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Big Science, Small Impacts - in the South ?

**The Influence of International
Environmental Information Institutions on
Policy-Making in India**

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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.

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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

Environmental policy-making is the art of taking right decisions based on insufficient knowledge of the underlying issues. To help decision-makers cope with this uncertainty, transnational networks of experts have been offering numerous assessments of the state of knowledge, often advertised as consensus of “international science”. These networks—such as the Intergovernmental Panel on Climate Change (IPCC)—could be understood as international institutions that provide governments and non-governmental actors information both on the state of the environment and on policy options. Substantial social science research has already analyzed the effects of such institutions on industrialized countries; this study explores their influence in India as a pivotal developing country. It appears that although information institutions did not remain entirely ineffective in India, their effect is still limited, among others by low prominence of global environmental issues on the Indian national agenda, by lack of independent research capacity regarding such issues within India, and by lack of participation of Southern experts in these institutions. It is proposed to address these limitations by increasing the usefulness and legitimacy of environmental information institutions in the South through stronger consideration of the socioeconomic context of developing countries and other Southern concerns and interests; by increasing participation of Southern experts; by enhancing research capacities in the South; and by ensuring that information institutions are organized as self-adaptive processes, such as IPCC, and not as one-shot effort, such as the Global Biodiversity Assessment.

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TABLE OF CONTENTS

ABBREVIATIONS

INTRODUCTION	1
EFFECTS OF INFORMATION INSTITUTIONS ON ISSUE PROMINENCE IN INDIA	4
EFFECTS OF INFORMATION INSTITUTIONS ON EXPERT COMMUNITIES IN INDIA	7
Global Environmental Change Expert Communities in India	7
Perception of Information Institutions Within the Indian Expert Community	9
<i>Credibility and Legitimacy</i>	10
<i>Usefulness</i>	11
Responses by the Expert Community to International information Institutions	13
EFFECTS OF INFORMATION INSTITUTIONS ON DECISION-MAKING IN INDIA	16
Environmental Policy-making and Assessment in India	16
India's Policy on the Protection of the Ozone Layer	19
<i>Policy Development</i>	19
<i>Influences of International Environmental Information Institutions</i>	20
India's Policy on the Protection of the Climate	22
<i>Policy Development</i>	22
<i>Influences of International Environmental Information Institutions</i>	23
India's Policy on the Protection of Biological Diversity	25
<i>Policy Development</i>	25
<i>Influences of International Environmental Information Institutions</i>	25
CONCLUSION	26
The Effects of International Environmental Information Institutions in Developing Countries	26
Perspectives for Institutional Design	28
<i>Improve Usefulness and Legitimacy</i>	28
<i>Increase Participation</i>	29
<i>Enhance Research Capacity</i>	30
<i>Ensure Process</i>	30
Creating Permanence in National Assessments in the South	30
NOTES	33
REFERENCES	39
Interviews	39
Secondary Sources	40

ABBREVIATIONS

ADB	Asian Development Bank
AIJ	Activities implemented jointly
ALGAS	Asia Least-cost Greenhouse Gas Abatement Strategy Project
ASSOCHAM	The Associated Chambers of Commerce and Industry of India
CBD	Convention on Biological Diversity (1992)
CFC	Chlorofluorocarbon(s)
CII	Confederation of Indian Industry
CSE	Centre for Science and Environment, New Delhi
CSIR	Council for Scientific and Industrial Research, Government of India
EPA	Environmental Protection Agency, United States of America
FAO	United Nations Food and Agriculture Organization
FICCI	Federation of Indian Chambers of Commerce and Industry
GBA	Global Biodiversity Assessment (1995)
GEF	Global Environment Facility (UNDP, UNEP and World Bank)
GREEN India 2047—	Growth with Resource Enhancement of Environment and Nature Project
IAS	Indian Administrative Service
ICC India	International Chambers of Commerce India
IGIDR	Indira Gandhi Institute of Development Research, Mumbai
IIT	Indian Institute(s) on Technology
IMD	Indian Meteorological Department, Government of India
IPCC	Intergovernmental Panel on Climate Change
IUCN	World Conservation Union (previously International Union for the Conservation of Nature and Natural Resources; 1948-1956 known as International Union for the Protection of Nature)
JNU	Jawaharlal Nehru University, New Delhi
MEA	Ministry of External Affairs, Government of India
MoEF	Ministry of Environment and Forests, Government of India
NPL	National Physical Laboratory, New Delhi
OECD	Organisation for Economic Co-operation and Development
SBSTA	Subsidiary Body for Scientific and Technological Advice under the UNFCCC
SBSTTA	Subsidiary Body on Scientific, Technical, and Technological Advice under the CBD
TERI	Tata Energy Research Institute, New Delhi, respectively Tata Energy and Resources Institute, Washington, DC
UN	United Nations
UNCED	United Nations Conference on Environment and Development (1992)
UNDP	United Nations Development Programme

UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change (1992)
UNGA	United Nations General Assembly
WBGU	Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen [German Government's Advisory Council on Global Change]
WMO	World Meteorological Organization
WRI	World Resources Institute, Washington DC
WTO	World Trade Organization

All humankind is naturally linked together by teaching, learning, communicating and discussing.

Marcus Tullius Cicero, *De officiis* I, 50¹

INTRODUCTION

From the global to local levels, environmental policy-making relies on information both on the kind of problem at stake and on the options for decision-makers to cope with it. Some global environmental problems, notably stratospheric ozone depletion, climate change and biodiversity conservation, have sparked off formidable increases in scientific research and in international scientific cooperation for assessing the accumulated knowledge and synthesizing it in a form accessible and useful to decision-makers. About 2500 scientists, for example, have been working with the UN-sponsored Intergovernmental Panel on Climate Change for its three-volume report *Climate Change 1995* (IPCC 1996a, b, c), and the Global Biodiversity Assessment (GBA 1995) involved participation of roughly 1500 experts in this field.

The immense networks of scientists, experts, national governments, private bodies and international organizations engaged in these major global environmental assessments² can be understood as social institutions, which consist of mutually accepted general principles for producing and synthesizing expert knowledge; norms and rules regulating this synthesis and evaluation of knowledge in specific cases; and pertinent decision-making procedures. Once information provided by these institutions is being relied upon in political decision-making, they will become political actors in their own right. Information offered by them will influence the allocation of resources, the legitimacy of actions, and possibly the prevention of harm to humans, ecosystems and economic assets. The main function of these institutions is not environmental protection as such, but comprehensive and reliable information on the state of the environment and on policy options which reduces transaction costs for governments; they are thus “international environmental information institutions” (see also Connolly *et al.* 1998).

Although enormous efforts are undertaken in environmental information institutions, political scientists need to question their effects on both national decision-making and international bargaining. Do such institutions really *matter* in the course of policy-making, and if, for whom do they matter? The debate on regimes and institutions in political science has long concentrated on institutional effects on national decision-making, yet chiefly with a view to institutions that purport to provide wealth or security. The impact of international information institutions, and of environmental information institutions in particular, has received only recently attention by students of international relations. In the early 1990s, it has been shown that an epistemic consensus about the interpretation of science reached within assessment processes influences negotiations and may help create international environmental regimes (Haas 1990a, b, 1992; Peterson 1992). More generally, political scientists have worked on the role of ideas in international relations (for example,

Goldstein and Keohane 1993; Jachtenfuchs 1995), on information systems in environmental regimes (Mitchell 1998), and on the social construction of science for policy in global environmental regimes (e.g., Jasanoff 1996). Likewise, substantial research has been directed to the impacts of international environmental information institutions on industrialized countries, such as the USA or Europe in the areas of climate change or regional air pollution (e.g., Botcheva 1998; Cash 1998; Farrel and Keating 1998; Fisher-Vanden 1997; Jäger, Farell and VanDeveer, forthcoming; Keating and Farell 1998; Moser 1998; VanDeveer 1998). Less attention, however, has been paid to their impact on developing countries.

This will be the focus of this study: How does information from international institutions “trickle down” from global to local, from transnational scientific networks to national decision-making in developing countries? Do international information institutions influence scientific assessment and policy-making in the South, or do developing countries evaluate the state of the world’s environment and policy options independently from global efforts, thus rendering information institutions ineffective in the Southern hemisphere? Which institutions are perceived as legitimate, trustworthy and useful in the scientific and political system of developing countries, in other words: which global assessments do experts and decision-makers in developing countries use as basis for decision-making, and why? How could these variables be influenced, if deemed necessary, by altering the way in which assessments within such institutions are conducted (Jäger 1998)? This paper analyzes these questions by focusing on environmental information institutions in the issue areas of (1) climate change, (2) biodiversity and (3) stratospheric ozone depletion.

(1) In climate change, the central international information institution is the Intergovernmental Panel on Climate Change (IPCC), set up in 1988 by the World Meteorological Organization (WMO) and the UN Environment Programme (UNEP). IPCC has produced a series of reports and is often seen as highly influential on the international level (Agrawala 1998a, b). In particular its 1995 statement that there was a “discernible” human influence on global climate has been a major factor in the negotiations leading to the 1997 Kyoto protocol. IPCC is no exclusive expert body but an inter-governmental process, although the exact delimitation of the influence of experts and diplomats remains difficult. Originally, IPCC consisted of a small group of experts from OECD countries. Quite soon it was felt that lack of participation of Southern experts would undermine the credibility of the process in the South. Since then, IPCC has taken a number of actions to the effect that in mere numbers, developing country participation has been increased. Agrawala (1998b: 630) notes, for example, that while only 14 non-OECD countries sent experts to IPCC in 1988, this increased to 98 non-OECD countries in 1995. This does not yet, however, reflect an increase in total numbers of participants from the South.

(2) As for the protection of biodiversity, there has been only one international institution on the assessment of the problem, which ended with publication of the Global Biodiversity Assessment (GBA 1995). GBA was initiated by UNEP in an attempt to transfer the IPCC model to other issue areas.³ It was set up in 1992/1993 with a two million US dollar grant from the Global Environment Facility (GEF) and institutionalized the cooperation of roughly 1500 experts. A final report was published in 1995 as a book of 1,140 pages with the same publisher that distributes the IPCC reports. There are major differences, though, between the climate and biodiversity assessments under UN auspices. While IPCC preceded the negotiation of the climate convention, GBA was completed some years after its related treaty, the biodiversity convention, had been adopted, and it has rather been influenced by the emerging regime than vice versa. Second, whereas IPCC evolved into a process and a long-standing international institution that churns out major publications every few years, GBA remained restricted to 1992-1995, although UNEP had initially envisaged successive reports.⁴

(3) Regarding the protection of the stratospheric ozone layer, the situation differs again. There is no dominating information institution but a series of single assessment processes, in particular the Coordinating Committee on the Ozone Layer, the “Blue Books” of 1986 and several reports of assessment panels under UNEP, the secretariat of the Montreal Protocol (Benedick 1998; Jung, forthcoming; Litfin

1994). These information institutions have been characterized by overwhelming Northern participation and by a lack of interest on the side of developing countries, except for their successful instigation that the term “joint responsibility” for the ozone problem should be replaced by the acknowledgement that industrialized countries had the main responsibility (Jung, forthcoming).

How did these international information institutions influence policy-making in developing countries? In examining this question, I will concentrate on one developing country, India, which many view as an essential player in global environmental negotiations. I will draw on primary sources and a series of in-depth interviews and informal discussions with representatives of the Indian governmental bureaucracy, non-governmental organizations both supportive of environmental and of business interests, and of the Indian scientific community, all conducted in India from January through March 1999, as well as on secondary sources.⁵ The study is limited in some aspects: different assessment reports could not be accounted for in all interviews, and quite often, only the general perception of “the IPCC” (and not of single reports or assessment cycles) could be considered. Moreover, most interviewees were professionals working on global environmental change, which entered a certain bias regarding the impact of assessments. Since the analysis addresses fairly sensitive issues, including legitimacy of United Nations and foreign scientific research as well as reasonableness and effectiveness of governmental policy and the impact of project funding, it appeared advisable to protect the identity of interviewees by disclosing them only in the reference section without ascribing single judgments and information to individuals.

What kind of effects of international institutions for assessing the “science” of environmental problems can be expected? Keohane, Haas and Levy (1993) argued, for international institutions in the field of environmental policy as such, that essentially three different forms of effects can be distinguished, the so-called three “c”: improving the *contractual* environment, increasing *capacity* on the national level, and raising *concern* among decision-makers on different levels. Empirically, their argument refers to international environmental regimes in a strict sense, for instance to the regime on the ozone layer that allowed governments to contract on a set of domestic measures, increased CFC-related capacities in developing countries and helped raise concern in various countries, which again supported political action.

The case is somewhat different for international environmental information institutions. *Capacity building*, for example, is no explicit function of institutions such as IPCC. It clearly happens, since all participants in IPCC cycles learn from each other, networks are built up within and among nations, and most participating research institutes are better informed about, and prepared to deal with, climate change than in the counterfactual situation, i.e., without institutions such as IPCC. Yet IPCC is different from technological training or dissemination programs such as those of the Ozone Fund (Biermann 1997) or in the framework of the Global Environment Facility (Fairman 1996). IPCC may increase domestic capacities in some countries, but its effectiveness cannot be measured by this indicator only. On the other hand, information institutions will bear on the *contractual environment*. Various sources of information are condensed and, in a sense, “pre-negotiated” before the actual political bargaining starts, thus decreasing the costs in terms of money and time that continuing scientific discordance would cause. Game-theoretic modeling, for example, has shown that rational actors who are more responsible for transboundary environmental problems will tend to overstate scientific uncertainty, thus slowing the negotiation process (Helm 1998). Consensus documents of scientists, if accepted by all other actors, may help here to narrow the negotiation options for all countries and reduce the transaction costs of striking a bargain. Hence, information institutions have the potential to affect any one country by altering the contractual environment which might influence bargaining outcomes.⁶ This study, however, adopts a different perspective. I do not negate that information institutions can have substantial *indirect* effects on countries through their influence on the bargaining situation on the international level. I am analyzing, however, the *domestic direct* impacts that international information institutions have on individual countries, that is, on their national decision-making system. This comes down to a focus on the third “c” identified by Keohane, Haas and Levy (1993), that is, *raising concern*.

On the face of it, many experts active in international environmental information institutions might deny that “raising concern” was part of their mandate. Most would claim that their task were to discover the “scientific truth” about the environmental problem and then leave the field to politicians and activists to raise concern if they so wish. However, strong governmental involvement, the multi-layer executive summaries preceding most assessments as well as wide media attention to institutions such as IPCC show that their political function is more than mere scientific debate. These institutions are seen as influencing national or international politics by raising concern—if scientists assert that there is problem—or else by “de-alarming”.

Arguably, this is the main function of international environmental information institutions, and this is the function I focus on in this paper. So far, most research on the direct influence of international environmental information institutions has analyzed industrialized countries in West and East. Even here, it could be shown that significant differences exist between Western industrialized countries and the countries in transition to a market economy in Eastern Europe (VanDeveer 1998). Less research has been done on the impacts of information institutions in the South. This is hence the focus of the present case study on India as pivotal developing country. I will first concentrate on the effects of international information institutions on the prominence of environmental issues within India. Then I will look at institutional effects on expert communities in India, examining how credible and useful information has been perceived and how Indian experts have responded, for example by changes in their own agenda. Based on both analyses, I will examine the effects of institutions on the way environmental policies have been pursued by the Government of India. In the concluding section, I will outline feasible avenues for improving the influence of such information institutions—with a view to equitable and yet effective global environmental policies—as well as for strengthening the internal assessment process in India.

EFFECTS OF INFORMATION INSTITUTIONS ON ISSUE PROMINENCE IN INDIA

In this section, I discuss the influence of information institutions on the salience of global environmental issues in India. Generally, it is often claimed that global environmental problems are less prominent in developing countries than in Western industrialized countries (Beck 1986: 26-27; Jakobeit 1996: 143; Jänicke 1996: 20; Ravenhill 1990: 741). This is certainly the case in India. The relative marginalization of global environmental problems in India is usually explained by wide-spread poverty, unemployment and the relatively low degree of economic development, which makes long-term issues such as climate change or ozone depletion less important in public debate than food security or industrialization (own interviews). Widely quoted is Indira Gandhi’s statement at the 1972 Stockholm Conference on the Human Environment:

The rich countries may look upon development as the cause of environmental destruction, but to us it is one of the primary means of improving the environment of living. [...] How can we speak to those who live in villages and in slums about keeping the oceans, rivers and air clean when their own lives are contaminated at the source? (New York Times, 15 June 1972).

This perception has changed in recent years when environmental pollution in the South became more severe. Water pollution, indoor and outdoor air pollution, degradation of natural resources or hazardous and other wastes are now regularly listed as pressing problems in India, too. There is a general awareness of the need of environmental policy, and gross incidences of local pollution make their way to the front pages of national newspapers. But this new public concern for environmental protection rarely extends to long-term

global issues such as climate change and ozone depletion. Only the protection of biodiversity is a prominent political issue in India: biodiversity has crucial socioeconomic value for many low-income groups who are struggling against logging companies, miners or hydropower developers; it is valued, too, as part of the national heritage, for example regarding the protection of tigers; likewise, there is public debate on the country's policy on biotechnology, in particular with a view to the intellectual property rights enacted by OECD countries on seeds and products that have been derived from Indian flora and fauna (so-called "biopiracy"). However, this concern with biodiversity seems different from industrialized countries, because the Indian debate focuses on the domestic context and not—as in many industrialized countries—on biological diversity and forests in other countries. In India, conserving biodiversity is prominent as a national and local issue, less so as a global concern. Illustrative of the marginal attention to global problems is a recent study that compared the perception of global environmental issues in Britain and India, concluding that

in global terms, the north south divide is a harsh reality when trying to define environmental problems. Those in the northern developed world believe that most environmental problems occur elsewhere—in Eastern and developing countries. Those in the South regard climate change and ozone holes as difficulties the Northern nations face (Chapman 1997: 1; Chapman *et al.* 1997).

Most Indians surveyed by that study considered "development" as their core project and the debate on global environmental policy, brought up by the North, rather as new form of neo-colonialism. For most Indian voters, the global debate seemed "irrelevant and unintelligible" (Chapman 1997).⁷

Consequently, most of the roughly nine hundred larger environmentalist organizations in India work on local issues, from the plight of peasants affected by pesticides to urban problems caused by hazardous fumes from local industry (Jasanoff 1993). While Greenpeace International, for example, runs one of the most visible transnational campaigns on climate change and ozone depletion, its Indian branch focuses exclusively on local issues and devotes all its energies to toxic waste and pollution by the burgeoning shipwrecking industry in India (own interviews; Greenpeace 1998). Likewise, the World Wide Fund for Nature (WWF) India is concerned with purely national environmental issues, albeit including conservation of biological diversity as one its four focal areas. The marginalization of global environmental problems is mirrored in Indian politics, particularly in the lack of attention by parliament and political parties in the world's largest democracy with its enormous electorate of 605 million voters. Even though India's 654 political parties⁸ are far from homogeneous—federal states have been governed by communist parties for decades whilst others are controlled by right-wing parties with strong ethnic and religious agendas—hardly any divisive views on global environmental policy are traceable. All parties stress the importance of environmental protection, subjected though to the national consensus that industrialization, economic development and eradication of poverty are the most pressing problems India is faced with (own interviews). A few questions were raised in parliament during the UNCED preparations (Jakobsen 1998: 14), and there is also a consultative committee of parliament attached to the Ministry of Environment and Forests (MoEF) that may question its policy or raise issues that have been neglected by the ministry. In 1997/1998, 373 such questions on environmental issues were brought forward in Lok Sabha and Rajya Sabha by individual parliamentarians, yet largely related to vehicular and industrial pollution or deforestation (MoEF 1998: 143).⁹ Regarding climate change and ozone depletion, parliament seems rather as a forum for the MoEF to inform on foreign environmental policy than as a locus of deliberation, debate and decision-making (own interviews; also M. G. Rajan 1997: 16).

Lack of prominence on the national agenda also explains the approaches adopted by industry, which differ entirely from fellow associations in OECD countries (on the latter see, e.g., Levy and Rothenberg, forthcoming). The Federation of Indian Chambers of Commerce and Industry (FICCI), the International Chambers of Commerce India (ICC India), the Confederation of Indian Industry (CII), and the Associated Chambers of Commerce and Industry of India (ASSOCHAM) are all active on environmental policy, aiming both at sensitizing their constituencies to environmental issues and at influencing governmental legisla-

tion, which has already effected a number of policies painful to business interests, including shutdown or relocating of factories or enactment of costly regulations. Industry associations have set up expert committees on the environment, special officers have been assigned, workshops and seminars are regularly held, publications are disseminated and internet databases have been set up (own interviews; Jasanoff 1993). Industry associations also pursue their own environmental assessments, often for submission to expert advisory committees that are set up under MoEF to prepare new environmental legislation. These assessments largely draw upon expertise of member organizations, which employ experts specialized on the environmental aspects of the particular economic activity.

On global environmental problems, however, there are hardly any activities of industry due to the general marginalization of these issues. Climate change or ozone depletion are perceived as problems the government has to struggle with as a matter of foreign policy, not as something with much relevance for Indian industry in the near future. Quite different from industry organizations in OECD countries, no need is felt by Indian industry to lobby on these issues: it seems to be taken for granted that internationally, the Government of India will protect the interests of Indian industry under the “national economic development” paradigm, so that no resources need be spent in this negotiation arena (own interviews). There are two emerging incentives for industry to care for global environmental issues in the future, though. One is unilateral trade sanctions by the North that have affected Indian fisheries and textile manufacturers, have almost affected Indian producers of ozone-depleting substances, and are likely to be extended in the coming years. As a rule, industry does not need to lobby much since the “trade and environment” problematique is chiefly seen as North-South conflict in which the government is protecting industry’s export interests, with hardly any objections by Indian environmentalists. On the other hand, the power of Northern consumer demands will compel Indian industry in the future to better follow environmentalist discourses in the North. A second yet theoretical incentive for industry to pay more attention would be the concern of Indian industry for efficiency, which is seen as an important benefit of many local environmental programs, for example on waste reduction. There has already been an initiative by some former members of the US administration to organize seminars on joint implementation and the clean development mechanism with one industry association. This is taken into consideration somewhat benignly but clearly does not stem from any original policy decision by Indian industry (own interviews). However, since business representatives stress the efficiency argument in support of environmental policy, foreign-funded energy saving programs as part of global climate protection efforts may be viewed with more interest by Indian industry soon.

What role did international environmental information institutions play in public debate? It seems doubtful whether the relative low prominence of global environmental change for the Indian public would have been even lower *without* information institutions such as IPCC or GBA. Low prominence of global environmental issues appears here as both cause and effect. Parliamentarians for instance need not bother about global environmental problems such as climate change since neither voters nor media do; but then, international environmental information institutions remain ineffective in changing this low prominence because hardly anyone pays attention. Likewise, environmentalists remain focused on national and local issues. Although industry associations are on distribution lists of UNEP and other UN bodies and their environmental officers are aware of global environmental assessments, they do not pay much attention to these issues for lack of any incentive, because no legislation is pending and consumers do not care about corporate responses to global environmental problems. This holds for GBA, too, though for a different reason. Biodiversity *is* a national issue of concern, and different branches of industry, from agriculture to biotechnology, have a stake in this issue area, for example in the widely discussed case of the recent US patent on basmati rice. Still, GBA appears to be irrelevant since it does not contain much information that industry would need for its decision-making or its lobbying activities vis-à-vis the government’s foreign environmental policy (own interviews).

As a result, with neither broad public debate nor interference of party politics, India's global environmental policy is left to the bureaucracy, which might, in certain negotiation situations, be directed in line of general foreign policy preferences of the ruling parties.¹⁰ Symptomatic is the answer offered by the Indian Minister of Environment and Forests, S. P. Prabhu, during a talk delivered at a US university in 1998, when being asked how the content of his speech would change should his government fail (what it did six months later): The reply was that no matter who represented the Government of India, the speech on global environmental policy would always be the same.¹¹ Notwithstanding the colloquial joke intended by this remark, it still captures the perspective of most participants and observers: that the crucial decisions of Indian global environmental policy are taken by generalist bureaucrats, India's prestigious "steel frame", with little intervention of party politics and public debate.

The Indian government thus enjoys remarkable autonomy in its policies on climate change, ozone depletion, and, to a lesser degree, on the international negotiations on biodiversity (own interviews; M. G. Rajan 1997), to the effect that Indian policy-making on climate change struck one observer even as "elusive and at times non-existent" (Jakobsen 1998: 3). Debates and decisions remain restricted to a close circle of senior civil servants, mostly within MoEF, and of some experts drawn from major national research institutions and a few private research and lobbying institutes. This situation hardly differs from other developing countries such as Brazil, Indonesia or Kenya (J. Gupta 1995). While in the North, climate problems have been carried into foreign policy by domestic public pressure, in countries like Brazil, Indonesia, Kenya or India it is the foreign policy system that "ignited" the domestic assessment and decision-making.

The following section examines the effects of international environmental information institutions on the network of governmental bureaucrats and experts in India. For both groups, some influences of institutions can be observed. Because the expert community feeds into the governmental decision-making, I will first analyze how international institutions affected problem definition and perception within this expert community. Then, I will describe how assessments of and decisions on global environmental problems are undertaken within the Indian government, and how this has been influenced by international institutions.

EFFECTS OF INFORMATION INSTITUTIONS ON EXPERT COMMUNITIES IN INDIA

GLOBAL ENVIRONMENTAL CHANGE EXPERT COMMUNITIES IN INDIA

A major difference between industrialized and developing countries bearing on the influence of information institutions is the lack of Southern research capabilities directed at or available for global environmental problems. Financial and technological resources in developing countries are often too scarce to pursue cutting-edge research on global environmental issues or are used in other areas deemed as more important. Given the low prominence of global environmental change in the Indian domestic debate, many environmental scientists prefer to work on national and local pollution problems, which are seen as more urgent. Even those Indian experts who participate in international information institutions on global warming or biodiversity often view these efforts as "such a waste of time", the more so since political action is seen as the industrialized countries' responsibility anyway (own interviews). Why care for IPCC and global warming when on the doorstep of one's own institute citizens suffer from pesticide use or from polluted drinking water and when Delhi is listed as the world's fourth worst polluted city? Moreover, involvement in global environmental assessments does not seem particularly helpful for an academic career in India. Nei-

ther governmental funding agencies nor the institution's own governing bodies bestow much value and prestige on, for instance, lead authorship of their scientists in global research efforts (except for some highly connected private research institutes). This seems to differ from other countries such as the United States or Germany, where a scientist's reputation is usually enhanced by an invitation to participate in IPCC. Finally, lack of financial and technological resources reduces the preparedness for and interest in international networks such as IPCC. As a result, most research on climate change and ozone depletion is done in the North. It is this research, therefore, upon which international information institutions chiefly rely. While decision-makers in industrialized countries can claim, through their own assessment capabilities and the overwhelming participation of their own experts, a certain sense of ownership over the information produced in the institutions, for many actors in developing countries this information appears more or less as a product received from abroad.

As for the expert communities in India, there are essentially two types, the role of which converges at times but varies with regard to their legitimacy with decision-makers. First, there are a number of national research institutions, including the universities and publicly-financed institutes, many of which function under the umbrella of the Council for Scientific and Industrial Research. Of special importance are the six Indian Institutes of Technology, the Indian Institutes of Science, the National Physical Laboratories (NPL), the Indian Meteorological Department and the national Jawaharlal Nehru University (JNU) in Delhi. The Indira Gandhi Institute of Development Research (IGIDR), established in 1986 in Mumbai, is a hybrid between a privately funded policy research organization, and a national research institution with the rank of a university conferring Ph.D. and M.Phil. degrees. Its focus is interdisciplinary research on development, including its ecological aspects. Although IGIDR receives some funds from foreign donors, its main financial backing is a grant from the Reserve Bank of India.

Apart from national research institutions, there are a number of private research institutes in India, often active both in research and scientific assessment and in lobbying and some form of fieldwork. Following the general low prominence of global environmental change in India, only few institutes are active on climate change and ozone depletion. Major actors are the Centre for Science and Environment (CSE), based in New Delhi, which produces a number of reports on global environmental policy; the Tata Energy Research Institute (TERI) with approximately 450 professionals, established in 1974 with funds from Tata, the major industrial conglomerate in India; and Development Alternatives, established in 1983 as a research, development and consultancy organization with roughly 160 professional and support staff. These institutes chiefly assess various policy-relevant questions of global environmental change, less its natural science aspects; some also do research on applied technology. All provide synthesis reports on the state of environmental knowledge, though predominantly on national or local problems. They also distribute newsletters and journals, lobby national and international actors, and organize seminars and workshops which are attended by academics, senior civil servants and environmentalist groups. These activities make them important potential multipliers for information offered by international information institutions.¹²

The national research institutions have many characteristics in common. All are chiefly sustained by public funds transferred to them directly from governmental agencies, mainly MoEF and the Department of Science and Technology. This situation creates, on the one hand, a high degree of independence from foreign and international donor organizations and allows for a domestically oriented perspective and research program. Cooperation with abroad is small in comparison with private research institutes in India and research institutions in industrialized countries, and only little funding from foreign governments or foundations is being received, though efforts in this direction are increasingly being made (own interviews). The other side of the coin is that national research institutions depend on the government for their research funding. The problem is less that the ministerial bureaucracy deliberately influences the research agenda of the institutes, whose (self-)perception seems comparable to continental European notions of academic research as public service, with a governmental obligation to sustain its research institutions and the institutions' correspond-

ing right to pursue their own agenda based on scientific priorities. The problem with “national science” within India is rather, as noted by Shobhit Mahajan somewhat provocatively, “a scientific bureaucracy which is unaccountable to the people, [...] lack of basic infrastructure facilities [and] insensitivity of the scientific establishment to the genuine needs of the people” (Mahajan 1999: 17). Added to this comes the general lack of resources. IPCC-related work of highly qualified Indian scientists, for instance, seems at times to depend on the loan of a laptop computer or a small workstation from Northern colleagues, which are then used in a day-and-night shift system among researchers. Foreign direct funding for Indian public institutes and universities, however, needs previous government clearing. This subjects international cooperation with the leading public institutes in India to an often tedious bureaucratic process absorbing much of the lead scientists’ time (own interviews).

The private institutes, on the other hand, are well connected with foreign and international bodies and receive substantial project-related funds from foreign foundations, governments and international organizations. Extensive links with abroad also exist by membership in the non-governmental organizations’ Climate Action Network, as in the case of CSE and Development Alternatives, or by regional representations that TERI maintains in Germany, Russia and the United States. TERI’s Delhi headquarters also serve as secretariat of the Asian Energy Institute, a network of policy research institutes in Asia and affiliated organizations in other regions launched in 1989. TERI thus stands out in the degree of its “globalization”, i.e. its integration in Northern and “global” debates; visits to its internet web site doubled from 1997 to 1998 alone, half of the hits coming from the United States, and the institute feels “overwhelmed with requests from the developed countries for visits from researchers” (TERI 1998b). Though most of TERI’s staff is located in Delhi and is of Indian nationality, an Indian identity sometimes gives way to a self-perception as part of a “global research community” and of “global civil society”. Yet this can limit legitimacy and credibility with those experts and politicians who view themselves as more closely connected to Indian interests and to a distinct Southern perspective (own interviews).

PERCEPTION OF INFORMATION INSTITUTIONS WITHIN THE INDIAN EXPERT COMMUNITY

Indian experts, both at national research institutions and private research institutes, are aware of international assessments, and one would find the relevant reports available on bookshelves in offices and laboratories. Thus, information advanced by international institutions is certainly effective inasmuch as it “trickles down” to the expert communities “in the field”. Especially for experts at some private institutes who are active in policy research, IPCC (1996), GBA (1995) and the ozone assessments seem even to be the prime source of reference. A biodiversity researcher at TERI, for example, when confronted with a new issue area, would first refer to GBA to gain broad understanding of the problem. A volume on *Climate Change. Post-Kyoto Perspectives from the South*, edited by TERI, draws almost exclusively on IPCC for the natural science aspects, along with some journal articles of Northern authors who are themselves highly visible IPCC authors (e.g., TERI’s piece on “The science and economics of climate change” by S. Gupta and Kumar 1998).

Foreign national assessments, too, are available within the Indian research community (own interviews). Yet there seems to be a bent towards assessments conducted in the United States (by EPA, NAOO, etc.) and in the United Kingdom. This follows the general language- and education-based bias toward Anglo-Saxon literature inasmuch as Northern debates are largely perceived through the filter of United States and British media, which is little representative for heterogeneous continental European positions. At times, pro-Southern positions in the North may be overlooked by Indian experts. For example, the German Advisory Council on Global Change, which also publishes in English, supports the per capita approach for allo-

cating climate protection obligations (WBGU 1995b, 1997, 1998). This is in line both with the Indian government's stance in international climate diplomacy and with the predominant view of the Indian scientific community (own interviews; Jakobsen 1998: 8). However, these assessments from German experts in the field are little known in India (own interviews).

Credibility and Legitimacy

Being informed is a necessary but not sufficient condition for trust. How do Indian experts and scientists perceive the information offered by international information institutions? Is the information viewed as *credible* (i.e., authoritative and believable in its technical dimensions) and *legitimate* (i.e., as resulting from a fair and open process) (Clark 1999)? It seems that on balance, all Indian institutes, both private and public, seem fairly critical of the assessments, though their degree of criticism differs. For some, it is essentially “only science”, but this seems to be a minority view. Most Indian experts are wary of prejudices in the framing of assessments. Some watch IPCC, for example, with “great suspicion” and argue that IPCC is a “political-scientific” institution with little transparency and inherent Northern intellectual supremacy (own interviews). It is not surprising that extreme anti-Southern frames, such as the World Resources Institute's greenhouse gas ranking¹³ or the “value of life” debate within IPCC¹⁴, are reviewed with considerable disapproval, if not outrage, by many experts in the South.

The Indian perception of international information institutions is influenced, too, by the degree to which researchers of the South took part (“you want to find Southern names on the list”). However, there is little confidence in the prospect of single Southern experts altering an assessment's agenda, for “the entire conceptualization has been done in the North, and Southern experts are often mere observers” (own interviews). Some doubt therefore that increasing participation of Southern experts in the current IPCC third assessment cycle will result in proportional increases in Southern influence. To many Indian experts, the Northern viewpoint in IPCC and GBA seems “overwhelming” (own interviews). This is explained by financial dominance of industrialized countries, by quantitative preponderance of Northern experts, along with a relative lack of knowledgeable, eloquent and energetic Southern experts capable of structuring and determining the scientific agenda even in a minority position (a task for which Southern bureaucrats and generalist diplomats in IPCC plenary sessions are seldom best qualified).

Some Indian experts on social and economic aspects of climate change feel simply “outnumbered by the North”, since “when we write one paper, they write ten” (own interviews). Such perception extends to the international literature which international information institutions purport to review and to synthesize. Some Indian scientists felt that peer reviewers in the North “operated on an entirely different wave-length”, and it seems that Southern authors try at times to anticipate this “wave-length divergence” when submitting articles for a predominantly Northern audience (own interviews). Some Indian researchers also prefer publishing their research in Indian scientific journals, which are cheaper to contribute to than foreign periodicals (with author's subsidies as high as one hundred US dollars per page) and cheaper to buy, which warrants prompt and wide distribution of scientific findings within the Indian community. Though Indian scientists feel confident that their studies reach their Northern colleagues—for instance by mail circulation of photocopied articles and by personal contacts—this South-North communication link might still limit the knowledge of Southern findings in the North. It has been claimed, for example, that the international assessment community had “effectively ignored” the results of the Indian Methane Campaign (Kandlikar and Sagar 1999), although interviews conducted for this study were a bit less negative about the Methane Campaign's international reception (own interviews; supported also by Jakobsen 1998: 28).

Frequently, appraisal of global environmental assessments is related to the degree to which they support or neglect Indian and Southern interests. Albeit with different conclusions at times. The IPCC second assessment report of 1995 (IPCC 1996a, b and c), for example, is lauded by some, for it noted the higher vulner-

ability of developing countries to climate change, their foremost need of economic growth and the inevitable growth in their emissions. Yet others criticize the same assessment for its focus on mitigation—perceived as a Northern issue—versus adaptation and vulnerability, which are seen as chief Southern concerns regarding global warming (own interviews).

A somewhat critical perception of international information institutions extends even to natural scientists. For atmospheric scientists, though cooperation with Northern institutes is important and Northern climate models and data are accepted and used in India (if computing resources permit), yet some admit that in general, “one has to keep an eye on the numbers” (own interviews). Northern researchers are usually not suspected of deliberate biases, since “all [natural] scientists are fair” (own interviews). It is anticipated, though, that data from the North are easily misleading if merely extrapolated to the South.¹⁵ On the other hand, occasional linkages between Northern national interests and Northern science seem to be anticipated, too. It has not gone unnoticed, for example, that most industrialized countries have been changing the method for calculating their carbon dioxide sink capacity over the years, which results in overall “growth” of sink capacity of the major greenhouse gas emitters.

Taken together, the information offered by international environmental information institutions is widely known and in use among research institutions surveyed for this study. The assessments are seen as handy tools for quick reference and a broad generalist knowledge, which is particularly required in the donor-driven, project-based community of private research institutes in India. But international assessments are also taken with a grain of salt. When confronted with international or foreign environmental assessments, most researchers expect actual or potential Northern bias, without forgoing advantages of the scientific information compiled in the report.

Usefulness

How useful is the information offered by international institutions as perceived by Indian experts? Though it is difficult to generate a clear picture that accommodates researchers from institutions as different in background and perspective as TERI and IIT, it seems that there are at least three restrictions on usefulness.

First, many Indian experts feel that international information institutions and the international research community do not take sufficient account of the *particular situation and problems of developing countries*, which limits the usefulness of the information. A case in point is the handling of climate change impacts in the IPCC (1996a) assessment. In the Northern public discussion, sea-level rise by melting ice shelves and glaciers usually stands in the center of citizens’ concern, and the drafters of IPCC (1996a) separated sea-level rise from other climate change impacts by devoting an entire chapter to this question. Without doubt, this particular climate change impact is vitally important for many developing countries, too. Yet more crucial for roughly half of humanity is, for instance, the monsoon cycle. In southern and eastern Asia, most agrarian activity depends on the monsoon, and for lack of financial and technological resources no leeway exists to adjust farming practices should monsoon cycles change. For Indian experts, monsoon variability stands in the center of their concern and research, and to them, a separate IPCC chapter on the monsoon appears justified—some even argue that the IPCC, had it been more concerned with Southern interests, would have had to present “an entire volume on the monsoon” (own interviews). Pivotal for Indian researchers is also the vulnerability of their countries to global warming and possible strategies for abatement, again issues which are seen as having been poorly covered by IPCC until very recently,¹⁶ and for which foreign foundations and governments are seldom inclined to provide funds. Despite two decades of intensive world-wide climate research, information on climate change impacts and on feasibility of adaptation options is still scarce for developing countries, or it is based on extrapolation from experiences in the North that must be viewed with caution, given substantial economic, social, technological and cli-

matic differences between industrialized and developing countries (own interviews; Agrawala 1998b; Kandlikar and Sagar 1999; Pachauri 1998: 147; Ramakrishnan 1998; Sharma and Kumar 1998: 28).

Secondly, the usefulness of the information offered by international institutions appears restricted since it does not fully account for the *socioeconomic context of developing countries*; to some Indian experts, the “human dimension” is missing in several assessments. The GBA, in particular, is viewed as framed too strongly in the flora-and-fauna-protection paradigm, without paying sufficient attention to the situation of local people living in the centers of biodiversity in India, for “you cannot think about biodiversity without thinking about people” (own interviews). The GBA frames agriculture too much as mere production system and neglects local farmers and their traditional methods. It could be hypothesized that a Southern framing of a global biodiversity assessment would begin with the human person and analyze the biophysical world from this starting point¹⁷—since

[l]inking ecological and social processes is crucial for appreciating the relationship between biodiversity and ecosystem function and to utilize this relationship for human welfare through sustainable management of resources (Ramakrishnan 1996b: 124).

Further socioeconomic concerns of developing countries are, to name a few, technology transfer (though meanwhile being addressed by IPCC)¹⁸ and the technological independence of the South, intellectual property rights and Northern “biopiracy” (in the case of India, e.g. Northern patents on basmati rice and neem tree products), as well as the safety of genetically modified organisms transferred into developing countries (A. Gupta, forthcoming). Almost all experts in India claim that GBA and IPCC have neglected these issues (own interviews). Particularly GBA seems rather useless in this respect for experts who have to deal with questions such as the legal status of farmers and indigenous communities vis-à-vis their traditional knowledge and their local seed varieties as well as the debate on trade-related intellectual property rights and Northern patents on Southern knowledge and biological diversity. Regarding technology transfer, assessments such as GBA are easily set into an even broader political context, for example by linking the private command on technology—which is held sacrosanct by the North in environmental matters—with the political sanctions that are currently in place against India and Indian (nuclear) scientists and that restrict private command on technology in this issue area (own interviews).

GBA is also seen as oblivious of social, economic and environmental harm that the biotechnological revolution could cause in developing countries. Biotechnology promises a second Green Revolution with huge increases in production, but for many experts in India 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 from Northern corporations, from local wholesale traders to 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 each spring anew (“terminator genes”), this will tremendously influence social structures and local markets in countries such as India (Shiva 1997: 54). 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 currency as would importing biotechnology products from Northern multinational corporations. In this range of different perceptions, GBA does not help much for Southern user communities. In its chapter on biotechnology, which was drafted by ten Northern lead authors, it dismisses traditional practices as disadvantageous (GBA 1995: 689) without discussing the economic and social aspects emphasized by Southern critics (e.g., Shiva 1993: 10). “Indirect impacts” of biotechnology are briefly mentioned but hardly discussed, and merely with an interest in adverse impacts on biodiversity and not on humans. In three sentences in which GBA discusses “disadvantaged groups” (GBA 1995: 707), these are foremost viewed as threat of accelerated loss of biodiversity since the losers could feel compelled “to degrade their environment further”. Indian experts who are working in this area and struggling with problems of international and national benefit sharing or possible adverse impacts of biotechnology, will not find it useful to consult GBA.

A third limitation of the usefulness of international information institutions seems to be that they largely neglect questions of *international equity*, which is seen, however, as crucial by many Indian experts. Article 3, paragraph 1, of the climate convention (UNFCCC, 1992) mentions the need for “equity” as a principle of all climate policy, and the biodiversity convention (CBD, 1992) provides for the “equitable sharing of benefits” that may arise out of the utilization of genetic resources (see Biermann 1999b; Harris 1997). Yet what equity eventually means is a question that leaves room for much 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 (1996c) did include a chapter on equity, yet there was not much linkage of this chapter to the overall assessment design. In the third assessment cycle, a task group within working group III (on mitigation) has been set up to assess methodological aspects of “cross-cutting issues”, including equity (IPCC 1997).¹⁹ This may lead to a broader consideration of equity issues within the socioeconomic analysis of IPCC; yet it is noteworthy that the major recent conflict within the current IPCC assessment cycle centered on just this cross-cutting nature of equity.²⁰

Nor has equity received much attention in GBA. Equitable sharing of benefits derived from utilizing genetic resources has not been addressed in the GBA biotechnology chapter (authored by an exclusively Northern writing team), even though “fair and equitable sharing” of these benefits is one of the three objectives of the biodiversity convention, which GBA wishes to support (CBD 1992: article 1; Mugabe *et al.* 1996, 1997; Henne 1997a, b). The assessment offers only few lines on “moral/ethical debates” on biotechnology, suggesting among others that the claim of developing countries and the convention’s third objective were not ethical in a “conventional sense” and that ethical debates would “lead to delays and restrictions on the use of genetic resources” (GBA 1995: 707). For a Northern audience, questions of benefit sharing may not really fit into a chapter on new technologies because almost as a rule, technological innovation and progress benefit rich industrialized countries, both their citizens who can afford to purchase the new products and their corporations who have the financial means to pursue cutting-edge research or to buy patents and licenses. For developing countries the situation is different, and in ozone politics and climate politics as well as in biodiversity negotiations, technological dependence has been a major issue for the South.

Taken together, for the expert community in India the usefulness of international information institutions appears restricted for three main reasons: first, particular Southern concerns, such as monsoon variability or the specific vulnerability of developing countries, are viewed as insufficiently covered by the assessments; second, the socioeconomic context of developing countries is regarded as not fully reflected in the assessment; third, Southern concerns of equity in global environmental policy are seen as having been treated as an annex theme, not as something that deserves center stage in the deliberations.

RESPONSES BY THE EXPERT COMMUNITY TO INTERNATIONAL INFORMATION INSTITUTIONS

How does Southern science respond to reports compiled by international information institutions? Do international institutions make a difference to the domestic expert appraisal of global environmental change and the experts’ response in their own scientific work? Would Indian experts have acted differently without the information institutions on the global level?

In the case of biodiversity, GBA could not provide much new information to Indian experts since this field has a long tradition in India. India’s Botanical Survey (since 1890), Zoological Survey (since 1916), and Forest Survey (since 1981) all conduct regular expeditions and publish assessments of India’s biodiversity, having surveyed by now about 65 per cent of the country. India’s biodiversity is currently estimated to represent seven per cent of the world’s flora and 6.5 per cent of the world’s fauna, and is still “growing”: no

less than new five species and one new genus have been added to the existing inventory of biodiversity only in 1997, and “the list [of plant and animal species] is being constantly upgraded specifically in respect of lower plant and invertebrate animals” (MEA 1997: 63; MoEF 1998: 14-35). There is thus not much role GBA can play in the assessment of biodiversity, and these questions which are new and crucial for Indian experts, such as benefit sharing or intellectual property rights, are not covered by GBA. Any influence of GBA on Indian science is thus difficult to trace.

This differs from the international information institutions in the field of climate change and ozone depletion. Although the influence of institutions on the overall scientific community is small due to the general marginalization of these issues, assuming the counterfactual—how would Indian science have proceeded without the international institutions—there seem to be at least four distinct reactions of Indian science, i.e., institutional effects. These responses differ from reactions by Northern experts because Indian reactive science is determined by factors particular to developing countries, notably a prevailing lack of financial and technological resources and a shared perception that economic and development interests of India must be protected vis-à-vis a predominant Northern science and Northern political and economic power.

First, participation of Indian scientists in the international information institutions has led inevitably to some *capacity-building*, by increasing the information available to Indian scientists, by helping establish contacts among Northern and Indian scientists, and at times by the provision of financial and technological support to Indian scientists, such as computer work stations. For example, many researchers, in particular from government-funded national research institutions in India, do not possess the means to travel abroad and participate in international conferences and meetings unless international or foreign donors reimburse the costs. 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, albeit only to IPCC meetings and not to general professional gatherings. In the second IPCC assessment cycle, at least one developing country participant for each IPCC writing team meeting was to be financially supported (own interviews; Agrawala 1998b: 630). This capacity building is small but still makes a difference: without the international institution, communication between Southern and Northern scientists would be even less.

Secondly, Indian scientists responded to Northern assessments and international institutions sometimes with “*counter assessments*” meant to verify or refute data believed as having negative political consequences for India. Most widely known is CSE’s report on *Global Warming in an Unequal World. A Case of Environmental Colonialism* (Agarwal and Narain 1991), which was directly responding to an (albeit private) assessment by researchers from the United States.²¹ Another instance is the theory of stratospheric ozone depletion, which became more widespread and eventually led to international negotiations in the mid-1980s. India is one of the few developing countries capable of verifying data on stratospheric ozone, and indeed, the 1988 Indian Antarctic expedition conducted a series of experiments on the state of the stratospheric ozone layer, with the explicit aim of checking the data presented by Northern experts. Eventually Indian ozone researchers came up with cautious conclusions, claiming that the emerging ozone picture was not clear enough to warrant action by the government at that time (M. G. Rajan 1997: 60-61; Chatterjee 1995).

Another example for Indian reactive science is the Indian Methane Campaign (own interviews; Kandlikar and Sagar 1999). Methane is a major greenhouse gas, with sixty to eighty per cent of global emissions being caused by human activities (IPCC 1996). Developing countries account for a larger share of global methane emissions compared to global carbon dioxide emissions, because a substantial amount of methane is emitted by agrarian activities, notably animal husbandry and rice farming. India, for example, possesses, with 2.2 per cent of the land surface and 16 per cent of world population, about 18 per cent of the world stock of goats, 19 per cent of cattle and every second water buffalo on earth (Paulus 1993: 5). In 1990, the US Environmental Protection Agency (EPA 1990) published a study that suggested that India alone would account for more than one third of global methane emissions from rice paddies; a result that would, if not contested, certainly have influenced climate negotiations. On publication of this Northern assessment, In-

dian national research institutions launched their so far most focused global environmental assessment, the “Indian Methane Campaign”. More than fifty researchers from sixteen Indian institutions joined the “Campaign”; its result indicated that Indian methane emissions from rice paddies were roughly ten times less than EPA had suggested, and that global methane emissions were accordingly lower too. In the counterfactual analysis, without the EPA assessment, the Northern debate as well as IPCC, the Indian Methane Campaign would not have been undertaken. Interestingly, this (first) reactive assessment process has broadened into analyzing and assessing all greenhouse gases to provide the national communications to the conference of the parties required under article 12 of the climate convention—instigated again by an international institution, the convention itself. In a sense, the Northern debate has helped to increase communication and cooperation among Indian science on climate-related issues (own interviews; Kandlikar and Sagar 1999).

Thirdly, international information institutions have influenced Indian *research activities* by pointing out certain particular problems for India or by raising concern about certain issues. This effect of shaping research agendas by international institutions seems to be stronger in developing countries as compared to the OECD, since in the South, lack of resources places stricter constraints on researchers. In particular scientists at the national research institutions concentrate their work on issues which they perceive as particularly relevant for the national interest and that are not sufficiently covered by international information institutions. While most IPCC research addresses general climate modeling and mitigation options, Indian scientists have directed most of their scarce resources on assessing adverse effects of climate change on India. The Working Group on Environment for the Ninth Five-Year Plan (1997), for example, expressly included in their terms of reference the assessment of adverse impacts of climate change on India. To answer such research questions, Indian researchers need to rely on Northern science since computing systems available in India do not allow for modeling regional climate change and vulnerability. Hence direct contacts and exchange programs with Northern institutes are used to apply Northern models to forecast regional climate changes in India and other Asian countries, which will be incorporated into the third IPCC assessment cycle (own interviews). Other issues which feature high on the Northern agenda, notably sea-level rise, are covered less by Indian research, although a major government-driven assessment project has recently analyzed the effects of a rise in sea-levels in India by one meter (own interviews; see also Lal 1995).

This Indian climate impact research evolved partly out of traditional work on monsoon patterns, through which Indian scientists had developed some confidence in predicting the monsoon cycle. Partly instigated by the international climate debate and the international institutions in this field, Indian monsoon experts have become increasingly concerned that global warming could affect these regional weather patterns, thus threatening food security on the sub-continent. Consequently, a new line of research on climate change has been established in the system of national research institutions working on monsoon and regional climate variability. This is both an indigenous development within the Indian meteorologists’ community and a response to IPCC. Government-funded research institutions also analyze some other aspects of global warming that are poorly covered by IPCC or by the donor-driven assessments of private research institutes. The Centre for Global Change, for example, which has been set up within National Physical Laboratories in 1992, focuses on human dimensions of global change, notably impacts on health and food security (own interviews; Jakobsen 1998: 27).

Fourth, work particularly at private research institutes is being indirectly influenced by international information institutions through their being fully or partly *funded by foreign foundations, foreign governments or international organizations*. International organizations such as GEF, UNDP, World Bank or UNEP or foreign foundations are often closely linked with international information institutions, and IPCC or GBA play some role in policy-development within these international organizations. To the extent that domestic decisions are taken with a view to the availability of foreign funding, some impacts of international infor-

mation institutions on shaping the domestic debate can thus be assumed. It appears that the inflow of Northern money for environmental policy research and assessment increased significantly after 1992. As for TERI, for example, foreign project-funding increased from less than three million Indian rupees (1987) to roughly hundred million rupees in 1997/1998, a tenfold increase when adjusted to the US dollar exchange value. Although in 1987, TERI's domestic funding exceeded foreign contributions, by now project funding from abroad is twice as much as funds received from within India (TERI 1998b: 102).

Because the initiative for projects is usually taken by Indian counterparts, the *direct* impact of foreign funding on details of the Indian (private) research and assessment agenda appears limited and it often not seen as such, in particular when donors' interests and the institute's agenda converge. On the other hand, issues that are not financed cannot be analyzed for lack of resources, since private organizations "have to earn money" and "any assessment must be financially viable" (own interviews). It is also viewed with concern and displeasure at times that Northern funds chiefly address the mitigation of climate change in India and other developing countries but rarely the assessment of vulnerability and of feasible adaptation strategies in the South. The "Asia Least-cost Greenhouse Gas Abatement Strategy" (ALGAS) project for example, which is executed by TERI and NPL and funded by UNDP, GEF and the Asian Development Bank, assesses exclusively the least-cost *mitigation* options in India and some other Asian countries but not feasible strategies or technologies for adaptation (own interviews; MoEF 1998: 97). Foreign funding is also a major driving force behind current research within India on market-based mechanisms in climate policy (own interviews); one expert rightly observed that it was "remarkable how much research is actually focused on AIJ [activities implemented jointly], least-cost mitigation and tradable permits in a country where the government has been strongly opposing such instruments in international negotiations" (Jakobsen 1998: 39). In a sense, many Southern researchers feel their hierarchy of assessment needs and interests being distorted by the need to raise money from Northern governments and foundations (own interviews).

Taken together, research on climate change and ozone depletion within the Indian expert community is small compared to research in industrialized countries. This follows both from the general lack of research capacity and the lack of prominence of these issues in India. However, there are four distinct effects of international environmental information institutions on the Indian expert communities: research capacities have been strengthened through some transfer of financial and technological resources and through funding of participation of Indian experts for assessment-related meetings; some "counter-research programs" have been undertaken; institutions helped raise concern on some issues and influenced the research agenda within India; and some research has been pursued which was linked to the priorities of Northern donors that again were influenced by information institutions. All these effects are not likely to be observed for industrialized countries, since capacities are stronger and own interests are better represented within international institutions so that "counter-research", "gap-filling" and "donor-oriented research" seem less necessary.

EFFECTS OF INFORMATION INSTITUTIONS ON DECISION-MAKING IN INDIA

ENVIRONMENTAL POLICY-MAKING AND ASSESSMENT IN INDIA

The *Arthashastra*, India's ancient textbook on "good governance" written roughly 2300 years ago, mentioned a superintendent for the care of forests and advised governments to regulate forest clearance by appointing special guards to prevent damage. This scholarly counsel was observed by Asoka, king of the

Mauryan empire, who legislated in the third century BC that “Forests must not be burned to kill living things or without any good reason” (Thapar 1997). Little is known about how Asoka organized the advice sought from his councilors, but it may be presumed with some confidence that he too availed himself of institutionalized learned assessment from his well-organized cadre of superintendents (Ramachandran 1996: 3-9).

Within the government of modern India, global environmental problems fall under the competence of the Ministry of Environment and Forests (MoEF). This ministry is assisted and consulted, depending on the problem, by the Ministries of Agriculture, Coal, Finance, Industry, Non-conventional Energy Sources, Science and Technology and, in particular, by the Ministry of External Affairs (MEA) when multilateral negotiations are involved. The cabinet and Prime Minister are generally briefed only shortly before major conferences. Within MoEF, senior positions are usually filled by members of the élitist Indian Administrative Service (IAS), a cadre of civil servants selected by a rigorous concourse system who are mostly generalists on short-term assignments without specific training or professional background in environmental policy. Once these generalists have acquired detailed knowledge about global environmental issues and negotiating strategies of other countries, they are often transferred to other departments or ministries—an administrative procedure which is viewed by some experts from outside the government as serious obstacle to efficacious policy. It also might effect, as has been suggested by some observers, a lack of genuine interest in global environmental change within the government, complemented at times by bureaucratism and lack of expertise (own interviews). It is only on lower levels of the MoEF hierarchy that specialists in environmental policy are employed. These are often consulted belatedly and, as M. G. Rajan argues based on interviews within MoEF, “tend to be very cautious, and usually recommend further studies” (M. G. Rajan 1997: 21). MEA has no environmental expertise of its own and is in this respect entirely dependent on the MoEF.

No general institutionalized procedure exists within the government to organize the scientific assessment of global environmental problems. There is neither an autonomous body comparable to an environmental protection agency,²² nor are there general environmental advisory committees comparable to the US President’s Committee of Advisors on Science and Technology or the German Advisory Council on Global Change, nor are there parliamentarian-cum-science assessment procedures comparable to German Enquete Commissions. Instead, the typical procedure is initiating assessment processes that are issue-specific and problem-driven and institutionalized as *ad hoc* expert advisory committees under MoEF. This problem-driven approach results in written documents such as outlines or drafts of legislation, but not in comprehensive scientific assessments of the problem which are published and distributed to the public. Environmentalist groups and experts are consulted but again, on an *ad hoc* and need-driven basis, and the bureaucracy enjoys full discretion over when and which representatives from the science and activists’ communities it wishes to consult. In addition, MoEF, categorized in India as “scientific ministry”, can avail itself of its own research unit, or commission research studies to national research institutions or private institutes.

These *ad hoc* expert advisory committees, and environmental assessment processes in general, are often made necessary by and closely linked to drafting of governmental legislation and upcoming international negotiations. The initiative is in most cases with the government, notwithstanding influences from outside through informal channels that are difficult to monitor but seem to play a major role in Indian politics (own interviews; Jakobsen 1998). MoEF will frequently summon selected experts to a meeting shortly before international negotiations. Every representative “has a chance to speak, and MoEF sums up” (own interviews; Jakobsen 1998: 15). In more important cases, MoEF would ask individuals from research institutions to advise *in personam* on the question. IPCC working group drafts, too, are distributed to members of these committees, who are asked to comment on the validity of drafts based on their expertise and perspective (own interviews). There is rarely direct coordination of the comments of the various private and public

research entities, and at times the experts do not know the position of their colleagues, apart from oral presentations at committee meetings.

A first instance—and typical example—of problem-driven assessments instigated by international negotiations, was the Indian reaction to the 1972 Stockholm Conference on the Human Environment. Preparations for this meeting sparked off three different assessment processes in India, on environmental degradation and its control, on problems caused by human settlements, and on rational management of natural resources. These separate processes were conducted under the auspices of an *ad hoc* Committee on the Human Environment, which had been established especially for the 1972 conference, and were then synthesized into the national communication of India to the conference. It seems unlikely that the government would have initiated these assessments without the need of responding to the Stockholm meeting. It was thus the institution-building within the United Nations that sparked off the first institutionalization of environmental policy within the Government of India: the National Committee on Environment Planning and Co-ordination that was set up in 1972 later evolved into the Department of Environment in 1980 and finally into the MoEF in 1985 (own interviews; Meachinkara 1998: chapter III).

What role do international environmental information institutions play in these governmental assessment processes? Are there any direct effects on governmental decision-making in India? A cloudy picture emerged from the interviews. While it has been stated at times that the government would take global environmental assessments, such as IPCC which was peer-reviewed by two thousand experts, “as the gospel” (own interviews), other statements point in the opposite direction. Indirect evidence is, however, that MoEF as a rule consults the Indian scientific community when confronted with foreign assessments or when preparing for negotiations. In these internal *ad hoc* assessment processes, the Indian government seems to place significant weight on the views of the Indian experts, in particular those from national research institutions. If international assessments and the view of Indian national research institutions differed, the government would most likely lend more credibility to Indian institutions (own interviews). What happens when opinions of the Indian experts themselves differ, however, is extremely difficult to say and may not be generalizable. It seems that substantial weight is placed on the comments of national research institutions, that is, those bodies which are chiefly funded by the government and maintain close links with the governmental bureaucracy (though in such highly sensitive matters the picture remains quite naturally opaque and contradictory).

Exceptional is the role of the Supreme Court of India (and the High Courts at the state level), a quite distinctive feature of the Indian political system both generally and in environmental politics (Ramachandran 1996: 109-118). Because gross environmental pollution is construed under Indian constitutional law as a violation of citizens’ fundamental rights, environmental pollution can under certain circumstances be directly taken to the Supreme Court without the lengthy and costly road over district and state courts. Public interest litigation groups have frequently taken advantage of this opportunity and have challenged governmental environmental policies directly before the Supreme Court. The Court’s constitutional power is remarkable: among others, it may issue Interim Orders without detailed explanation, to the effect, for example, that some polluting plants in Agra had to be shut down immediately or that in Delhi cars older than 15 years had to be banned—an interim order which might have affected roughly 40,000 inhabitants of the world’s fourth most polluted city (own interviews).

Because most environmental cases can be decided only based on some scientific evidence, the Supreme Court usually orders the establishment of an *ad hoc* committee to advise on the science underlying the legal case. The experts for these committees are selected by the Court, with neither formalized rules nor a roster of which experts may be chosen. Instead, the Court appoints committee members in an *ad hoc* manner depending on the problems raised by the case, whereby some are suggested by the government (which is respondent under public interest litigation), some by the plaintiff (frequently public groups that have brought the case before the Court), and some experts are chosen by the Court on its own initiative. Apparently, the

Court relies heavily on recommendations issued by these expert committees, which gives scientific knowledge represented there a remarkable influence on Indian environmental policy, with the power to override governmental policies. It seems common among advocates in India, as in any other country, to use all information supporting their case. Thus, global environmental assessment reports, found in libraries, internet web sites or recommended by experts asked for advice, also easily enter the courtroom of the highest Indian tribunal, such as the ozone assessments (discussed below). The Supreme Court seems inclined to bestow substantial weight on international assessments, especially compared to information presented by the affected industry or by the government, since here vested interests are all too obvious (own interviews).

The question of the effects of information institutions on policy-making in India will be explored in the following in more detail, starting with the policy on stratospheric ozone depletion, followed by the policy on climate change and on the protection of biological diversity.

INDIA'S POLICY ON THE PROTECTION OF THE OZONE LAYER

Policy Development

The response to the problem of stratospheric ozone depletion is often seen as major success story in international environmental relations, and it has been analyzed by numerous writers (e.g., Benedick 1998; Gehring 1994; Kindt and Menefee 1989; Parson 1993). Major political steps were the negotiation of the 1985 Vienna Convention on the Protection of the Ozone Layer, its 1987 Montreal Protocol and a number of subsequent amendments and adjustments. As for North-South relations, the crucial event was the 1990 London amendment, in which industrialized countries guaranteed developing countries reimbursement of their full incremental costs if they joined the regime and complied with its provisions (Biermann 1997, 1998).

The Indian government acted by and large in line with most other developing countries, and often, together with China, as an opinion leader for the rest. As many other developing countries, India did not participate in the 1985 Vienna conference, when the framework treaty was signed, and sent only observers but no formal delegation to the 1987 Montreal meeting. The general consensus among Indian decision-makers was that this problem was something only industrialized countries ought to be concerned with, and Indian diplomats suggested informally that ozone depletion was “a problem of the rich” requiring “a solution by the rich” (Benedick 1998: 101). The economic stakes associated with CFC use were perceived as high. India had, in 1987, the second highest prognosticated growth in CFC use in the developing world (exceeded only by China). One study estimated that from 1980 to 2000, India's production of household refrigerators would rise by 102 to 313 per cent, of air conditioning systems by 94 to 334 per cent and of propulsion gases by 218 to 266 per cent (Kohler, Haaga and Camm 1987). With significant CFC production sites in their own country, Indian decision-makers seemed much more concerned with the economic costs of CFC regulation than with ozone depletion. To many observers in the North, India's position appeared as overly pro-business oriented. When in 1987 industrialized countries—together with a few developing countries—agreed on trade restrictions against non-parties in article 4 of the Montreal Protocol, India announced that it would provide CFC to all developing countries that needed them, in case the North would eventually end CFC trade with developing countries (Williams 1993: 22).

After the 1990 London amendment, India acceded on 18 March 1991 to the Vienna convention and on 19 June 1992 to the Montreal protocol as amended in London (it has not yet accepted the Copenhagen amendment). India has extended its CFC consumption over the years, as have most other developing countries (Oberthür 1997). This increase, however, is in line with the 1987 Montreal protocol, which granted developing countries a so-called “grace period” of ten years in their compliance with the regime. India's program for phasing out ozone-depleting substances appears well underway, with more than half of the

1996 CFC consumption now covered by conversion projects. It is expected that India will meet its obligation of stabilizing CFC consumption by July 1999 (details in MoEF 1998: 139; MoEF 1999: 48-50; Chatterjee 1999b).

Yet it remains the firm official position of the Government of India that the problem of stratospheric ozone depletion must be dealt with by the international community and particularly by the industrialized countries. Therefore, in its most recent environmental program, protection of the ozone layer appears only in the chapter on “International Co-operation”, not as part of the national program activities such as pollution control or preservation of natural resources (MoEF 1998). This defines the government’s perspective on the ozone problem most clearly.

Influences of International Environmental Information Institutions

Given this policy development over roughly a decade, what difference did international environmental information institutions make? Would India’s policy have been different without the institutions? On balance, it appears unlikely that India would have pursued its CFC phase-out program without the international debate and international negotiations on this issue (and without financial reimbursement). Therefore, to the extent that international information institutions affected the international negotiations in Montreal 1987, London 1990 or Copenhagen 1992, these institutions did have some influence.

Within India, it does not seem that public debate has much changed due to the influence of the international information institutions. In the late eighties, there was only little attention being paid to the ozone issue in India, which is mirrored in the general lack of policy formulation within MoEF vis-à-vis the ozone issue that was almost entirely advanced by the North. The Indian bureaucracy was seemingly taken by surprise in 1987 when legally binding reduction quotas were agreed by some nations. This lack of pressure from within India is partly due to lack of information and research on this issue, but even more due to the perception that the problem has been caused by industrialized countries, that most CFC uses are crucial for economic development and that developing countries should not act at all, at least not until global per capita emission levels had converged to some extent.

Given such low issue prominence, an *ad hoc* expert advisory committee—the typical MoEF procedure—was not constituted in 1985 or 1987, but only in 1989.²³ However, MoEF solicited some informal advice from Indian experts, primarily from its own national research institutions, which indicates that the international ozone assessments were not taken at face value. India’s scientific community, it seems, cautioned the government not to take premature and costly actions, thus contradicting the view propagated by international assessments (own interviews; M. G. Rajan 1997: 60-61). For example, three years after adoption of the 1987 Montreal Protocol and two years after an Indian expedition to Antarctica, the National Physical Laboratory cautioned in its Ozone Layer Study Plan that the

whole picture of ozone which emerges [...] is not very clear and has many missing links [...] one requires large amount of data both for ozone as well as other related geophysical parameters [...] It may then be possible with proper inputs to foresee through theoretical predictions, the extent of ozone destruction and necessary corrective steps that can be taken.²⁴

Yet there was apparently some disagreement within the scientific community, too. M. G. Rajan suggests, based on an interview with a former senior consultant of MoEF, that the junior scientists were indeed concerned about the effects of ozone depletion, but these concerns were played down by more senior scientists who were not prepared to assume responsibility for the diversion of scarce public research funds to the ozone issue. Not different from industrialized countries, the Indian assessment seemed less focused on the global problem as such than on its direct impacts on India: the ozone content above India has always been

low, and skin cancer was at times dismissed as a “white man’s problem”.²⁵ The message the government first received was to wait and let the issue be further studied.²⁶

Since the reports of Indian scientists were cautious and the environmentalist movement did not care much about the issue, the MoEF bureaucrats fully supported the demands of Indian business representatives during 1987 to 1989 who emphasized the forecast growth of CFC demand in India, past domestic production increases and not least the considerable opportunities for export. India had bought CFC technologies from US enterprises shortly before 1987, had four manufacturing plants in 1989 (Benedick 1998: 101) and—for want of sufficient domestic markets—depended on the export of CFC. By and large, the agenda was therefore dominated not by environmental concern that could have been created or strengthened by international information institutions, but rather by expected economic losses due to an international ozone regime dominated by the North: notably losses by the devaluation of indigenous CFC technology through global CFC phase-out, losses of export market shares due to the global introduction of substitutes (by Northern corporations), increasing dependency on Northern technology in refrigeration, air-conditioning and other sectors, and the threat of economic losses by trade restrictions enacted under article 4 of the Montreal Protocol (Benedick 1998; Biermann 1998; M. G. Rajan 1997: 60-61).

Most of the small public debate that emerged on the issue in the late eighties centered on this perceived structural inequality in the 1987 Montreal Protocol, not on the environmental problem as such. The widely read journal *South*, for example, published an editorial under the title “The Hole in the Ozone Logic” (April 1989). At that time it appeared not entirely unlikely that India and China would simply abstain from the regime if their equity demands—in particular full financial reimbursement and technology transfer—were not met (Benedick 1998: 101). Taken together, it seems difficult to imagine how this internal policy process could have been different without international information institutions. At least before 1990, their direct influence on the Indian decision-making system appears negligible.

After the 1990 London amendment, India’s policy on ozone depletion changed, but this was primarily motivated again by economic concerns, that is, by the establishment of the Multilateral Fund for the Implementation of the Montreal Protocol that reimburses the incremental costs of developing countries (Biermann 1997); secondly by changing market demands that turned CFCs into yesterday’s technology; and, third, by increasing international pressure including the threat of trade sanctions under article 4 of the Protocol. Increasing scientific certainty about the seriousness of the environmental problem no doubt played some role in this development after 1990 (own interviews), which indicates some direct effects of international information institutions, but still ozone depletion is conceptualized by the government as a matter of “international cooperation”, not of endogenous environmental concern within India.

There is one exception to this general low influence of the international information institutions. In 1994, a law professor at the University of Delhi sued the Government of India in the Supreme Court claiming that efforts to protect the stratospheric ozone layer were insufficient and that funds donated for that purpose by international agencies had been used too slowly and inefficiently, to the effect that citizens’ fundamental right of life under article 21 of the constitution²⁷ was violated and even “merciless tortured, twisted and infringed”. It was requested that the Court order the Government of India to enact further programs and measures. The Supreme Court accepted this legal claim that fundamental rights were impaired, and initiated hearings in which evidence pro and contra the plaintiffs’ plea was heard, including statistics and data contained in UN documents and information packages. The government, respondent in this case under public interest litigation, argued in its defense, among others,²⁸ that the UNEP assessments would prove that stronger action by India would have only marginal effect on the ozone layer, since the industrialized countries were the major producers and consumers of ozone-depleting substances. Therefore, action by the Government of India could not limit the harm to Indian citizens (for example, eye cataracts which already account for roughly 16 million cases of blindness in India) and to humankind, both of which was claimed by the petitioner. The Court deemed the UN information generally credible and sufficient, but did not accept

the defense that action was to be taken primarily by industrialized countries. The government was ordered, in essence, to show less “complacency” and to take immediate further action. Some time later, the government came up with a detailed compliance report, and the case was settled (Supreme Court 1994; own interviews).

Of course, the Supreme Court cannot directly enact or implement detailed environmental legislation. Still, the general high respect for the Court, media coverage and the legal requirement for the government to respond with compliance reports constitutes a significant pressure on the bureaucracy and the ruling parties that cannot easily be dismissed in the world’s largest democracy. It is therefore noteworthy that the Court seems prepared to accept global environmental assessments as evidence, and though no cases similar to the ozone case have been brought before the Court as of yet, this might change when climate change and other issues gain prominence on the agenda. The courtroom may turn into an arena where information institutions have their most crucial direct impact on Indian politics.

INDIA’S POLICY ON THE PROTECTION OF THE CLIMATE

Policy Development

The main steps of climate policy were the agreement on the United Nations Framework Convention on Climate Change in 1992, which became binding law in 1994, and the adoption of its Kyoto Protocol in 1997, which has not yet entered into force. India’s policy on climate differs from the policy on ozone, since the government participated in climate negotiations from the very beginning, motivated in part by the experience of ozone diplomacy that had illustrated how fast entire industrial sectors could be affected by the environmental debate in the North. India’s negotiation strategy during the climate negotiations was, in a nutshell, to ensure that the principle of “common but differentiated responsibilities” was honored and extensively implemented. This principle called for differentiating duties between North and South and guaranteeing that the North will reimburse the full incremental costs incurred by the South in (future) emission reduction programs.

By and large, India and other developing countries have been fairly successful in meeting these objectives in negotiations so far (Biermann 1998). India’s ratification of the climate convention in November 1993 did not oblige the country to reducing its emissions, though it may be argued that some mitigation programs are required under article 4 paragraph 1 of the convention. The Government of India has taken the stand, however, that no climate policy needs to be pursued, and no legislation is planned. Officially, the issue is treated as part of MoEF’s Environmental Research Programme. While MoEF created a separate Ozone Cell for coordinating CFC phase-out, no such entity has yet been set-up for mitigating climate change (own interviews). Nevertheless, some climate-change related programs are underway. TERI and NPL have been entrusted by MoEF with preparing inventories of sources and sinks of Indian greenhouse gas emissions, as required by the convention. This project shall also analyze mitigation options and outline feasible least-cost abatement strategies (MoEF 1998: 96-98). An advisory group for GEF-funded projects has been set up to explore possible activities in India (own interviews; see also MoEF 1999: 40). Moreover, though not primarily motivated by climate concerns, India has increased its capacity of windfarms from 1993-1997 by the factor 18, almost doubled the number of solar cookers, and extended the use of biomass power and other renewable energies.²⁹

Influences of International Environmental Information Institutions

As in the ozone case, India's policies on climate, such as the work on the national inventory, have mostly been motivated by outside pressure, that is, by the international bargaining situation. Because this again has partly been influenced by IPCC, mainly through its influence on important industrialized countries, India was indirectly affected by international information institutions. Without the international negotiations, the climate issue would most likely have been even less prominent in India. As in the ozone case, the low prominence is caused partly by lack of information and research capacity on this issue, but as well by the perception that global warming has been caused by the North and that growth in carbon dioxide emissions is a *sine qua non* for economic development and poverty eradication in countries such as India.

Apart from these indirect effects, IPCC has had some direct effects on the research priorities within the Indian expert communities: As discussed earlier, it redirected research efforts to areas such as monsoon or sea-level rise, it fostered some counter-research such as the Indian Methane Campaign, and through the link to international organizations and Northern donor bodies, it influenced the research activities at some private institutes, who invested considerable efforts, for example, on mitigation options in India or on the pros and cons of market-based approaches which are hardly in line with India's official policy. Would Indian policy have been different without IPCC (and without consideration of the indirect effects on the international level)? As in ozone policy, the government seems to rely rather on advice from Indian experts than on IPCC reports.

This is indicated, first, by the government's response when the climate issue was pushed on the agenda by industrialized countries in the 1980s. MoEF reacted by initiating, in 1989, an *ad hoc* national assessment process and established an Expert Advisory Committee on Global Environmental Issues to "advise the Government on all aspects related to global warming and depletion of the ozone layer in the Indian, regional and global context".³⁰ However, it seems that informal person-to-person exchange of views and information dominated the policy deliberations within MoEF before 1992, and the expert advisory committee became defunct (Jakobsen 1998: 14, 27). In the preparations for the third conference of the parties to UNFCCC, the government again created a number of new *ad hoc* commissions: a Working Group of Experts on Climate Change under MoEF; a Task Force to evaluate the pilot phase of Activities Implemented Jointly, chaired by the Secretary to the Government of India, MoEF; an Expert Advisory Committee on Research in Global Environment Issues; and a Core Group to Deal with the Problem of Global Warming/Climate Change under the national Planning Commission³¹ (own interviews; Chatterjee 1999b). All these expert advisory committees comprise of civil servants and half a dozen experts from universities and research institutes, all are need-driven and *ad hoc* with sometimes overlapping membership, and all are seemingly one-way affairs—the government invites statements, comments and reports on specific questions or general views from outside, which are converged into a policy position without much response or information given to members of the committee or the public.

Second, the Government of India's lack of trust in international information institutions is indicated by its fervent support for increased participation of developing country experts in IPCC, as well as the refusal to accept IPCC as the forum for climate negotiations before 1992. As other developing countries, India raised at this time fundamental objections to the entire IPCC process and supported the disqualification of the 1990 IPCC report by inserting in the preface that this reflected the technical assessment of experts rather than government positions, particularly those governments that could not participate in all IPCC working groups (see also Agrawala 1998b; Jung, forthcoming). The Southern position was seemingly accepted by leading Northern experts; Bert Bolin, for example, opined in 1991 that "many countries, especially developing countries, simply do not trust assessments in which their scientists and policymakers have not participated. Don't you think global credibility demands global representation?" (cited in Agrawala 1998b: 628).

Nonetheless, even though the government relied largely on advice from Indian scientists, IPCC still had an effect through its influence on the Indian expert community. Some Northern reports had led already, in 1982, to the first warning about climate change in India. CSE's *First Citizen's Report* stated that "the nations of the world ought to move towards an agreement on the control of carbon dioxide emissions. An International Law of the Air, like the International Law of the Seas, is clearly needed" (CSE 1982: 90), without missing the point that this international action is chiefly to be taken by the North. Likewise, the 1989 *Tata International Conference on Global Warming and Climate Change—Perspectives from Developing Countries* in Delhi was influenced by the international scientific debate at that time (Tata Conference Statement 1989). The later IPCC reports, together with additional Northern research findings, influenced Indian scientists to redirect their work to certain areas and to become more concerned, in particular, with possible changes in monsoon patterns. Though the monsoon research is rather an endogenous development within the Indian community, yet it appears that without the Northern debate and IPCC the Indian concern about monsoon would have occurred later and maybe in different form. Eventually, this concern about the monsoon might have led to increased concern within the governmental bureaucracy. This has not been followed, however, by any concrete action because the responsibility question—that industrialized countries are prime cause and cure of the problem—has not been affected. Apparently, almost all actors in India agree that the country shall undertake no commitments in the foreseeable future, at least not until per capita emissions converged somewhat.

Indian experts quite often advise their government therefore in a way which is contradictory to the general themes advanced by international information institutions. CSE's 1991 report *Global Warming in an Unequal World* (Agarwal and Narain 1991), for example, strongly influenced governmental policy by refuting in particular the World Resources Institute assessment which ranked India as the world's fifth largest greenhouse gas emitter. Private expert advice was crucial, too, for the elaboration of the principle of "equal per capita emissions", which has been adopted by the Government of India as its negotiation platform. Likewise, private Indian institutes brought the dichotomy of "survival" versus "luxury" emissions to the attention of MoEF, contrary to the simple category of "anthropogenic" emissions advanced by the Northern dominated IPCC, which indicates a limited effect of international institutions in this respect. The Government of India has used the concept of "survival emissions" in negotiations, recently supported by China; yet without pressing for the concept's use in the 1995 IPCC reports (own interviews). In a world without international information institutions, these private institutes would have cared less about the problem of climate change. However, this concern of experts does not lead to the call that India itself should act. Instead, Indian experts generally reject any commitments for India, quite different from environmentalists in the North which are usually lobbying their governments to adopt *more stringent* legislation and programs.

Even so, it is remarkable that at least one international workshop on "voluntary commitments of developing countries" was held by an internationally well-connected private institute in Delhi in 1998, although apparently boycotted by governmental officials who had first accepted their invitation but then seemed afraid that participation in such a workshop might be misunderstood (own interviews). Similarly, it is interesting how much research and debate in India focuses on whether the country should accept market-based mechanisms through which industrialized countries could fulfill some of their climate obligations by (cheaper) projects in the South. This debate is understood by some observers as being heavily influenced by the influx of research money from the North which is, in a sense, "fueling" the debate by commissioning studies on the pros and cons of market-based mechanisms, such as joint implementation, emissions trading or the clean development mechanism. One institute is being judged, in private conversation, even as the "Voice of America", a sobriquet rather unhelpful in India's political establishment (own interviews). Albeit, those experts in favor of the clean development mechanism or emissions trading have been unsuccessful at persuading the ministerial bureaucracy of this idea.³²

Taken together, IPCC did raise concern with experts and then with governmental bureaucrats, but this has had so far no discernible effect on the policy that the government actually pursues. Given that the prime responsibility for climate change is seen to lie with the North, the Government of India did its best to prevent any obligations for developing countries and to secure instead financial and technological transfer from the North.

INDIA'S POLICY ON THE PROTECTION OF BIOLOGICAL DIVERSITY

Policy Development

The protection of biodiversity differs from climate change and ozone layer depletion. First, biodiversity protection has a long history in India, with legislation dating back to the Indian Forest Act of 1865. Biodiversity is considered one of the chief responsibilities of MoEF. The ministry has initiated, among others, a new National Forest Policy in 1988, a National Conservation Strategy and Policy Statement in 1992 and a scheme on Biodiversity Conservation in 1991, all before the Global Biodiversity Assessment was begun. The need to preserve natural resources and the country's rich biological diversity is also widely accepted by the public, notwithstanding usual friction between the government and some (mostly poor and rural) citizens who are directly affected by, and at times feel not at ease with, conservation programs for predators like the Indian tiger.

Likewise, the national Environment Action Programme, drawn up after UNCED, gives much weight to conserving and using biodiversity and to afforestation (MoEF 1993). On 18 February 1994, India also ratified the biodiversity convention. A new Biodiversity Legislation to implement this convention and a draft National Action Plan on Biodiversity are now under discussion (own interviews; MoEF 1998: 41-42) and were even the subject of a complaint before the Supreme Court (contrary to the ozone case without any discernible influence of GBA).³³ This political activity is accompanied by several assessment processes, as usual in India rather need-driven and *ad hoc* than in permanent institutionalized form.³⁴ A legal draft document of a Biodiversity Legislation was released by MoEF on 27 October 1997, is now again under consideration within the governmental bureaucracy and will soon be submitted to parliament. It is felt by some experts that their imprint on this final draft was considerable, primarily regarding involvement of local communities and numerous technical questions, such as the precise definition of biodiversity and other concepts (own interviews; MoEF 1998: 41-43, 48; Kothari 1999; Meachinkara 1998).

There are certainly deficiencies in the effectiveness of India's policy on biodiversity, evidenced, for example, by the latest forests assessment, which showed that the country lost 5,482 sq. km of forest cover from 1995 to 1997 alone. Nonetheless, MoEF views biodiversity protection clearly as part of its actual policy, while classifying ozone layer protection as a matter of "international cooperation" and climate change as part of its general research activities.

Influences of International Environmental Information Institutions

The overall impact of GBA is difficult to trace. GBA is almost never mentioned in interviews or informal discussions, and it is fair to assume that it was not of much use for Indian experts or the Indian government. India's biodiversity is documented in various reports compiled by Indian agencies and published under MoEF auspices, and the gaps in knowledge that undoubtedly exist have not been filled by GBA. Moreover, GBA contributed little to issues most pressing for Indian decision-makers and environmentalists: how to counter "biopiracy" of industrialized countries; how best to protect indigenous knowledge and food security vis-à-vis modern biotechnology while not foregoing its possible advantages (see Science Reporter,

February 1999; A. Gupta, forthcoming); and how to reconcile biodiversity protection with development needs of the people, especially the poor. The latter question is to some extent addressed by GBA, but not in a way that led the assessment gain more relevance and a higher standing in the national debate. Taken together, effects of GBA on Indian policy-making are negligible.

The government's certain unease with international information institutions is indicated, too, by its attempt to limit the role of "independent" experts in the emerging biodiversity regime, comparable to similar conflicts about the role of IPCC (discussed above). During the negotiation of the biodiversity convention, some states had proposed that the conference of the parties to the treaty should be supported by a subsidiary body for scientific and technological cooperation, with less than universal membership and with independent experts instead of governmental representatives. The Indian government apparently feared that such a body would transfer institutional power from the purely diplomatic conference of the parties, with governmental representation and equal voting power, to less controllable and even independent assessment processes. The government's concerns stemmed from the anticipation that such international independent expertise would be dominated by Northern research institutions which would not fully reflect the situation in developing countries. In particular, the Indian government feared that a subsidiary body for scientific and technological cooperation under the convention might assume some implementing functions, either institutionalized or informally, and draw attention to, or even direct sanctions against, countries deemed to be in non-compliance with the convention. Such countries were most likely to be developing countries, including India as one of the twelve "mega-diversity countries" (M. G. Rajan 1997: 222). Implicit in this fear were also concerns that under the influence of Northern natural scientists the biodiversity treaty could evolve into a purely environmental treaty, and sideline the development concerns of India such as transfer of biotechnology and sovereign rights over genetic resources. The GBA, completed three years later, justified somewhat the concerns raised by the Indian government before 1992. But though India's government eventually failed in its efforts to entirely block the establishment of the subsidiary body, Indian concerns were nonetheless taken into account in the eventual shape of article 25 of the CBD.³⁵

CONCLUSION

THE EFFECTS OF INTERNATIONAL ENVIRONMENTAL INFORMATION INSTITUTIONS IN DEVELOPING COUNTRIES

Did international environmental information institutions matter in the development and implementation on India's policy on ozone depletion, climate change or biodiversity protection? The *indirect* effects may be substantial, in particular those institutional effects that helped raise concern in industrialized countries among environmentalists, media, decision-makers and voters, because this fed back into the international negotiation process by increasing the pressure on India to take action on global warming and ozone depletion. The *direct* effects on India seem limited. The public perception within India hardly changed due to international information institutions. In the case of climate and ozone, issue prominence was low and remained so, and biodiversity protection had already been disputed in public and parliament before GBA was initiated. Still, international information institutions had some effects. They led to changes in research priorities of Indian scientists, helped build some research capacities, and probably were a crucial factor in raising concern about the climate problem by initiating research on monsoons and sea-level rise, which emphasized the precarious vulnerability of India vis-à-vis global warming.

By and large, this fed back into assessment processes within the Government of India, yet without changing the negotiating strategy much—although evidence is ambiguous and counterfactual reasoning difficult. For example, during the ozone negotiations in the late 1980s, India’s strategy was essentially not to join the regime if Southern problems with the protocol were not sufficiently resolved. In climate policy, on the other hand, India did not threaten to stay away from the regime. One could argue that this “more cooperative” behavior (in a Northern perspective) was influenced by Indian concerns about their own vulnerability which have been raised by international information institutions. Another reading would be that India pursued broadly the same negotiation strategy—no domestic mitigation programs without Northern financial reimbursement—but in the climate case *within* the framework convention and in the ozone case *outside* the regime. This could be explained by the Indian learning experience that being “in the game” right from the beginning is more promising than staying aloof first while having to re-negotiate pivotal regime rules later.

Taken together, for any international assessment to be credible and relied upon by the Indian government it needs endorsement by government-funded national research institutions and, to a lesser degree, by private research institutes. Both national research institutions and private institutes are, in varying degrees, internationally connected and open to international cooperation, but most of them will scrutinize any information provided by international information institutions from an explicit Southern and Indian perspective. The apparent North-South variation in the effectiveness these institutions of can be explained, first, by the generally lower prominence of global environmental problems on the national agenda of developing countries. Admittedly, such prominence is low in some industrialized countries, too. But there is still a difference. In the United States for example, even though the country is not pushing for strengthening the climate regime the issue has yet led to media attention, hotly debated hearings in Congress, formal resolutions by the US Senate and to a series of assessment processes undertaken by various actors (Clark and Dickson 1997). The situation in India differs significantly, and issue prominence is much lower. It seems, moreover, that low issue prominence in developing countries is not a matter of policy-cycles and not comparable to the so-called “pre-emergence” stage of environmental issues in industrialized countries,³⁶ when concern remains restricted to a close circle of scientists and few politicians. Rather the socioeconomic context in the South, particularly widespread poverty and unemployment, prevents global environmental issues from gaining wider prominence in Southern political debates, even in cases where scientific certainty about the problem seems fairly high and when issue prominence in wealthier industrialized countries is at its peak.

Second, and related to the first, there is less *research capacity* regarding global environmental problems in the South compared to industrialized countries. While some developing countries, in particular the least developed, have no research capacity at all to assess global environmental change, others are directing most of their capacities to other issues which are seen as more pressing. In India, for example, substantial scientific efforts are undertaken for applied technology or for guarding national security against threats perceived from abroad (comparable in rationale though not in size to large-scale nuclear weapon research programs in some industrialized countries). Climate change research, however, is a side issue because of the relative lack of interest within India’s scientific and political communities and the public. In short, user communities in North and South differ significantly, and information offered by international institutions meets a less receptive environment in developing countries.

Third, actual *participation* in international environmental information institutions varies between industrialized and developing countries. On the face of it, this follows from the overwhelming research capacity in the field of global environmental change that has been amassed in the North. There are also structural reasons behind the domination of these institutions by experts from industrialized countries; some observers even claimed that there were instances where scientific research from the South had been “effectively ignored” (Kandlikar and Sagar 1999). Research on scientific assessments in industrialized countries indicates that increased participation raises the influence of assessments among stakeholders (Cash 1998; Moser 1998). In India, perceived Northern domination of bodies such as IPCC limits the sense of ownership of

such assessments among decision-makers who often see the content of the assessment as being not fully reflective of the information needs, socioeconomic context and political interests of developing countries. International environmental information institutions are viewed in India generally as something foreign that is advanced towards India by the North; not surprisingly, this limits the influence of such institutions compared to their influence in industrialized countries.

PERSPECTIVES FOR INSTITUTIONAL DESIGN

What can decision-makers wishing to design effective international information institutions learn from the Indian case study? Clearly, assessments published by such institutions will hardly suffice to change the public perception of issues such as climate change in India. The root causes of the low prominence of, say, climate change in India is not lack of information but that people have other, more short-term problems to care about in public discourse: not only economic development, poverty, a difficult national security situation or ethnic violence, but also a number of immediate local environmental problems. In times when winter smog prevents airplanes from landing in Delhi, global warming by 2100 loses somewhat its significance. Pollution of both drinking water and aquatic ecosystems, indoor air pollution due to the use of biofuel or toxic and hazardous waste are the most pressing environmental problems in India with which most environmentalist groups are concerned, and the best designed international information institutions will not alter these priorities. Climate change and ozone depletion will thus remain élitist issues with which mainly senior governmental bureaucrats and some hundred experts within national research institutions and private institutes will be concerned. However, some improvement in institutional effectiveness seems possible. I suggest four “lessons” for institutional design that may be drawn to increase the effects of international information institutions in developing countries and the benefits of scientific research.

Improve Usefulness and Legitimacy

First, the effectiveness of international information institutions might be improved if they better took into account Southern concerns and viewpoints. In the most radical formulation, it could be simply argued that other problems needed to be addressed and assessed. Anil Agarwal and Sunita Narain (1991: 24) noted, for example,

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 environmental action were to be measured by indicators such as “maximal number of human lives protected with least effort”, pollution and degradation of freshwater resources would be the most important issue to which research and funds should be directed (WBGU 1999). Degradation of the world’s soils, too, is an environmental issue affecting the life of more than a thousand million people, but less targeted by global research efforts than climate change (WBGU 1995a).

Taking Southern concerns into account would also entail, in essence, a reorientation away from mere “scientific” analysis and a stronger analysis of the socioeconomic issues that are cause and consequence of global environmental change. Candidates for debate are consumption patterns in the North (and how to influence them), equity issues, the specific vulnerability of developing countries and how this could be addressed. All these issues have already been addressed, for example by IPCC, and have been strengthened in the planning of the third IPCC assessment cycle. It is likely that this development will increase IPCC’s

credibility, legitimacy and usefulness at least within India (though simultaneously it may *decrease* credibility within OECD countries).

Increase Participation

Lack of credibility, legitimacy and usefulness in developing countries are linked to the domination of assessment processes by experts from industrialized countries who are capable of structuring the assessment process and of influencing the outcome according to their own priorities. From present experience with international information institutions and the debate within India, it seems that strong Southern participation is crucial to prevent the institutions from neglecting the interests of developing countries. For example, it were chiefly the representatives from the South within the IPCC plenary who hindered the body from adopting economic calculations which valued Northern lives ten times higher than Southern lives.³⁷

How could Southern participation be strengthened and made more effective? IPCC has already taken, after the 1990 report of the Special Committee on the Participation of Developing Countries,³⁸ a number of actions to remove obstacles that impair developing country participation. For example, to increase the communication of scientific knowledge and IPCC findings in particular, major documents are now being translated in all six UN languages, and IPCC takes much more account of geographical representation—similar to purely political UN bodies or information institutions such as the International Court of Justice—as well as representation of the views of environmentalist and business organizations represented by experts (own interviews; IPCC 1997). Current IPCC rules of procedure require each working group to be chaired by one developed and one developing country scientist. Each chapter of assessment reports must have at least one lead author from a developing country (own interviews; Agrawala 1998b: 630). Participation of developing country scientists in IPCC's third assessment cycle appears much more visible than in previous rounds. In a sense, IPCC's governance structure has a quota system that resembles political bodies such as the meetings of parties to the Montreal protocol, the executive committee of the ozone fund or the GEF, all of which are governed by North-South parity procedures.³⁹ On the other hand, even though some leading Indian experts are prominently placed in the third IPCC assessment cycle—India contributes one IPCC Vice Chair—the increase in India's participation in IPCC does not fully reflect the country's scientific mainstream. This may in turn limit the infusion of Southern perspectives into IPCC as well as its legitimacy and impact in developing countries such as India.

Lack of funds remains a problem in this context. Government-funded research institutions in India normally do not have money to send their scientists to professional conferences abroad. This has been attenuated for direct participation in IPCC working groups, but still, the general communication between Indian and foreign scientists is scarce compared to transatlantic or intra-European cooperation. Moreover, traveling and communicating alone is not sufficient to enable developing country experts to write or review chapters for international assessments, since working time in itself is a scarce and costly resource. In particular private institutes are sometimes unable to permit their staff to devote their time to international assessments if this is not accompanied by project funds. At least one highly qualified Indian atmospheric scientist had to refuse an invitation to the third IPCC assessment cycle purely for financial reasons, while researchers from other private institutes anticipate no financial constraints at all to participate in international assessments if they were invited and their travel costs reimbursed (own interviews). The difficult financial situation in India thus privileges participation of those researchers who have sufficient financial support to widely communicate on a regular basis with Northern scientific communities. Added to this is the general lack of interest in global environmental issues within the government, which submitted too late, for example, the list of Indian experts suitable for participation in the third assessment cycle (though IPCC now seems fairly permissive in accepting belated nominations). Some Indian researchers felt only poorly informed about the recruitment

process for IPCC's third assessment cycle and complained of a lack of transparency on the side of the government, of the better connected Indian institutes and IPCC (own interviews).

Taken together, these factors prevent some qualified Indian scientists from being invited to, or from making the effort to participate in, international environmental information institutions. This again creates a predominance of those Indian scientists who are internationally well connected and funded, who can avail themselves of time and money sufficient to draft and review lengthy IPCC or GBA chapters, and who are particularly open to international networking. Therefore, one private institute alone managed to contribute six experts to the current third IPCC cycle, which has caused some displeasure among Indian experts not from this institute (own interviews). Though these researchers are certainly qualified for their tasks as IPCC contributors, they do not fully represent the entire spectrum of Indian science, and cooperation with experts from national research institutions is limited or non-existent (own interviews).

Enhance Research Capacity

The need to improve the usefulness and legitimacy of information institutions in countries like India and to increase participation of their experts requires enhancing the endogenous research capacity in the South (see also Agrawala 1998b: 632; Kandlikar and Sagar 1999).⁴⁰ Two ways of doing this are conceivable. One would be increasing the funds of IPCC or of a future GBA to enable these institutions not only to reimburse travel costs of developing country participants at IPCC but to organize Southern contributions as commissioned papers, i.e. to pay for them. At least in the Indian context, this would help to achieve a more balanced participation of Indian scientists and would assist in building up more endogenous capacities within the Indian national research institutes. If Indian scientists, for example, could base their assessments and statements to their government less on Northern data but rather on global circulation models that have been developed and are used within India itself, this might influence the perception of these data in the Indian decision-making system. A second possibility would be to provide more research capacities directly, for example through the Global Environment Facility, with similar effects.

Ensure Process

Finally, it appears that a larger impact of international information institutions could be achieved if these were designed as a process instead of single events. This may explain, among others, the relatively stronger impact of IPCC compared to GBA in India (even though many other factors do count). Organizing assessments as long-term processes also ensures, with respect to North-South relations, that the special concerns of developing country experts and governments could be better taken into account, in particular if the assessment need has first been felt and articulated by Northern actors and the initial framing has been done within the North. If GBA, for example, would have been more than a mere one-stop endeavor, it would have been possible, in successive "assessment rounds", to re-focus the assessment and to include more information on the human dimensions of biodiversity, the sharing of benefits of biotechnology or the question of intellectual property rights on genetic resources.

CREATING PERMANENCE IN NATIONAL ASSESSMENTS IN THE SOUTH

As for India (and maybe other developing countries), the analysis leads to three conclusions regarding deficiencies in current assessment processes and negotiation strategies.

First, in India as well as in most other developing countries, the *indirect* effects of international environmental information institutions are often overlooked. With no doubt, possible political biases in international assessments are anticipated by the Indian government, and assessment reports are distributed among Indian experts for review and comment. This internal review within India, however, fails to influence the effects that international information institutions have on the debate in the North. By defining problems and (partly) responsibilities, by legitimizing agenda and acceptable courses of action and by outlining rightful and expectable behavior among the Northern public, international information institutions influence the Northern framing of international environmental negotiations. Sheila Jasanoff (1996: 196) argues, for example, that 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.

Stronger and better organized Southern participation in information institutions could thus influence the course of international environmental negotiations, by bringing in Southern problem definitions and Southern concerns.

Second, it is a distinctive feature of domestic Indian environmental assessments that no organized cooperation exists among research institutions. This limits the international political impact of Indian science. In a world of overwhelming scientific power of the North and lively environmental movements in most industrialized countries, India’s internal assessment system puts the country in a reactive negotiation position, rendering it ill-prepared to anticipate new issues that may come up and affect Indian interests. Undoubtedly, India is faced with more pressing problems than global environmental change, and industrialized countries are more responsible for creating and more capable of solving most of the problems. Yet the country will eventually be confronted with all global environmental issues, either because they threaten to affect vital Indian interests, such as the monsoon cycle, or because the North demands that India engage in costly protection efforts. In this respect, India’s assessment system in the field of global environmental change seems inadequate—too slow and reactive and too reliant on *ad hoc* individual initiatives that help in some cases but fail in others. The 1998/1999 government was trying to tackle this problem and to increase its planning capacity, following the Marathi version of the precautionary principle, “Don’t dig a well when you’re thirsty” (i.e., do it before). Three commissions—on environment, forests and wildlife—had been set-up to develop scenarios for the next 25 years which should assist in elaborating action plans and in re-organizing the ministry with a view to the needs most pressing 25 years from now. Likewise, ad-hocism in India’s assessment system is being perceived as problem, because, as the Minister Prabhu mentioned in March 1999, “*ad hoc* assessments create *ad hoc* solutions” (own interviews). Yet even by this governmental policy it seems unlikely that *global* environmental problems will gain prominence in India’s decision-making and planning procedure. Again, this will leave India in a reactive mode vis-à-vis Northern problem definitions and negotiation frames.

Third, it seems that this situation could be improved by creating an independent and *permanent* Indian “committee”, “council” or “board” on global environmental change that could bring together the leading experts from national research institutions, universities and private institutes. The advantages of such a permanent and independent scientific institution are manifold: First, the generalist bureaucrats in MoEF would be regularly provided with a *consensus* document on the state of the global environment of their best scientists, including maybe advice on various available policy options. This would insert a strong element of continuity and knowledge accumulation in the Indian assessment process that short-term assigned gener-

alists within the bureaucracy (and increasingly short-lived governments) could not provide. Second, a permanent independent committee on global environmental change could help the government to *anticipate future problems*, both environmental threats that will affect India and policy demands that could be posed by the North in future. This would help India to better influence the global environmental assessment process in its beginning and to struggle for a problem framing that is more favorable for Southern interests. Third, such permanent committee could help Indian experts to coordinate their collective participation in information institutions such as IPCC, thus increasing their cumulative bargaining power in the negotiation of problem definitions and frames. Fourth, given considerable scientific resources that India can avail itself of, a permanent and independent advisory committee on global environmental change could provide orientation for many smaller developing countries, which could use both the assessments advanced by industrialized countries and India's assessments.

It seems that in a sense, permanent committees are atypical in the Indian environmental policy context, and at least in the 1998/1999 government it was felt that regular reports would be useless and that permanent councilors would focus their global assessment "on the environmental problems of Geneva, Paris and New York instead of the villages of Bihar" (own interviews). However, the traditional *ad hoc* expert advisory committees of governmental bureaucrats and a few experts from outside are by their nature primarily reactive to governmental policies and international negotiations. In their present form, they are not the best institutionalized assessment processes to anticipate future global environmental problems that could affect Indian interests or with which India could be confronted through international negotiations.

But however important (and theoretically interesting) increasing the effectiveness of international environmental information institutions in developing countries is, only marginally will it affect the solution to most problems of anthropogenic global environmental change. At least for the next few decades, it is up to the industrialized countries to act, for—as noted by Jyoti Parikh for the problem of global warming (1994: 2943)—"[i]f all countries had the living standards similar to those in India and China, there would not have been [greenhouse gas] concentrations accumulated as of today". For many in the South, the choice of where to reduce greenhouse emissions appears quite clear: Jyoti Parikh and colleagues (1991: 39) for instances noted that 1000 tons of carbon equivalent are being emitted either by 800 cars or by the fuelwood-based cooking of 10,000 persons, by the rice consumption of 12,000 persons or by the cement production to build 300 houses. The consumption of the Indian middle class is indeed on the increase, as often noted by Northern observers, but the average income and "environmental consumption" of the richest ten per cent of all Indians is yet significantly below the income and consumption of the poorest twenty per cent of US citizens (Parikh *et al.* 1994a). However important it is that international information institutions are effective in India and offer crucial information to decision-makers and the public in India, their most crucial effects still need to be in the North.

NOTES

- ¹ This is slightly paraphrased. The full quote is: "... Sed quae naturae principia sint communitatis et societatis humanae, repetendum videtur altius. Est enim primum quod cernitur in universi generis humani societate. Eius autem vinculum est ratio et oratio, quae docendo, discendo, communicando, disceptando, iudicando conciliat inter se homines coniungitque naturali quadam societate, ..."
- ² I use the term "assessments" somewhat contrary to day-to-day language, that is, not as merely written reports but as an entire process of collecting, organizing, interpreting and integrating knowledge, usually to inform policy-making (see Global Environmental Assessment Project 1997). This broad definition is of special importance for developing countries, in which environmental problems are being assessed rarely in written institutionalized form as known from industrialized countries. When the Government of India, for example, informally solicits opinions from its national research institutions, including maybe personal advice from leading experts, without publishing or even writing down the results of such *ad hoc* survey, it is still considered as "assessment" in this paper. This definition makes it difficult to distinguish assessment from original research. Assessment is generally understood as synthesis of previous research, but at times, it may include original research as well. The "Indian Methane Campaign", for example, in which leading national research institutions attempted in a joint effort to assess the country's methane emissions, initiated a number of original research projects without which the final assessment would have been impossible.
- ³ In July 1992, the GEF Technical and Scientific Advisory Panel had recommended to UNEP that a global assessment of the available knowledge on biodiversity should be pursued. The project was approved by UNEP in May 1993, when a steering group was appointed.
- ⁴ For example, the (then) UNEP Executive Director Elizabeth Dowdeswell stated on occasion of the release of GBA: "This unique assessment has the potential to shape the scientific agenda for the next decade. It could also be the starting point for future assessments conducted within the framework of the Convention that would begin providing a sound basis for policy-making" (UNEP 1995).
- ⁵ In particular, Sheila Jasanoff (1993) provides a detailed account of India's environmental policy, with special reference to the climate issue; Milind Kandlikar and Ambuj Sagar (1999) analyze numerous aspects of how climate research is being conducted in India, and Jakobsen (1998) examines the emergence of India's climate policy from 1992 to 1997. Mukund Govind Rajan (1997) describes in detail how India's foreign environmental policy evolved before 1993, offering an extensive and in part fascinating narrative based to a remarkable extent on "confidential sources", apparently internal documentation and letter-exchange within the Indian diplomatic service and ministerial bureaucracies. Unfortunately, his study ends with the 1992 Rio Conference, and except for brief references to neo-liberal and neo-realist theoretical positions, he refrains from developing a theoretical argument based on this vast amount of insider material.
- ⁶ Jean Ripert, the founder chairperson of the International Negotiating Committee for the climate treaty, believes that the climate convention would "certainly not" have been possible without IPCC (interview with Shardul Agrawala [1998b: 639]). See also Jäger (1998: 150) and Jung (forthcoming).
- ⁷ It is noteworthy that according to this study, the perception of the English-language press, generally the only Indian media received in the North, is hardly representative. For example, media in Indian languages favor new large dams to improve the supply of water and electricity, quite in contrast to the English-language press. In view of advantages promised by dams, especially increased food security, their ecological consequences were discussed neither in the Hindi press nor by their surveyed readers. Shri Raut, a journalist with *The Independent* (Mumbai), observed for instance "a clear divide between English newspaper and [local] language newspaper. All English newspapers are generally unanimous on anti-Narmada agitation, while the language press in Gujarat or Maharashtra are very pro-dam. So that shows a complete divide in that" (cited in Chapman 1997: 3-4; see also Chapman *et al.* 1997).
- ⁸ Admittedly, of these are only seven "National Parties", that is, parties "recognized" for having won in the last elections in at least four states some minimum percentage (either 4 per cent of seats in the national parliament

or 3.3 per cent of seats in the state parliament over five years, or at least 6 per cent of the total valid votes in the last national or state elections). Additional 35 parties were “recognized” in 1998 as “State Parties” in the respective states where they could muster the minimum requirements. The other 612 parties are merely “Registered Unrecognized Parties”.

- ⁹ During the Lok Sabha Standing Committee meeting (which comprises 14 Members of Parliament) on 20 June 1998, global environmental problems were not discussed (MoEF 1999: 61). However, on 22 July 1999, during the five-hour debate on the functioning of MoEF in the Rajya Sabha, members of this assembly reportedly raised, among others, the issue of “the need for India to take an initiative in international fora on Climate Change related problems” and of “the environmental conditions leading to acid rain, depletion of the ozone layer, damage to agriculture products, soil erosion, etc.” [sic, in this context]. In his replies, Minister Prabhu reportedly “mentioned” the Montreal Protocol and the UNFCCC, though the exact content of his reply could not be confirmed (see MoEF 1999: 63-65).
- ¹⁰ Such foreign policy preferences would be, for example, the degree to which the government is willing to accept isolation from the Group of 77 (or else rather going with the majority), the relative weight being placed on US-Indian relations and Indo-Chinese relations, as well as the general attitude toward international institutions and organizations (see, e.g., M. S. Rajan 1994, 1997).
- ¹¹ Shri Suresh Prabhakar Prabhu, Union Cabinet Minister of Environment and Forests, Government of India, presentation on “India—Sustaining Development”, delivered at Harvard University, 23 September 1998.
- ¹² While all three organizations play significant roles in the Indian assessment landscape, they follow nonetheless different priorities: TERI is more concerned with policy-related research and advice, often on behalf of international and foreign agencies, including consultancies for African and other Asian countries; CSE is more active in lobbying; and Development Alternatives concentrates most efforts on practical outreach activities, such as developing and disseminating technologies.
- ¹³ 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). India was ranked fifth, scoring higher than West Germany, Great Britain or France. The then Indian Minister of Environment and Forests felt increasingly pressurized by foreign environmental organizations and governments that used the WRI assessment as bargaining chip during the UNCED preparations, arguing that developing countries too were to blame for the climate problem. CSE was asked by the Ministry to re-assess the Northern assessment (own interviews; 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” (Agarwal and Narain 1991: 1). See on this debate also Jasanoff (1993); McCully (1991); Parikh *et al.* (1991: 43-44); and Subak (1991).
- ¹⁴ Based on neo-classic economic evaluation methods, some IPCC contributors had suggested different monetary values for the human life to allow for assessing the “damage costs” of global warming; it was suggested valuing loss of one life in OECD countries with 1.5 million US dollars and in developing countries with 150,000 US dollar. 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 plenary. Developing countries prevented the report from being accepted (Agrawala 1998b: 626).
- ¹⁵ This is seen, for example, as prime reason for the dispute on methane emissions (discussed below), when global emissions had first been forecast based on measurements of Northern rice paddies only—though Indian scientists accept that at that time, this had been a defensible first guess which has now been corrected by the Indian methane research that advanced the debate by showing that Indian methane emissions were much lower than in the North (own interviews).
- ¹⁶ IPCC has prepared since 1996, originally in response to a request by the political body SBSTA under the climate convention (which demanded a technical paper), a special report entitled “The Regional Impacts of Climate Change. An Assessment of Vulnerability” (IPCC 1998b). It is explicitly noted in the preface to this volume that it “provides a foundation for the TAR [third IPCC assessment report] in another important respect, as it represents a substantial further step forward in increasing the level of participation of scientists and technical

experts from developing countries and countries with economies in transition. The IPCC [...] will not relax its efforts to identify experts from these regions and secure their participation in future assessments” (IPCC 1998b). As for the current IPCC cycle, Working Group II will explicitly “assess the scientific, technical, environmental, economic and social aspects of the vulnerability (sensitivity and adaptability) to climate change of, and the negative and positive consequences (impacts) for, ecological systems, socioeconomic sectors and human health, with an emphasis on regional sectoral and cross-sectoral issues” (IPCC 1997: paragraph 2); this might increase the usefulness of the report, which is due 2000/2001, for developing countries.

¹⁷ “What is at stake is a biosphere that is becoming more and more unsustainable. The problems are only not scientific, but include people’s value systems and expectations, education and judgement [...]. We, in India, are fortunate to have an edge in being able to effectively link up natural with social sciences; at an international level, under the IGBP program related activities, this linkage has not still been adequate and effective” (Ramakrishnan and Saxena 1996: 27; also Ramakrishnan 1996a and 1997: 56). Admittedly, other—more radical?—Southern experts might reject this as “Northern anthropocentrism” (e.g., Shiva 1997), which illustrates the difficulty of generalizing “Southern” and “Northern” viewpoints.

¹⁸ IPCC is currently working on a special report on technology transfer, which was initiated by the political body on scientific and technological advice (SBSTA) under the climate convention. The report is being coordinated jointly by Working Group II (vulnerability) and Working Group III (mitigation). The IPCC special report shall identify and evaluate different options to accelerate the development and diffusion of technology for both limiting greenhouse gas emissions and adapting to climate change. Work on this report begun in June 1997; the report is expected to be completed by 2000. Likewise, the third assessment report will contain, in working group III (mitigation), a chapter on “barriers, opportunities and market potential of technologies and practices” (IPCC 1998a).

¹⁹ The first chapter of working group III’s report will address “development, sustainability and equity in climate change mitigation” and “alternative development pathways”; the equity theme also pervades most other chapters (IPCC 1998a).

²⁰ In February 1999, 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. I do want to discuss the value of this particular paper on economics, and 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. Still, when a Southern scientist submits a chapter on equity which is rejected by six Northern economists, few observers would not feel inclined to regard this as 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 somehow threatened in their own perception of what are appropriate standards of “economic science”, to react by seeking open conflict—what is seen as a somewhat “over-reaction” by some observers from India (own interviews).

²¹ See note 13 above.

²² In the mid-eighties, the need of an autonomous environmental protection agency had been debated within the Indian government, but these plans were never realized. It is noteworthy in this context that the MoEF is an institutional offshoot rather from the Ministry of Science than from the Ministry of the Interior (as in Germany, for example); thus, scientific expertise and science management competencies were already included in the new MoEF.

²³ The committee was rather concerned with the climate issue, which had been discussed within the United Nations since 1988; it was set up to “advise the Government on all aspects related to global warming and depletion of the ozone layer in the Indian, regional and global context.” Ministry of Environment and Forests, Government of India, Order (Expert Advisory Committee on Global Environmental Issues), No. 24 (1)/88, cited in Jakobsen (1998: 27); see also M. G. Rajan (1997: 100).

- ²⁴ “Ozone Layer Study Plan of NPL”, in: *World Science News* 27, 4 July 1990, 11-13 (cited in M. G. Rajan 1997: 60).
- ²⁵ Personal observation of M. S. Swaminathan, former president, IUCN, Madras, 1990 (cited in M. G. Rajan 1997: 59).
- ²⁶ There seems to have been some lobbying effort by private actors with close ties to the international debate, notably TERI, in sensitizing MoEF on the ozone issue in the late eighties, but effects on the official negotiating and policy position are difficult to trace.
- ²⁷ See article 21 of the Constitution of India, “No person shall be deprived of his [sic] life or personal liberty except according to procedure established by law”. This norm is being directly relied upon by the Court to order improved environmental protection. In the Ganga Pollution (Tanneries) Case, a judge of the Supreme Court observed, “We are conscious that closure of tanneries may bring unemployment, loss of revenue, but life, health and ecology have greater importance to the people”. M. C. Metha *versus* Union of India, AIR 1988 S C 1037, p. 1048 (cited in Meachinkara 1998: 41).
- ²⁸ Other arguments of the petitioner were: that India was in breach of the Montreal Protocol because article 5 grants a grace period to developing countries only for “basic domestic needs”, which refers to “food, clothing and shelter” and not to “the fulfilment of the luxuries of the people [such as] air conditioning, refrigeration, domestic fire extinguishers, perfumes, spray cans and plastic foams”, the more so since “air conditioning is not even known to the Indian masses and is a luxury of only a few wealthy people”; that the 1992 Copenhagen amendment were part of the law of the land and must be respected even if not formally being ratified by India; that it were not sufficient for the Government of India simply to comply with the protocol, but that further steps must be taken, also in view of the precautionary principle, and that India should strive to over-comply with the protocol; that the interests of Indian industry and the issue of technological dependence from multinational corporations must not override the health concerns of the poor masses in India who must be protected from eye cataracts; that the Government of India must prohibit the export of ozone-depleting substances to third parties; that the Government of India were “not permitted to avoid our obligation of phase-out on the ground that we are causing lesser damage to the ozone layer than the United States” (as has been argued by the government); and that, therefore, the Government of India shall enact mandatory measures in addition to simply cooperating with the Multilateral Fund (Supreme Court of India 1994; own interviews).
- ²⁹ R. K. Pachauri and S. Sharma, India’s Achievements in Energy Efficiency and Reducing Carbon Dioxide Emissions. Paper submitted to the United Nations Development Programme and the World Resources Institute (mimeo 1998, to be published; cited in Pachauri 1998: 150). See also Jakobsen (1998: 13).
- ³⁰ See note 23 above.
- ³¹ This Core Group is the most recent institutional set-up. It shall work out future research requirements, build up databases, internalize climate change issues in the planning process, and develop long-term perspectives. Opinions on the effectiveness of this new consultative mechanism are, however, mixed at least (own interviews).
- ³² Some experts in India are convinced that the relative inefficiency of energy use in India offers no-regret options that could be realized by “activities implemented jointly”, by the clean development mechanism or by emissions trading. In fact, India produces with one unit of energy half of what is usual in industrialized countries (Paulus 1992, 1993). Many would argue that there is a potential for win-win-situations. On the other hand, there is also much concern whether equitable no-regret agreements will be negotiable or whether India will not end up with economic losses to the benefit of Northern countries. Besides, energy-related projects could perfectly be implemented, too, by GEF under the “full incremental costs” formula as stipulated in the convention, so that the flexible mechanisms ardently supported by the North appear somewhat unnecessary to many Indian actors. After all, it appears that those environmentalist organizations most supportive of the CDM—and which receive substantial funds from countries that are also strongly favoring the mechanism—could not yet manage to convince governmental officials of the necessity of such new policy instrument.
- ³³ The Supreme Court had to deal with biodiversity, but there is no indication that GBA played a role in the courtroom. It is noteworthy that the major Supreme Court case on biodiversity, in which the private Research Foun-

dation for Science, Technology & Ecology and others demanded that the government be ordered to “take action to protect the biodiversity of our country in conformity with the Convention on Biological Diversity (CBD) and such other Conventions for protection of the biodiversity”, was closely linked to the question of patent rights which GBA so entirely ignored, for the second plea was that government shall “challenge the patenting of Basmati rice, if required, in the United States Patent and Trademark Office (USPTO) and/or before the Dispute Settlement Body (DSB) created under World Trade Organization”. The Court ordered the case to be settled because the government’s Attorney General brought evidence that two pieces of legislation, a “Biodiversity Act” and a “Geographical Indicators Act” (which would prohibit foreign licensing of products of Indian geographic origin, such as Basmati rice or Darjeeling tea) were “in the process of finalisation for being introduced in the Parliament”. A further Bill entitled “Plant Varieties and Farmers’ Right Protection Bill” had already been completed and was scheduled to be introduced in Parliament during the Winter Season (Supreme Court 1998).

³⁴ In 1989, an *ad hoc* expert advisory committee was set up to develop a first outline of a new Biodiversity Legislation, as well as of a Plant Breeders Variety and Farmers’ Rights Legislation, which was seen as increasingly necessary given the tendency in industrialized countries to grant patents on plant variants derived from Southern biological resources. This was followed by consultations of MoEF with other branches of government, experts and environmentalist organizations, including a final National Consultation on 10 June 1997 and similar meetings on the related new National Action Plan on Biodiversity. MoEF then set up a new expert committee, chaired by a distinguished university scientist, to suggest a legal draft document of a Biodiversity Legislation, which was released on 27 October 1997. A similar example is the recent review of the Wildlife (Protection) Act of 1972. Again, the MoEF set up a new separate inter-state committee to assess the Act’s effectiveness; the report submitted by the expert committee has now been circulated to state governments and ministries.

³⁵ Article 25 CBD now stipulates that the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) shall comprise government representatives and be open to participation by all parties, and it shall act only upon request and under the authority of the conference of the parties. Though the subsidiary body still may “provide scientific and technical assessments of the status of biological diversity”, this will now hardly result in any form of detailed review of the policies of developing countries. While India and other Southern countries could thus foil into Northern attempts to establish far-reaching independent scientific review of treaty implementation, many observers agree on the flip side—that SBSTTA in its present shape is merely a miniature edition of the conference of the parties, with doubtful use.

³⁶ On different stages of the policy cycle in industrialized countries—“pre-emergence”, “peak attention”, and “post-emergence”—see Clark (1999) and the literature cited there.

³⁷ See note 14 above.

³⁸ 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 (M. G. Rajan 1997: 108; Agrawala 1998b: 629).

³⁹ For IPCC’s third assessment cycle, it has been decided that Chair and Vice Chairs will be three from industrialized countries (including one from a country with an economy in transition) and three from developing countries, with similar quotas applying to the working groups (IPCC 1997: paragraph 14). The IPCC thus has in effect the same parity governing structure as the GEF or the Montreal Protocol and its Fund. In the GEF, the governing council consists of 16 developing countries, 2 countries with economies in transition and 14 OECD countries, and it decides by a vote representing both a sixty per cent majority of participants (favoring the South) and a sixty per cent majority of total contributions (favoring the North) (GEF 1994: 16). Both the meeting of parties to the Montreal Protocol and the executive committee of the ozone fund decide by two-thirds majority vote that must include the majority both of developing and industrialized countries (Biermann 1997, 1998).

⁴⁰ For a critique of current programs for capacity building in developing countries, see Miller (1998). He argues that such programs should pay more attention to the specific social context in developing countries when “transplanting” scientific knowledge from North to South.

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