed issue area. It is quite obvious that critics (referred to as "technology detractors," GBA, 1995: 700) of genetic engineering have not been heard or not been listened to. Genetic engineering is hailed as "new spectrum of possibilities, because it breaks barriers between species, genera, families and even kingdoms, making available the entire gene pool for crop or livestock improvement" (GBA, 1995: 686), including the prospect of genetically optimized "forest tree breeding" and of modified animals more tolerant to environmental pollutants such as ground level ozone (so-called "bioreactors"; see GBA, 1995: 690, 692-3). GBA offers the blueprint of a brave new world not everybody may desire to live in. Often, the authors even depart from the usage of academic writing, through usage of exalted expressions such as "very exciting new fields" (GBA, 1995: 690). Regarding the concept of "species integrity" advanced by many critics of biotechnology—that species have an inherent right to exist as created—the assessment merely asserts that "the concept [of species integrity] lacks substantial scientific support [...]. It is an

emotional rather than a scientific issue [...]" (GBA, 1995: 707). "Science2 itself is rather narrowly defined by the biologists who had drafted this chapter. Purportedly "non-scientific" questions, such as the very social legitimacy and acceptance of scientific research, are first dismissed as mere "emotional" issues, and second not being taken further into account.

GBA is oblivious, too, of social, economic and environmental repercussions of an increased reliance on biotechnology, particularly in developing countries (see Gupta, 1999, 2000). Biotechnology promises a new, second Green Revolution, with increases in production, but it also raises the specter of the problems of the first Green Revolution, including costly investments in capital-intensive, high-tech applications and, as a result, growing dependence of Southern farmers on Northern suppliers, on local wholesale traders and on frail agricultural monocultures. If, for example, progress in genetic engineering allows companies to create new seeds that can no longer be reproduced by individual farmers but must be bought anew each spring (so-called "terminator technology"), this will have a tremendous influence on social structures and local markets in the South. Many actors in developing countries fear that they might find themselves in a new form of unwelcome dependence on multinational companies such as Monsanto—a dependence that is not inevitable since various indigenous and sometimes less costly alternatives to widespread adoption of genetic engineering exist in developing countries, which the biotechnology revolution might drive into extinction. As Shiva, one of the most widely known and outspoken Southern critics of biotechnology, sums up,

> [t]he corporate demand for the conversion of a common heritage into a commodity, and for profits generated through this transformation to be treated as property rights, will have serious political and economic implications for Third World farmers. They will now be forced into a three-level relationship with the corporations demanding a monopoly on life forms and life processes through patents. First, farmers are suppliers of germ plasm to transnational corporations; second, they become competitors in terms of innovation and rights to genetic resources; and third, they are consumers of the technological and industrial products of these corporations. In other words, patent protection transforms farmers into suppliers of free raw material, displaces them as competitors, and makes them totally dependent on industrial supplies for vital inputs such as seed (Shiva, 1997: 54).

If properly implemented, biotechnology might help developing countries to increase food production and security. It could even develop into a Southern growth industry. At present, however, it is often feared in the South that the biotechnology revolution will heavily bear on trade relations between North and South and on economic relationships within rural areas of developing countries. At present, traditional cultural practices and biological control agents are still available in developing countries, and, as pointed out by critics, these do not consume foreign currencies, as would the import of biotechnology products from Northern multinational corporations.

In this range of different perceptions, GBA clearly takes sides. Traditional practices are simply dismissed as disadvantageous (GBA, 1995: 689), without discussing further economic and social aspects as emphasized by Southern critics. In a sense, GBA would fit in the picture painted by Shiva of "scientific imperialism" of Western societies who argued that "when local knowledge does appear in the field of the globalising vision, it is made to disappear by denying it the status of a systematic knowledge, and assigning it the adjectives 'primitive' and 'unscientific'" (Shiva, 1993: 10).

"Indirect impacts" of biotechnology are briefly mentioned in the GBA but hardly discussed. Moreover, the focus is on impacts on biodiversity, not on humans. Only the chapter's very last page is devoted to "moral/ethical debates." Even here, the GBA authors seem more afraid that "the debate [...] will lead to delays and restrictions on the use of genetic resources." The last paragraph of chapter 10 finally addresses

"disadvantaged groups," who are seen as the "relative losers [that] are seldom discussed" (GBA, 1995: 707). And yet, the GBA itself does not discuss disadvantaged groups, except for three sentences that suggest that the real danger posed by disadvantaged groups will be a further loss of biodiversity, since the losers could feel compelled "to degrade their environment further." The fundamental Principle 1 of the Rio Declaration on Environment and Development (UNCED, 1992), that "[h]uman beings are at the centre of concerns for sustainable development," was obviously not paid much attention to in UNEP's Global Biodiversity Assessment. This is not to suggest that biotechnology is necessarily evil. It might have many advantages for people in both the North and South. However, the biotechnology revolution also entails social and economic risks for developing countries that need to be anticipated and addressed. These were clearly neglected by the authors of GBA, and it seems fair to assume that one reason for this neglect was that all ten lead authors of the chapter came from the North.

## SCIENCE AND VALUE—ADDRESSING "EQUITY" IN GLOBAL ENVIRONMENTAL SCIENCE

For most actors in the South, global environmental negotiations center on notions of equity. Indeed, article 3, paragraph 1, of the 1992 Framework Convention on Climate Change mentions the need for "equity" as a principle of all climate policy. Also, some provisions of the 1992 Convention on Biological Diversity refer to the "equitable sharing of benefits" that may arise out of the utilization of genetic resources (see Biermann, 1999a; Harris, 1997). Yet what equity might mean in practice is a question that is very open to debate. Until now, considerations of "equity" in global warming policy—for example the debate on "fair" entitlements to emissions—has largely been ignored by IPCC, even in its socioeconomic sections. IPCC (1996) did include some legal analysis on equity, yet there was not much of a link between this chapter and the overall assessment design, and equity was dealt with as a fringe issue. Southern experts and representatives of non-governmental organizations have repeatedly complained about this treatment of equity in the assessment process.

After the participation of experts from developing countries in IPCC had significantly increased in the course of the third assessment cycle, equity concerns gained prominence too. In February 1999 a first open clash among Southern and Northern IPCC authors occurred in the third assessment cycle, when six economists from industrialized countries openly impugned a "cross-cutting chapter" on equity, sustainability and development written by a World Bank scientist from Sri Lanka, demanding that this chapter should not be included into the third assessment report. This is not the place to discuss the merits of this particular paper on economics in detail. Likewise, it would be playing fool to the extensive peer-review system of IPCC if it were impossible to reject papers submitted to such peer review.

And yet, when a Southern scientist submits a chapter on "equity and climate change" which is collectively rejected by six Northern economists, few observers would not feel inclined to regard this as a clash within IPCC between Northern and Southern perspectives on global warming, on economics and maybe on the general role of science. The incidence is without precedence in earlier assessment cycles, and it is fair to assume that the recent increase of Southern participation in IPCC has at least created an assessment environment which enabled a Southern scientist to propagate a fairly controversial paper and which compelled Northern economists, maybe threatened in their own perception of what are appropriate standards of "economic science," to react by seeking open conflict.

Equity concerns of the South were marginalized by the Global Biodiversity Assessment as well. First, the sharing of benefits from biotechnology is ignored. For a Northern audience, questions of benefit sharing

may not really fit into a chapter on new technologies since almost as a rule, technological innovation and progress benefit the rich industrialized countries, both their citizens who can afford to purchase the new products and their companies that have the financial means to pursue cutting-edge research or to buy patents and licenses. For developing countries, however, the situation is generally different. In ozone politics and climate politics, as well as in biodiversity negotiations, technological dependence has been a major concern for the South. Maneka Gandhi, then Indian Minister for Environment and Forests, spoke out loudly in the 1989 ozone negotiations the Indian perception that "[t]he whole 21st century's survival will be based on [...] knowledge. [...] We have a problem about turning into a client state. [...] Either you [sell us] the technology or you change your laws or you change your patent rights" (cited in Benedick, 1998: 189). Added to this comes the Southern concern that the biotechnological revolution heavily relies on genetic resources from developing countries, which are processed into ready-made products protected by Northern patent laws.

Hence, developing countries pressed hard to stipulate in the biodiversity convention that benefits must be equitably shared and genetic resources be accepted as part of the sovereign resources of a country (and not as *res communis* or common heritage). The 1992 convention states therefore three "Objectives" of equal rank: (1) conservation of biological diversity, (2) sustainable use of its components, and (3) fair and equitable sharing of benefits arising out of the utilization of genetic resources (Convention on Biological Diversity, article 1). For developing countries, the second and third objectives were crucial conditions for joining the treaty regime. Especially the guarantee of fairness and equity is seen as major brick in the entire treaty edifice, guaranteeing to the South that biodiversity is conceptualized not as mere environmental issue but as development concern (Mugabe *et al.*, 1996, 1997; Henne, 1997a, 1997b).

However, these three principles of the convention are not equally covered by the GBA. The overall framing of the assessment centers on the convention's first objective, conservation of biological diversity. The second objective, sustainable use of its components, is discussed, yet annexed to the conservation theme. The convention's third fundamental objective, the "fair and equitable sharing of the benefits" of the use of biodiversity, is almost entirely ignored. Equally neglected, from the Southern perspective, are the rights of farmers and indigenous communities in the South, in particular their common property rights to their traditional knowledge and their seeds, as well as concerns relating to trade-related intellectual property rights and Northern patents on Southern knowledge and biological diversity. Only a few lines have been devoted to the question of benefit sharing in the minuscule section on "moral/ethical debates," suggesting that the claim of developing countries and the convention's third objective were not ethical in a "conventional sense" (GBA, 1995: 707). To some extent, benefit sharing is dealt with in Chapter 12, on the "economic value of biodiversity," but this chapter is hardly a substitute for the extensive North-South debate on benefit sharing in biotechnology and genetic engineering that the South pushes for in other fora.

## "EVALUATING" NORTH AND SOUTH

Environmental negotiations are influenced not only be assessments of who is to blame, but also of who will suffer most. Quite naturally, damage cost estimates are crucial for cost-benefit analyses, an economic tool chiefly used in some industrialized countries for evaluating different options to mitigate global warming or to conserve biological diversity. The lower the estimated damage costs of climate change, the lower will be the political incentive to act, particularly when mitigation costs are believed to be higher than damages. Economic science has achieved remarkable advances in developing tools for appraising damage costs and the "value" of a healthy environment. Eventually, such academic damage cost assessments are meant to inform policy and to help decision-makers to rank their priorities. Given limited resources and other important needs, it may be that not every species and ecosystem can be preserved or

protected to the same extent, so that available domestic funds and international assistance can concentrate on issues which are deemed to be most pressing and crucial. By the same token the appraisal of the "value of nature" and of damage costs serve as political distributive mechanisms by determining who gets what resources: once a value assessment or cost-benefit analysis has been accepted by decision-makers, it will direct scarce resources to some areas while leaving others neglected.

Economists agree that every national cost-benefit analysis is biased which excludes costs that will occur beyond the area under investigation. For example, if the costs of climate change mitigation programs in Germany were compared with the expected damages only in Germany, the analysis would be skewed to the disadvantage of the people of the Maldives Islands. If cost-benefit analysis is undertaken with regard to national benefits only, this will lead to grossly distorted results, since, as Southern authors argue,

> [p]olluters cannot make decisions based on their cost benefit analysis alone when stakeholders are not just polluters. Adaptation burden passed on to others, and the environmental space needed for South and future generation to grow and develop, need to be considered (Parikh, 1994: 2940).

However, while the costs of environmental protection are often well-known, its benefits remain debatable. If an industrialized country wanted to compare the cost of mitigating climate change with the harm to other nations likely to be prevented by such action, analysts would need to monetarize the "value" of coastal areas or agricultural production zones in low-lying island nations or countries such as Bangladesh that will be affected by climate change. In such situations, inter-national comparisons or global aggregates of nature's "value" are required. The problem is that in global aggregates of the "value" of nature, economic cost assessments may tend to undervalue nature in developing countries and, within developing countries, undervalue the interests of people who depend on the non-market economy. From a Southern perspective, this calls for careful use of economic cost assessments on a global scale—a problem which has been rather understated in assessment networks dominated by Northern experts.

The Global Biodiversity Assessment, for example, devotes an entire chapter to appraise the "social importance of biodiversity [and] its value to human society" (GBA, 1995: 829). Despite the ambition evident in this introductory statement, all but one expert working on this assessment of "social importance" and "values" to "human society" came from the North. Seventy-two percent of the experts came from UK and US, 21 percent from Scandinavia, and only one expert was from a developing country, India, who was simultaneously active as lead author for other chapters (thus presumably over-committed and less than fully effective). It might be that other countries, in both North and South, do not have as much expertise in economic evaluation methods as the UK, US and Scandinavian countries. Still, the overwhelming participation of a few industrialized countries may also indicate that other nations assess the value of biodiversity differently, yet without having been invited to bring into the GBA their particular views on the "social importance and value of biodiversity to humankind."

Essentially, these experts from UK, US, and Scandinavia offered a range of methods to assess the social importance and value of biodiversity, all taken from the usual mainstream of neo-classic economics. On the face of it, these methods are unbiased regarding North-South relations. Though one could wonder why ethical, philosophical or legal perspectives on the value of nature to humankind have not been considered, yet this is no distinct Southern concern. It could be argued, however, that economic assessments of nature's value are problematic for the South if they are to be applied on the global scale—which is implied by the chapters' outline that inquires into the value to humankind as such, and by national cost-benefit analyses that take into account the costs accruing to other nations and the globe.

This is because as a matter of principle, neo-classic economics bases calculations of nature's value on real or simulated market behavior, that is, values are derived not from ethical or legal reasoning but from the

actual or potential action of individual actors, essentially from their willingness and capability to pay. Obviously, the willingness and capability to pay are highly dependent on available income, which in turn influences value estimates when global aggregates are calculated. There are several examples of this. One would be methods that try to reveal not directly observable preferences of actors, for example by taking travel expenses accepted by visitors as proxy for the value of a nature park. Even in industrialized countries, such revealed preference methods are problematic when used for allocating public funds. How should decision-makers deal, for example, with the finding that people in the north-western United States would spend more on protecting the spotted owl while the owl's "value" seems much lower for people in Colorado far away from the Northwest (GBA, 1995: 874)?

In a global aggregate of local evaluations, nature parks in poorer developing countries would tend to be assessed as less valuable (apart from parks in the South that are frequented by rich Northern visitors). For example, Northern citizens valued, per person and year, the visibility of the Grand Canyon with 27 US dollar and the preservation of the Australian Nadgee Nature Reserve with 28 US dollar, of a Kakadu Conservation Zone with 40 to 93 US dollar and of Norwegian coniferous forests with 90 to 140 US dollar (GBA, 1995: 875). As for developing countries, a contingent valuation of the Borivli National Park in Mumbai, India, was undertaken in 1995. This park is unique amongst the world's national parks, for it is the largest reserve located within the boundaries of a metropolis, which makes visits by Mumbai citizens much easier and more frequent. Even so, the people of Mumbai were willing and able to spend for preservation of this park merely 120 Rupees per person and year, which roughly equaled four US dollar (Hadker *et al.*, 1995). Notwithstanding methodological differences among the studies and the different range of habitats included, it becomes obvious how disparate monetary evaluations for Northern and Southern nature could be. In order to account for differences in purchasing power, economists would certainly adjust the monetary value of parks in North and South if they compared North and South (though it is not indicated whether they did this for the intra-North comparisons). And yet, it seems likely that given the lower standards of living in developing countries, people would spend relatively less on leisure activities and tourism to parks than the richer Northern public, which would result in lower values for the Southern nature reserves. Taken together, it seems doubtful whether such methods could provide guidance to international decision-makers on "the value of biodiversity to human society."

Similarly, a "production function" approach would be useless or biased for global aggregates of nature's value or for comparisons between North and South. In the production function approach, nature is valued to the extent that it is used as input for market-based economic activities. When a local fishery depends, for instance, on some mangrove area as spawning ground, the economic "value" of this mangrove area will equal the expected financial loss to the fishing industry if the mangroves were non-existent (or destroyed). In the North-South context, the problem is, first, that the value of nature in developing countries will be underestimated since nature-dependent economic activities in the South tend to be less valuable in pure market-based terms. Second, the value of nature for non-market activities in developing countries, in particular subsistence farming and fishing, cannot be evaluated or can be done only with tremendous difficulties. Related to this, as the third example, are the approaches that build on changes in productivity. Suppose a certain hill forest provides various functions for agriculture or water conservation downhill, its value can be derived from the fall in productivity should the forest be destroyed. Here, in particular, non-market survival activities in developing countries often do not count in the final assessment. Global aggregates or North-South comparisons would therefore systematically underestimate the value of nature in the South.

In spite of this, all these three methods and many similar ones are extensively reviewed in the UN-sponsored Global Biodiversity Assessment (GBA, 1995: 825-912). The authors were clearly aware of the problems inherent in their approaches and frequently admit that most economic assessment methods are

highly dependent on income (e.g., GBA, 1995: 829, 835, 888). Nor are global aggregates attempted. Yet these caveats are not linked to a substantial appraisal of methods, which tend to be benevolently reviewed without much critical discussion about the situation in developing countries. This is not to challenge economic assessment methods as such. They may be useful within fairly homogeneous societies and are indeed in frequent use in the United States and in Great Britain. Some researchers in the South, too, have begun to "evaluate" their country's nature, partly motivated by the hope of increasing the value of nature preservation for national decision-makers, since "economics is a language that politicians understand" (Datye, 1999). In the aforementioned study on the Borivli National Park in Mumbai, it was widely noted that the park seemed worth 1000 million Rupees while the current related public expenditure was a mere 17 million Rupees (Hadker *et al.*, 1995).

What economic evaluation methods cannot offer, though, is guidance to international decision-making bodies about the priorities to be internationally followed, for such priorities, if based on mainstream neo-classical economics, would systematically underestimate Southern biological diversity and overestimate the value of habitats and species in the North. Admittedly, "over-evaluation" is an incorrect term if one accepts that global priorities should be based on global market behavior. In a sense, the spotted owl in Northwest America is indeed more "valuable" in pure monetary terms, since it is highly valued by one of the world's richest nations. Eventually, therefore, it comes down to ethical judgments: whether global decision-makers should base their rankings, exclusively or predominantly, on priorities established by markets, and the willingness and capability to pay, or rather on non-economic and more egalitarian evaluation methods.

The problem is aggravated when not only the value of species but the value of the human person is calculated. In domestic settings, estimating the value of human life is no unusual undertaking. It is also fairly common that different societies use different "values" for human life in their implicit or explicit cost-benefit analyses, so that some nations spend large amounts of money on providing their citizens with, say, organ transplants or expensive diabetes treatment, that is, with services that would be inconceivable in African and most Asian countries. Following standard economic science, such differences in actual health standards between nations can be conceived of as differences in the "willingness to pay," which can be understood as the revealed preferences of societies. Based on this line of economic reasoning, some IPCC contributors from the North suggested different monetary values for the human life to allow for assessment of the global warming "damage costs." Meyer and Cooper, for example, wanted to value loss of one life in OECD countries with 1.5 million US dollars and in developing countries with mere 150,000 US dollar (Meyer and Cooper, 1995, cited in Agrawala, 1998b). These values were accepted by the writing team responsible for drafting chapter 6 of Working Group III's 1995 Report and subsequently presented to the IPCC plenary. It was only the public outcry from developing countries that prevented the report from being accepted in this form. In fact, this was the first incidence when the plenary rejected a writing team's submission (Agrawala, 1998b). It seems quite plausible that this widely publicized conflict was possible only because of the overwhelming participation of Northern experts in the IPCC writing team, while the conflict settlement—that is, the rejection of "value of life" estimates—was clearly influenced by the Southern participation in the IPCC plenary.[11]

## FRAMING RESEARCH AND ASSESSMENT AGENDA

Finally, it is not only the questions that expert networks do assess but also those that are left out or neglected in assessment processes that matter. Certain questions, though vitally important for some nations, are often either excluded or only insufficiently addressed by international assessments. Here, northern domination within the global research community seems to influence the assessment agenda

since all major international assessment projects address issues of particular relevance for the North, that is, issues that directly affect Northern interests and that rank high on the public agenda in industrialized countries. Conversely, issues of exclusive Southern interest are generally less extensively covered or are omitted altogether by international expert networks. As noted by Agarwal and Narain (1991: 24),

> if issues like climate change have to put [sic] on the agenda, then it is equally important to put environmental problems like desertification, land and water degradation [...] on the global agenda. The global environmental agenda, as it is being framed by the West, must be questioned. The agenda in itself has become politics.

If urgency of international action were to be measured by indicators such as "maximal number of human lives protected with least effort," pollution and degradation of freshwater resources might be the most important issue to which research and funds should be directed. It is estimated, for example, that 550 million people in the north of China do not have adequate water supplies, and lack of freshwater adversely affects roughly 17 percent of China's annual harvest (Washington Post, 2 October 1998). Degradation of the world's soils is a second environmental issue affecting the life of more than a thousand million people. Again, some international assessments have been undertaken, but with less institutional and financial support than, say, IPCC. Notably, degradation of neither soils nor freshwater has been addressed by international legal agreements yet. One might explain this by the difference between an "atmospheric global interdependence" that requires global research on climate and ozone, while local problems of soil and water degradation can be solved nationally. Such technical explanations, though, do not explain the resilience of issues on the international agenda.

As for climate assessments, it is sometimes argued that the international research community's ranking of priorities is not fully reflective of Southern concerns. A widely cited case in point is the handling of climate change impacts in the IPCC (1995a) assessment. In the Northern public discussion, sea-level rise by melting ice shelves and glaciers usually stands in the center of citizens' concern. Therefore, the drafters of IPCC (1995a) selected sea-level rise from all other climate change impacts and devoted an entire chapter to this question. With no doubt, this particular climate change impact is of vital importance for many developing countries, too—for some, their very survival as a nation will depend on future sea level. Yet more crucial for roughly half of humanity is, for example, the monsoon cycle, which has not been ignored by IPCC (e.g., IPCC, 1996a: 47), but was not granted center stage as was the problem of sea-level rise.[12] In southern and eastern Asia, most agrarian activity depends on the monsoon, and given lack of financial and technological resources, no leeway exists to adjust farming practices should monsoon cycles change. India, China and ASEAN countries would be entirely different nations and polities were the monsoon to change over a longer period.

The assessment of future sea-level rise, however, which also affects the North, has been given prominence over assessment of the monsoon cycle, which is of immediate concern only for the South. This neglect is clearly felt, e.g., by Southern experts for whom monsoon variability stands at the center of their concern and research. To them, at least a separate IPCC chapter on the monsoon appears justified—some even argue that IPCC, had it been more concerned with Southern interests, would have had to present an entire volume on the monsoon (Biermann, 1999b). Equally important for many researchers from the South is the general vulnerability of their countries and possible strategies for abatement—issues that have been poorly covered by IPCC and for which foreign foundations and governments are seldom inclined to provide funds for research and assessment. In 1995, IPCC clearly favored the assessment of mitigation options over adaptation options. Some Southern researchers have linked this to the distribution of costs between North and South, since the short-term mitigation costs will have to be borne by industrialized countries, while developing countries will be confronted with most of the long-term damage and adaptation costs (see in more detail Biermann, 1999b; Sharma and Kumar, 1998).

The IPCC authors are not primarily to be blamed for these shortcomings since IPCC merely synthesizes information found in the scientific literature and thus depends on research agendas that have been defined elsewhere. Eighty-six percent of all scientists active in the International Geosphere-Biosphere Programme, on which IPCC often relies, are from industrialized countries and funded by the North (Jakobsen, 1998: 39). This may explain why the monsoon pattern has not yet found the prominent place on the research agenda that it deserves both for the survival of Asian nations and for long-term (though yet inadequately perceived) interests of OECD nations. Despite two decades of intensive world-wide climate research, information on climate change impacts and on feasibility of adaptation options is still lacking for developing countries, or it is only based on extrapolation from experiences in the North that must be viewed with caution, given substantial economic, social, technological and climatic differences between industrialized and developing countries (Pachauri, 1998: 147; Sharma and Kumar, 1998: 28; Agrawala, 1998b).

## CONCLUSION

This study has examined a number of cases in which the information synthesized and assessed by international expert networks has tended to be to the disadvantage of or oblivious to the interests of developing countries. Of course, this conclusion does not necessarily hold for the myriad global environmental assessments that fill the libraries of politicians and scientists alike. Assessments are not "political" in each and every chapter of their reports—in sections on taxonomies of plant and animal species, framing the information to the disadvantage of some nations are hardly conceivable, and atmospheric science will be the same no matter the passport of the physicist (notwithstanding attempts by Stalin to develop "socialist physics"—i.e., more close to Marxist dialectic—or by Hitler to establish a "German physics").

Furthermore, the paper does not intend to suggest that the strong Northern influence in the assessments has been deliberately pursued by individual researchers from industrialized countries. Instead, it seems that asymmetries or biases in the assessments result from the structural dominance of the North in setting the international scientific agenda, given their overwhelming financial and technological advantage over the South, which then translates into overwhelming participation of Northern scientists in assessment networks. This structural dominance is strongest in research on global environmental change, which is perceived in the South as an issue that the North has to chiefly act upon, with the result that developing countries generally do not spent much of their scarce resources on research in this area (on Southern research, see, e.g., Kandlikar and Sagar, 1999, on India).

Still, it seems that the best way to redress this situation would be through increasing the participation of Southern experts in international networks. Strong Southern participation in assessments helps to ensure that assessments remain useful and credible for developing countries. For example, it were only representatives from the South who hindered IPCC from adopting economic calculations which valued Northern lives ten times higher than Southern lives. This call for increased participation is not necessarily new. Already, by 1989, the second IPCC plenary had agreed to establish a Special Committee on the Participation of Developing Countries based on parity representation, which means that five of the committee's members came from developing and five from industrialized countries (Agrawala, 1998b). This committee presented to the IPCC plenary in 1990 several factors that limited Southern participation in the IPCC process,[13] and over the years, developing country participation has been increased, in mere numbers, by a number of reform measures (Agrawala, 1998b). And yet, strengthening the participation of developing countries is still being called for in the 1995 IPCC report. The Executive Summary of the

report's first part—on *The Science of Climate Change*—argues for the need "to increase support for national and international climate research activities, especially in developing countries" (IPCC, 1995a: xii).

How could Southern participation be further strengthened and made more effective? Following the report of the Special Committee on the Participation of Developing Countries, the IPCC has already taken a number of actions to address the obstacles to developing country participation. For example, IPCC documents are now being translated in all six UN languages, as a way to increase the communication of scientific knowledge and the IPCC reports in particular. As for participation of Southern experts, the entire IPCC set-up has been changed in a way that takes less account of traditional professional merit and more of geographical representation, as is the case in purely political UN bodies as well as other international expert networks such as the International Court of Justice. In fact, the officially "scientific" recruitment procedure for IPCC working and drafting groups has been increasingly transformed into an openly political recruitment procedure, taking into account geographic representation, but also, for the upcoming third IPCC report, representation of the views of environmentalist and business organizations represented by experts. In a sense, the IPCC governance structure now has a quota system resembling political bodies such as the meetings of the parties to the Montreal Protocol, the executive committee of the ozone fund and the Global Environment Facility, all of which are governed by North-South parity procedures granting developing and industrialized countries equal voting power. As in these bodies, current IPCC rules of procedure require that each working group be chaired by one developed and one developing country scientist. Each chapter of the assessment reports must have at least one lead author from a developing country. Again similar to purely political bodies under the climate and ozone treaties and to UN institutions, the IPCC Trust Fund supports participation of developing countries in IPCC meetings by devoting half of its budget to reimbursing travel expenses of Southern delegates to the meetings. In the second IPCC assessment cycle, at least one developing country participant for each IPCC writing team meeting was to be financially supported (Agrawala, 1998b). Taken together, especially in IPCC major changes in the institutional outline have been undertaken to increase participation of developing countries. In fact, participation of developing country scientists in IPCC's third assessment cycle appears much more visible than in previous rounds.

Unlike IPCC with its series of reports, the Global Biodiversity Assessment has remained a singular affair so far. At present, the scientific assessment of the state of global biodiversity has its place in the framework of the convention organs, notably the Subsidiary Body on Scientific, Technical, and Technological Advice (SBSTTA). This body has evolved, however, into an overtly political body that some observers have likened to a "miniature" conference of the parties, with not much influence of scientists. In this context it has been argued, e.g. by the German Advisory Council on Global Change (forthcoming), that the scientific assessment of the threats to biodiversity should be conducted in a more science-based body, for example in the form of an Intergovernmental Panel on Biological Diversity, which might be structured along the lines of IPCC. When such body will be set up, participation of developing countries will certainly be a disputed issue again, and given the special nature of biological diversity and its various uses and threats, some geographic representation in this issue area might be even more important than in the case of IPCC.

However, merely increasing the participation of developing country experts in global environmental assessments might not suffice after all. Even a balanced geographic representation of views in the assessments does not help to overcome the geographic imbalance in the underlying scientific capacities between North and South. Since global environmental assessments are only meant to collect and evaluate existing knowledge, assessments with equal representation cannot change the inequalities in the global research community. This, however, calls for more than for adjusting the design of global environmental

assessments, but rather for a fundamental reform of the way in which science in North and South is conducted.

# ENDNOTES

1 Keohane and Nye (1998: 86) write that "[s]oft power [...] is the ability to get desired outcomes because others want what you want. It is the ability to achieve goals through attraction rather than coercion. It works by convincing others to follow or getting them to agree to norms and institutions that produce the desired behavior. Soft power can rest on the appeal of one's ideas or culture or the ability to set the agenda through standards and institutions that shape the preferences of others. It depends largely on the persuasiveness of the free information that an actor seeks to transmit. If a state can make its power legitimate in the eyes of others and establish international institutions that encourage others to define their interests in compatible ways, it may not need to expend as many costly traditional economic or military resources."

2 See declarations of Fiji, Kiribati, Nauru, Papua New Guinea and Tuvalu in United Nations Doc. ST/LEG/SER.E/12 XXVII.7.

3 See the International Law Commission (1980) Draft Articles on State Responsibility, article 1, "Every international wrongful act of a State entails the international responsibility of that State", and article 3, "There is an internationally wrongful act of a State when: (a) conduct consistent of an action or omission is attributable to the State under international law; and (b) that conduct constitutes a breach of an international obligation of the State."

4 WRI used the term "carbon dioxide heating equivalents of annual atmospheric increases" of greenhouse gases.

5 From a Southern perspective, the empirical methods used by WRI have also been contested. In Brazil, for instance, extreme years of deforestation were taken as decade averages and difficulties in quantifying carbon dioxide emissions from deforestation with some confidence were ignored: while WRI felt, in 1990, confident enough to calculate deforestation data on country basis, five years later IPCC still had to admit that "the input from deforestation cannot be estimated accurately" (IPCC 1995a: xv).

6 Hammond, Rodenburg and Moomaw (1991: 13) see this as one of the main advantages of their approach, since "by focusing on the instantaneous change in radiative forcing of the atmosphere, [the greenhouse forcing contribution method] emphasizes the rate of warming. The rate of climate change, as much as the eventual magnitude, poses the greatest difficulties to ecosystems and human societies."

7 These were (in descending order of importance) China, India, Brazil, Saudi Arabia, South Korea, Indonesia, Nigeria, South Africa, Mexico, Turkey, Argentina, Venezuela, Algeria and Iran (Kohler, Haaga and Camm 1987). Only Mexico, Nigeria and Venezuela had ratified the Montreal Protocol by August 1989.

8 The participation of Southern experts as peer reviewers was somewhat larger at 31 percent, and of the five coordinators, at least one expert was from a developing country. However, the nationality of fifty percent of all contributors was not listed in the annex, though given the family names, it would appear that almost none of the "anonymous" contributors were from the South.

9 Tom Wilbanks, personal e-mail communication, December 1998 (on file with author).

10 The South Centre (1996: 32), for example, warned that "'Global Governance' has been put forward as a concept that encapsulates recognition of the need for new and more advanced forms of international co-operation,

management of global affairs, and dealing with problems common among nations. [...] However, in an international community ridden with inequalities and injustice, institutionalizing 'global governance' without paying careful attention to the question of who wields power, and without adequate safeguards, is tantamount to sanctioning governance of the many weak by the powerful few."

[11] It is to be noted that economic valuation methods are the culmination of an anthropocentric world view that values living species in respect only to their use for humans. Economic valuation "rationally" determines which species, deemed as less valuable for humans, should be more depleted, and which species, seen as more valuable, should be preserved and protected. Although this is not the place to discuss philosophical foundations of environmentalism, I personally do not see an alternative to some form of moderate anthropocentrism. However, it is to be noted that the neo-classical economists' extreme anthropocentrism is equated, by some Southern authors, with Western (or Northern) thought—some argue that in the same way in which Columbus heralded the Western man's colonial conquest of the South, Western anthropocentrism colonializes nature according to a restricted Western (and male) calculation of utility that redefines animals as "bioreactors" and grass as "weed," thus destroying the oneness of humans with nature that is seen by some Southern authors as being inherent to Southern philosophy and ethics: "If we recognize that the dominant economic system is at the root of the ecological crisis because it has failed to address the ecological value of natural resources, expanding the same economic system will not protect indigenous knowledge or biodiversity. We need a transition to an alternative economic paradigm that does not reduce all value to market prices and all human activity to commerce" (Shiva, 1997: 77; also 1993: 10). Needless to say, to those Southern authors, all expert networks are entirely dominated by Northern anthropocentrism, although this seems to be accepted today by most experts and decision-makers from developing countries as well.

[12] Moreover, IPCC (1996c) offers a "vulnerability index" for developing and developed countries that is based on a country's export dependence, its remoteness and insularity, and its proneness to natural disasters such as cyclones. Yet the adequacy of this vulnerability index is debatable and has been challenged by Southern authors (Sharma and Kumar, 1998: 37-40). Export dependence does not reveal much about food security within developing countries, and instead of mere remoteness and insularity, it is availability of domestic or foreign resources that determines the vulnerability of developing countries. The proneness to natural disasters cannot be assessed unless the capacity to anticipate, prepare for and react to such disasters is also considered, as indicated by the quite different impact of cyclones on Florida and Nicaragua respectively. It is difficult to understand why fairly obvious indicators, such as life expectancy or per capita income, have not been included in the IPCC vulnerability index. Thus, even when IPCC addresses vulnerability, its assessment is framed in a way that neglects the interests of and conditions in developing countries, and these are at times challenged by Southern researchers.

[13] In view of the committee, developing countries lacked, first, enough experts experienced in the field of climate research. Moreover, information about the climate problem was deemed insufficient in developing countries. Yet to bridge the information gap, existing channels of information to the South were seen as too ineffective, which was explained by the institutional environment in developing countries, such as lack of coordination. Finally, the financial resources in developing countries did not suffice to allow for wider participation of their experts (Rajan, 1997: 108; Agrawala, 1998b).

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