Towards a Global Consensus on Matters of Science: How process and membership can generate valid and sustainable science advice in multilateral environmental treaty negotiations

By

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TOWARDS A GLOBAL CONSENSUS ON MATTERS OF SCIENCE: HOW PROCESS AND MEMBERSHIP CAN GENERATE VALID AND SUSTAINABLE SCIENCE ADVICE IN MULTILATERAL ENVIRONMENTAL TREATY NEGOTIATIONS

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ABSTRACT: In most multilateral environmental agreements (MEAs), science advisory bodies (SABs) are tasked with producing guidance on scientific aspects of the problem. SABs are a necessary infrastructure of global environmental management because they provide a forum where experts come together to negotiate a consensus on matters of science relevant to a given MEA. This consensus, much more than merely an assessment of available information, creates new knowledge that feeds into decision-making. I propose, that to contribute effectively to implementation, this consensus must be both valid (scientifically accurate) and sustainable (acceptable to stakeholders and not requiring frequent renegotiation). This thesis identifies two institutional design features of an SAB that are crucial for obtaining a valid and sustainable outcome: representative membership, and a transparent and flexible organization of work. A three-tier SAB design is recommended based on these findings, and its theoretical application to the provision of science in the Biodiversity regime is explored.

Representative membership describes the individual experts chosen to contribute to an SAB's work. To maximize validity and sustainability, I identify several kinds of diversity which can enhance the validity and sustainability of the SAB outcome, namely national, economic, institutional, disciplinary, regional and personal diversity. A process which is both transparent and flexible are also classified into several types of transparency and flexibility, including: access to meetings; document release; and the establishment of norms and procedures. This thesis concludes that while all these types of diversity, flexibility and transparency have the potential of improving the SAB consensus' validity and sustainability, the relative importance assigned to each of these should be tailored to the MEAs needs to produce the best consensus.

The thesis is based on the in-depth study of six MEAs: the UN Framework Convention on Climate Change and the Intergovernmental Panel on Climate Change, the Ramsar Convention on Wetlands, the Convention on Biological Diversity and its Biosafety Protocol, the Vienna Convention and Montreal Protocol on the ozone layer, the Stockholm Convention on Persistent Organic Pollutants, and the Rotterdam Convention on a Prior Informed Consent Procedure for the transport of hazardous chemicals.

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TABLE OF CONTENTS

GUIDE TO FREQUENTLY USED ACRONYMS

BAT	Best available technologies
BEP	Best environmental practices
CBD	Convention on Biological Diversity
CFCs	Chlorofluorocarbons
COP	Conference of the Parties (to a Convention)
CRC	Chemical Review Committee (under the Rotterdam Convention on PIC)
ENB	Earth Negotiations Bulletin
FAO	Food and Agriculture Organization
GHG	Greenhouse gas (contributing to climate change, including: carbon dioxide (CO_2) methane (CH_4) and nitrous oxide (N_2O))
ICRC	Interim Chemical Review Committee (under the Rotterdam Convention on PIC)
IPCC	Intergovernmental Panel on Climate Change
IUCN	World Conservation Union
ICSU	International Council for Science
LMO	Living modified organism
MBTOC	Methyl Bromide Technical Options Committee (under the Ozone regime)
MEA	multilateral environmental agreement (also referred to as treaty or convention)
MOP	Meeting of the Parties (to a Protocol)
NGO	non-governmental organization
PIC	prior informed consent (procedure for the transport of chemicals)
POPRC	POPs Review Committee (under the Stockholm POPs Convention)
POPs	persistent organic pollutants (bioaccumulating chemicals that exhibit long range transport)
SAB	science advisory body (to an MEA)
SBSTA	Subsidiary Body on Scientific and Technical Advice (to the UNFCCC)
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice (to the CBD)
STRP	Scientific and Technical Review Panel (under the Ramsar Convention on Wetlands)
UN	United Nations
UNEP	United Nations Environment Programme
UNFCCC	UN Framework Convention on Climate Change
WMO	World Meteorological Organization

CHAPTER I: INTRODUCTION

In "The Day After Tomorrow," a 2004 disaster movie about accelerated climate change, a lone American climatologist (played by Dennis Quaid) is called upon to report on "the science" to world leaders as signals of impending doom threaten the planet[1]. While this vision of a unitary and certain voice of scientific expertise may be what policy-makers seek, in reality when turning to science to assist them in complex decision-making, policy-makers are often faced with many divergent claims.

At the national and local level, policy-makers routinely turn to "blue ribbon" panels to guide them – calling on the most qualified experts to provide answers and assist decision-making. And at the global level, as the world's nations seek to address environmental problems through multilateral environmental agreements (MEAs), they too turn to science advisory bodies to fulfill their needs for scientific input.

In effect, these varied stakeholders are looking to science advisory bodies to provide enlightenment to guide their decision-making, and as such the science advisory body's essential role is to facilitate the emergence of a science consensus. Unfortunately, not all such efforts to broker consensus within a science advisory body are likely to be accepted by policy negotiators or allowed to serve as a basis for policy decisions.

This introduction will review some of the existing scholarship on science for public policy-making, outline the way MEA's are negotiated and structured, and introduce six MEAs that will be used as the basis for this study.

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[1] The Day After Tomorrow Directed and written by Roland Emmerich, Released May 2004.

SCIENCE IN ENVIRONMENTAL DECISION-MAKING

Public policymakers have long turned to the science community for assistance in solving problems and evaluating policy options (Guston, 2000; Barker and Peters, 1993; Jasanoff and Wynne, 1998). And, even as scholars in the field of science and technology studies (STS) have been exposing the myth of science "speaking truth to power" (Collingridge and Reeve, 1986; Sarewitz, 1996), policymakers are still, to a large extent, looking to the science community to gather "all the facts" and produce answers to troubling questions.

The myths surrounding the role of science are further accentuated when policymakers seek means of addressing global environmental threats. These clearly fit Weinberg's definition of trans-science, or "questions which can be asked of science but which cannot be answered by science" (Weinberg, 1972).

Global environmental challenges often fall under the heading of what Funtowicz and Ravetz call post-normal science (1992), as issues with high systems uncertainty and high decision stakes. They suggest that these require a broader coalition of contributors to the production of knowledge. This reinforces the relevance of the growing STS scholarship highlighting what is called the "social construction of science" (Jasanoff, 1990; Jasanoff and Wynne, 1998).

Nevertheless, little of this work has been applied in practice. In seeking science input on environmental problems, policy-makers still for the most part look for an enlightened source of advice. Approaches to providing science advice in environmental decision-making at national and global levels (the core focus of this thesis) are presented in greater detail in Chapter II. Most MEAs have acknowledged this need through the creation of science advisory bodies (SABs), most often a small subsidiary body to a larger Conference of the Parties (COP) entrusted with providing global decision-makers with guidance on scientific issues. The institutional make-up

of these SABs varies widely and is often the focus of contentious negotiations leading up to their establishment. And while existing scholarship on science in MEAs is rather limited, some ideas have emerged as to the most successful approaches to providing science advice on a global scale.

Early efforts to learn about the role of science in MEAs focused on identifying successful models of science advice, the most readily cited example being the technological assessments of the Montreal Protocol on Ozone Depleting Substances (Parson, 2002) and the Intergovernmental Panel on Climate Change associated with the United Nations Framework Convention on Climate Change (Agrawal, 1998).

Another significant wave of scholarship centers on stakeholder perception of the salience, credibility and legitimacy of the output of global environmental assessments. Several research projects produced by the Harvard Kennedy School of Government's project on Global Environmental Assessments emphasize the inevitability of trade-offs between: salience, or "whether an actor perceives the assessment to be addressing questions relevant to their policy or behavioral choices"; credibility, or "whether an actor perceives the assessment's arguments to meet standards of scientific plausibility and technical adequacy"; and legitimacy, or "whether an actor perceives the assessments as unbiased and meeting standards of political fairness" (Clark et al, 2002). These and other investigations into the provision of science advice in the MEA context are discussed in greater depth in Chapter II.

In this thesis, I propose that the most important output of an SAB lies in the generation of a consensus on the relevant science that is both valid (scientifically accurate) and sustainable (accepted by stakeholders and not subject to frequent renegotiation). I identify two necessary pre-conditions for achieving such an outcome: representative membership and a process which is flexible and transparent. In presenting the practical implications of my findings, I will highlight

how in fact there are opportunities to avoid what is so often couched as an "inevitable tradeoff" between validity and sustainability, and instead focus on what can be called a "mutual gains" approach to science advising.

RESEARCH METHODOLOGY

The findings presented in this thesis are based on my qualitative study of six MEAs: the Ramsar Convention on Wetlands, the Ozone Regime, the Climate Regime, the Biodiversity Regime, the Rotterdam Prior Informed Consent Convention and the Stockholm Persistent Organic Pollutants (POPs) Convention. These were selected to ensure variation in stages of implementation, number of Parties involved and MEA and SAB structure. These attributes for each case are briefly described in Table I.1. These MEAs also vary in terms of the political and economic stakes of, and level of uncertainty surrounding, the problem they are intended to address.

Treaty Name	Number of Parties[2]	Summary of Objective	Date of Adoption	Date of Entry into Force	Science Advisory Body	Type of Science Advisory Body
The Convention on Wetlands of International Importance Especially as Waterfowl Habitat	147	to stem the progressive encroachment on and loss of wetlands	1971	1975	Scientific and Technical Review Panel (STRP)	Single, smaller scientific panel
Vienna Convention for the Protection of the Ozone Layer	190	cooperation on monitoring and data and research exchange	1985	1988	Scientific Assessment Panel Environmental Assessment Panel Technology and Economic Assessment Panel (TEAP)	Three overarching panels, with several smaller Technical Options Committees, including on methyl bromide
Montreal Protocol on Substances that Deplete the Ozone Layer	189	Setting targets for the phase-out of ozone depleting substances	1987	1989		
UN Framework Convention on Climate Change (UNFCCC)	189	the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system	1992	1994	Subsidiary Body on Scientific and Technological Advice (SBSTA) Intergovernmental Panel on Climate Change (IPCC)	Large (plenary style) subsidiary body Independent , intergovernmental large-scale assessment
Kyoto Protocol of the UNFCCC	157	emissions reductions commitments for developed countries to 5% below 1990 levels	1997	2005		
Convention on Biological Diversity	188	- the conservation of biological diversity the sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of genetic resources	1992	1993	Subsidiary Body on Scientific Technical and Technological Advice (SBSTTA) Roster of Experts *ad hoc* Working Groups Millennium Ecosystem Assessment	Large (plenary style) subsidiary body Independent large-scale assessment
Cartagena Protocol on Biosafety	130	safe transfer, handling and use of living-modified organisms	2000	2003	N/A	N/A
Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	100	promote shared responsibility and cooperative efforts" in protecting human health and the environment and to contribute to the environmentally sound use of certain hazardous chemicals	1998	2004	Chemical Review Committee	Single, smaller scientific panel
Stockholm Persistent Organic Pollutants (POPs) Convention	114	to protect human health and the environment from twelve persistent organic pollutants	2001	2004	POPs Review Committee *ad hoc* Expert Group on Best Available Techniques and Best Environmental Practices for reducing the production of unintentional POPs	- several smaller scientific panels

Table I.1 – Overview of Case Selection

[2] As of December 2005

The theory developed in this thesis is based on materials gathered through participant observation, stakeholder interviews, surveys, a review of meeting reports and reactions, and a close reading of official documentation. Participant observation was carried out primarily from July 2002 to December 2005. During this period, I attended 16 meetings[3] related to the MEAs being studied as a report writer and editor for the *Earth Negotiations Bulletin*[4] *(ENB).* In this capacity, I was granted access to proceedings (including contact group meetings), and also had an opportunity to conduct both informal interviews and more structured interviews with my choice of participants and administrators. This material was supplemented with more detailed interviews with administrators, and an e-mail survey of some randomly selected COP participants (government delegates, non-governmental organization (NGO) representatives and SAB participants). ENB reports, other records and position papers related to the MEA's negotiations, and of course the MEA's official documents, were also rich sources of information.

Prior to introducing the cases, it is helpful to briefly explain how MEAs are negotiated and administered.

NEGOTIATION AND STRUCTURE OF MEAs

Multilateral environmental agreement negotiations (as opposed to bilateral discussions) bring many countries together again and again, and under these circumstances, certain norms have developed regarding the negotiation and administration of MEAs (Chasek, 2000). In fact, some are managed under the auspices of the UN or a UN agency like the UN Environment Programme (UNEP). For example, the majority of MEAs (including those addressing biological diversity,

[3] Due to scheduling conflicts, I was unable to attend in person meetings of the Ramsar Wetlands Convention. Nevertheless this case was still included in light of the richness of materials available from the Secretariat (including detailed minutes of meetings of subsidiary bodies) and access to stakeholders' interviews and surveys.

[4] ENB reports have become the record of note for many MEAs. While ENB is an NGO (a subsidiary of the Canada-based International Institute for Sustainable Development), it is most often contracted directly by the MEA's Secretariat to provide daily summarized reports of proceedings.

ozone layer depletion, desertification and chemicals management) are administered by UNEP or entities overseen by UNEP, and as a result they share some of the same operational characteristics, including for example conducting meetings in the UN's six official languages. In contrast, the Ramsar Convention on Wetlands is hosted by the World Conservation Union (IUCN).

Since the traditional approach to convening a large number of countries requires an official and institutionalized call for negotiations to begin, the moment of problem definition truly marks the initiation of any MEA. Problems have varied in the way and speed with which they have been put on the global agenda. In some cases, the UN may be pressed to act by a small group of countries who have already adopted national level legislation to deal with a problem (as illustrated by the role of northern countries with arctic interests in promoting action on persistent organic pollutants[5]). In other instances, specialists within a scientific community identify the need for action (as posited by Peter Haas in his discussion of epistemic communities pushing for the Mediterranean Action Plan[6]), or alternately events in the public eye may spur action (as occurred with global concern over the "ozone hole" and the negotiations that led to the ozone regime).

When an issue is "ripe[7]" for action, an international entity is charged with developing the text of a possible treaty. This can be a pre-existing body or a body specifically created for that purpose. It is often the UN General Assembly that will establish such a negotiating body (often called an Intergovernmental Negotiating Committee). This body's work can proceed over several

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[5] As described in Eckley, 2001, POPs were first addressed by a series of regional agreements, including the UN/ECE Convention on Long-Range Transboundary Air Pollution, whose Protocol on POPs was spurred by Canadian concerns about the level of POPs found in arctic indigenous populations.

[6] This is discussed in great details in Haas, 1990, and the applicability of this concept to other phenomena is discussed in greater detail in Haas et al, 1995.

[7] This notion of "ripeness" is analogous to what Kingdon (1995) refers to as "an idea whose time has come." In the international arena, "ripeness" is often signaled by agreement within the UN General Assessment to examine the need for a global agreement.

years (indeed, an average of ten years!), and its membership often grows as the discussions advance. For example, INC-1 for the Persistent Organic Pollutants (POPs) Convention drew delegates from 92 countries[8], while INC-5 (the last INC prior to the adoption of the Convention text) involved delegates from 122 countries[9].

The first step is generally to identify the scope of the problem and the objectives of a possible MEA and then negotiate a subsequent agreement with more specific objectives, in what has become the norm of the Convention/Protocol approach (Susskind, 1994). The initial text (the Convention) usually does little beyond specifying common beliefs and establishing an administrative infrastructure to pursue further negotiations. For example, while the Vienna Convention for the Protection of the Ozone Layer emphasized the need for cooperation on monitoring, and on data and research exchange[10], it is the Montreal Protocol on Ozone Depleting Substances that lays out phase-out schedules for banning CFCs and other ozone depleting substances[11]. Similarly, under the climate regime, Parties to the UN Framework Convention on Climate Change state their objective of "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system[12]" while it is the Kyoto Protocol which sets specific emissions reductions targets for Parties and puts in place mechanisms for achieving these targets[13].

Once the intergovernmental negotiating committee reaches consensus on a "convention text," it is adopted by those present, and opened for signature by those countries who wish to join. Signatories must then initiate a ratification process. The ratification process varies by

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[8] Earth Negotiation Bulletin, vol. 15, no.5, June 29 1998
[9] Earth Negotiation Bulletin, vol. 15, no.20, December 12 2000
[10] Text of the Vienna Convention, Article 2: "General Obligations"
[11] Text of the Montreal Protocol, Article 2: "Control Measures"
[12] Text of the UN Framework Convention on Climate Change, Article 2: "Objective"
[13] Text of the Kyoto Protocol to the UNFCCC.

country and refers to the administrative steps required to generate a national commitment (this can include parliamentary approval). For example, in the United States, the President must obtain the concurrence of the Senate (Hunter et al., 1998). The convention text usually specifies a minimum number of ratifying countries for entry into force. Once the convention enters into force, countries that have ratified it become Contracting Parties. Some conventions never reach this stage. When this occurs and there are no prospects for further ratifications, negotiations usually cease.

The threshold for entry into force is negotiated as part of the convention text and will vary according to the aims of the MEA. This is designed so that early ratifiers are not legally-bound by the convention unless a sufficient number of other countries are liable as well[14]. Perhaps the most elaborate requirement for entry into force was specified in the Kyoto Protocol. The Protocol's entry into force depended not only on its ratification by 55 Parties, but also required ratification by developed countries accounting for 55% of the emissions subject to reductions according to the Protocol[15]. This 55% requirement was designed so that either the United States or the Russian Federation (the two largest emitters subject to reductions) would have to ratify before the Protocol entered into force, thus protecting smaller emitters from being at a competitive disadvantage[16].

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[14] This is seen as a means of avoiding the so-called "free-rider" problem often associated with common-pool resources (Ostrom, 1990). Since access to common-pool resources (such as the atmosphere for example) can not practicably be restricted, free-riders will be able to reap the benefits of fewer greenhouse gases without having to take steps to reduce their emissions. Therefore if the convention entered into force right away, those few countries who ratified the Convention would be committed to (disproportionally) bearing the costs of action, while those countries who don't ratify, and don't bear these costs, will still benefit from the action of a few countries, thus becoming "free-riders."

[15] Kyoto Protocol Status of Ratification, UNFCCC Website, http://unfccc.int/essential_background/kyoto_protocol/status_of_ratification/items/2613.php accessed on November 19, 2005.

[16] ENB, vol. 12, no. 76, 13 December 1997

In the period between a convention's initial adoption and its entry into force, the negotiating body often continues to meet to specify additional obligations of future Parties. These "interim" negotiations generally cover controversial issues on which agreement remained elusive, or administrative details regarding day-to-day operations. Graph I.1 presents the idealized timeline for an MEA negotiation.

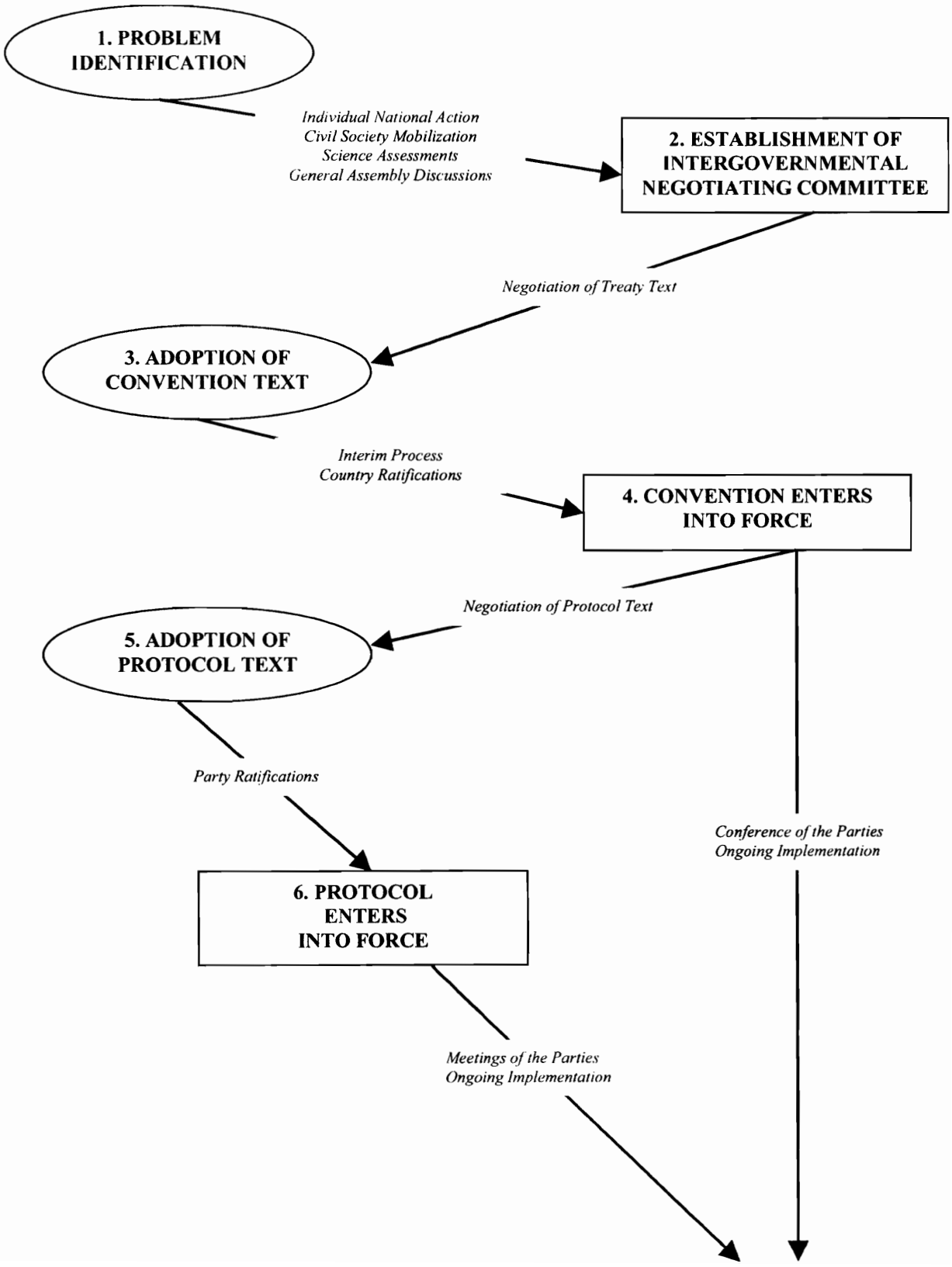
For example, under the Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, the interim process (still called the INC) met six times[17], and its work included "ironing out[18]"operational details of the secretariat, and resolving remaining disagreements in the Convention text, for example the membership of the Chemical Review Committee. In fact, the interim process under the PIC Convention is also unique in that it provided for beginning the process of reviewing potential chemicals for addition to the Convention's purview prior to the Convention's actual entry into force. This "interim PIC procedure[19]" allowed for countries to nominate chemicals, not included in the Convention text, so that they too be subject to the PIC procedure. Upon their nomination, these chemicals were reviewed by the Interim Chemical Review Committee (ICRC) to determine whether they met the Convention criteria for listing under the Convention. The INC then considered those chemicals whose nominations were forwarded to them by the ICRC and agreed to the listing of 13 additional chemicals. These decisions by the INC were then quickly approved by the Rotterdam PIC Convention Conference of the Parties (COP) at its first meeting,

[17] see www.iisd.ca/vol15/

[18] this reference to "ironing out housekeeping issues" was often employed by delegates and administrative support staff in discussing the matters at hand at these meetings.

[19] The details of the "interim process" were agreed upon in a "Resolution on Interim Arrangements" adopted at the same Conference of the Plenipotentiaries that adopted the Convention text in September 1998. (ENB, vol. 15, no. 99)

Graph I.1: The MEA Negotiation Process



and soon after it's entry into force the Rotterdam PIC Convention had already expanded its scope.

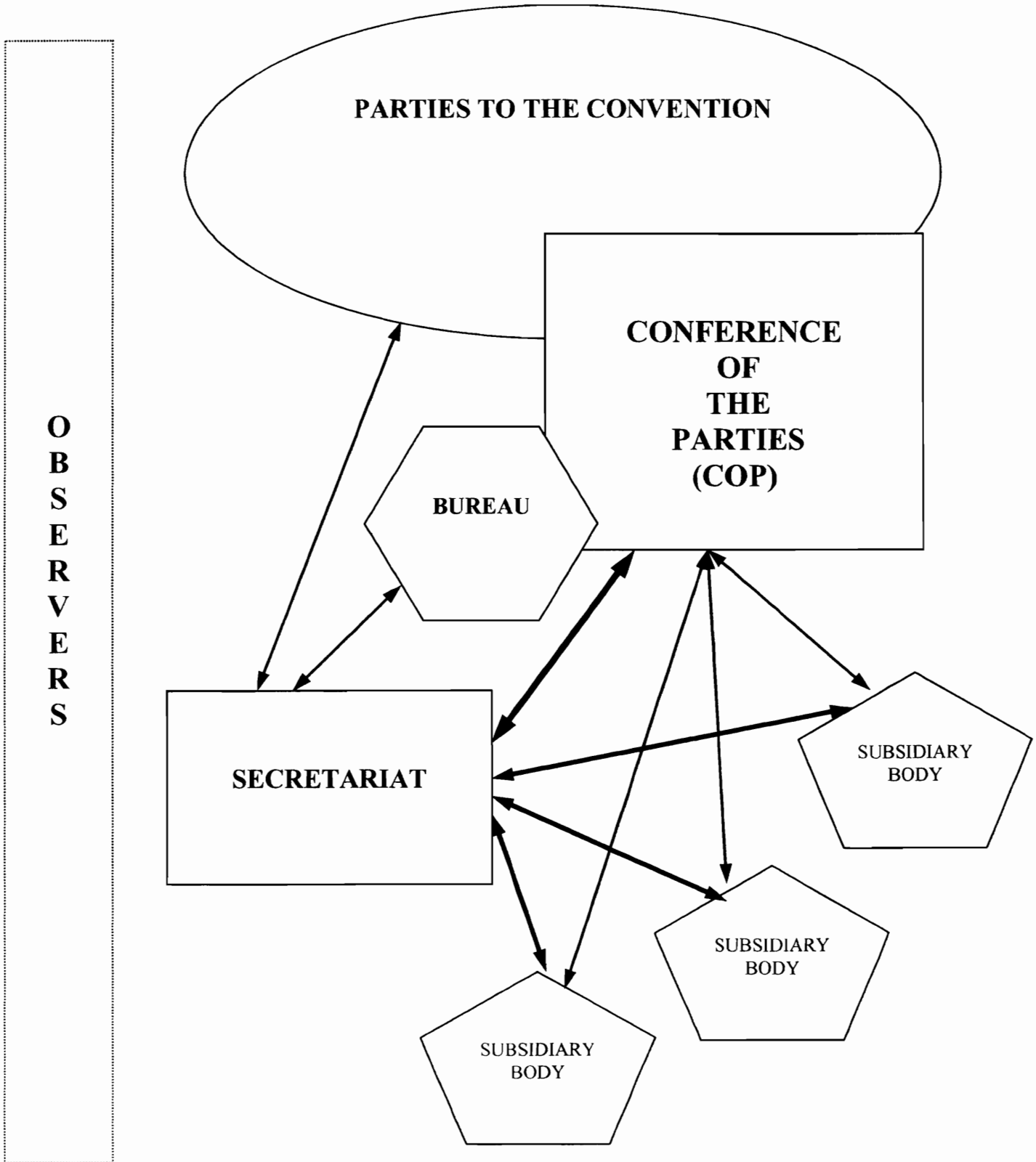
The convention sets in place an administrative structure, the core of which generally operates on an interim basis until the convention enters into force—though that is, of course, dependent on the signatories' willingness to provide financial support. In fact, the negotiations for the POPs Convention were financed by the "POPs Club[20]" a fund established by UNEP, and which collected voluntary contributions from governments, but also from intergovernmental organizations and non-governmental organizations, including for example a donation by the Inuit Circumpolar Conference at POPs INC-6. Throughout the negotiation and INC process of the Stockholm POPs Convention this POPs Fund was used to finance the Convention's negotiation and the interim process.

An MEA's administrative structure (see Graph I.2) generally involves a secretariat (which has a permanent staff and is self-standing or hosted by an international organization) and a Conference of the Parties (COP)– a body made up of representatives from all Contracting Parties which holds meetings at regular intervals (these intervals are usually spelled out in the Convention). It is the secretariat's responsibility to prepare material for consideration by the COP and these materials serve as the starting point for negotiation by Parties. At its first official meeting after ratification, the COP usually considers all resolutions brokered in the period between the Convention's adoption and its first meeting[21].

[20] http://www.chem.unep.ch/pops/POPs_Club/pops_club.htm

[21] The practice has evolved to use COP-1 as a shorthand for the first meeting of the COP, COP-2 for the second meeting, etc. This same practice applies to meetings of an intergovernmental negotiating committee (INC-1, INC-2...), or for a Protocol to meetings of the Meeting of the Parties (MOP-1, MOP-2...)

Graph I.2: The Administrative Structure of MEAs.



In some cases, the text of the Conventions also establishes subsidiary bodies (most often to provide science advice but also to oversee compliance and implementation). The COP also retains the authority to establish subsidiary bodies or *ad hoc* groups to carry out work between COP meetings. The structure of these science advisory bodies varies widely across MEAs, but can be broadly described as fitting into one of three categories: a large subsidiary science advisory bodies, one smaller scientific panel, or several smaller expert panels (Kohler, 2002).

Large (plenary) subsidiary science advisory bodies do not restrict membership and their meetings will generally be attended by government delegates and held in the traditional UN plenary format. For example, the Subsidiary Body for Scientific and Technological Advice (SBSTA) to the Framework Convention on Climate Change (FCCC) is, as specified in the Convention, "open to participation by all Parties (...), multidisciplinary" and made up of "government representatives competent in the relevant field of expertise.[22]" However, the Convention does not specify who determines a participant's competence, nor does it put in place a process for identifying relevant fields of expertise. In addition, participation by other stakeholders, for example from academia, industry and environmental non-governmental organizations is not addressed under the Convention, but rather is only covered as part of the Convention's rules of procedure. The implication of such membership considerations is discussed in greater detail in Chapter III.

In other instances, international environmental conventions have called upon one smaller scientific panel, a more limited group of specialists, to provide science advice. The Ramsar Convention on Wetlands has entrusted such a small committee -- The Scientific and Technical Review Panel (STRP) to provide its science advice[23].

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[22] UNFCCC Convention, Article 9: "Subsidiary Body on Scientific and Technological Advice"
[23] http://www.ramsar.org/about/about_strp.htm

International conventions have also called upon multiple expert groups to integrate scientific knowledge into policy-making. The Executive Body to the Convention on Long-Range Transboundary Air Pollution (LRTAP) has designated three separate panels to provide science advice. These are: the Working Group on Effects, the Working Group on Strategies and Review, and the EMEP Steering Body. The EMEP refers to the 1984 Protocol of the Convention and relates to a Co-operative Programme for Monitoring and Evaluation[24].

While meetings of the COP are usually plenary sessions with simultaneous translation into the Convention's official languages, contentious negotiations are often handled by smaller groups and are usually conducted in English only. Each COP elects a bureau, a small committee with equal membership from all regional groups[25]. This bureau meets regularly during the meeting of the COP itself and is also mandated with the supervision of intersessional meetings prior to the next meeting of the COP[26].

As COPs meet to monitor implementation, some adopt amendments or protocols, which in turn need ratification again to enter into force. These amendments often set specific targets and timelines, or put in place procedures intended to achieve specific goals. For example, while the Montreal Protocol set targets for reduction of CFCs and halons by developed countries, subsequent amendments not only accelerated the phase-out schedule, but expanded it to include phase-out commitments for developing countries, and introduced phase-out schedules for other ozone depleting substances not originally included under the scope of the Montreal Protocol[27].

In some instances, a Protocol can become the central focus of the regime and the Meeting of the Parties to the Protocol (MOP) may be more frequent that those of the Convention itself. For

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[24] http://www.greenyearbook.org/agree/atmosphe/lrtap.htm
[25] the definition of regional groups varies according to each MEA. This is discussed in greater detail in Box III.2.
[26] There is also a long-standing tradition in most MEAs that the President of the COP (and of the Bureau) be a high-ranking administrator from the COP meeting's host country.
[27] http://www.unep.ch/ozone/Treaties_and_Ratification/montreal_protocol_amendments.asp

instance, under the Ozone Regime, the Montreal Protocol, which sets out specific phase-out targets for ozone-depleting substances, has more frequent MOPs and a larger budget than the original Vienna Convention[28].

SIX MULTILATERAL ENVIRONMENTAL AGREEMENTS

Ramsar Wetlands Convention

Wetlands are a particular type of ecosystem whose definition has historically been contentious, but which, according to some estimates, cover at least 6% of the Earth's land surface. While wetlands have a long history of being drained and converted to other uses, from the 1960s there has been increased attention to their value of wetlands, first as wildlife habitats and then as polyvalent ecosystems, with implications for water supply, fisheries, agriculture, forestry and tourism.

The Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Wetlands Convention) was signed in Ramsar, Iran in 1971, and entered into force in 1975. As of December 2005, there are 147 Parties to the Convention, which aims to stem the progressive loss of wetlands.

The Convention defines wetlands as "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres." The Convention provides for Parties to designate within their territory wetlands "of international significance in terms of ecology, botany, zoology, limnology or hydrology." Each Party must designate one such wetland in order to ratify the Convention, but there are no limits to the number of wetlands each Party can add to this "List of Wetlands of International Importance."

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[28] ENB, Vol.19, no. 24, 2 December 2002

In its thirty-year existence, the COP has overseen the preparation of several recommendations on the management and protection of wetlands, which have been applied by managers at the local level, and, as of December 2005, Parties have listed 1524 wetlands of international importance, representing a total surface area of 129.2 million hectares.

The Ramsar Secretariat is hosted by the IUCN, and meetings of the COP are held at least once every three years[29]. A sixteen-member Standing Committee (reflecting the geographic distribution of Parties) is elected at each COP to oversee Convention matters until the next COP meeting. In 1993, the COP established a Scientific and Technical Review Panel (STRP) mandated with providing scientific and technical guidance to the COP, the Standing Committee and the Secretariat.

Ozone Regime: Vienna Convention and Montreal Protocol

The ozone layer is the stratospheric portion of the atmosphere protecting the earth from harmful ultra-violet rays, which are known to have detrimental impacts on natural ecosystems and also on human health, especially through higher incidence of skin cancer and cataracts. In the 1970s, scientists discovered that chlorofluorocarbon (CFC), an industrial compound widely used as a coolant and solvent, was reaching the ozone layer and leading to the breakdown of ozone molecules. Several large scale science assessments focused on this process, and in 1985 a team of scientists discovered evidence of an "ozone hole" over the Antarctic.

The Vienna Convention for the Protection of the Ozone Layer was adopted in 1985 and entered into force in 1988. It has 190 Parties and calls for cooperation in monitoring and data and research exchange. It was supplemented in 1987 by the Montreal Protocol on Substances that Deplete the Ozone Layer. The Protocol entered into force in 1989 and as of December 2005 had 189 Parties. The Montreal Protocol set out targets for developed countries (referred to as non-

[29] Article 6 of the Ramsar Convention

Article 5 Parties) to control ozone depleting substances (some CFCs and halons). Under the Montreal Protocol, developing countries (referred to as Article 5 Parties) were granted a grace period to continue their use of these chemicals prior to committing to control measures.

Subsequent amendments to the Montreal Protocol have set out accelerated phase-out schedules for an even wider range of ozone depleting substances for both developed and developing countries. Developing countries are granted a longer time-period for achieving phase-out, and these phase-out activities are supported by contributions from the Montreal Protocol Multilateral Fund.

Since its entry into force, Parties to the Montreal Protocol have successfully phased out the use and production of hydrobromofluorocarbons and bromochloromethane. Developed countries have also successfully phased-out their use of CFCs, carbon tetracholoride and methyl chloroform. Developed countries are also are expected to phase out methyl bromide by 2005, although several developed country Parties have been granted exemptions for critical uses of methyl bromide in 2006 and 2007[30]. Finally, developed countries are scheduled to phase-out consumption of HCFCs by 2030. As CFCs were first being phased out, HCFCs were widely used as CFC substitutes, but have more recently been found to have significant global warming potentials. Their rapidly increasing atmospheric concentrations has been the focus of discussion under the Climate regime as well.

Developing countries are required to phase out CFCs, halons and carbon tetrachloride by 2010, methyl chloroform and methyl bromide by 2015, and consumption of HCFCs by 2040. Production of HCFCs is scheduled for stabilization by 2016. The ozone regime is widely

[30] The review of these critical use nominations for methyl bromide have been the responsibility of the Methyl Bromide Technical Options Committee, and disagreement among Parties regarding the size of these exemptions have necessitated the convening of two extraordinary meetings of the MOP.

heralded as the most successful MEA (Parson, 2003), and was in fact used as a template in negotiating the Kyoto Protocol on climate change.

The Montreal Protocol MOP is convened on an annual basis, while the Vienna Convention COP meets every three years. Every three years the COP and MOP are held jointly. The Ozone Secretariat is hosted by UNEP in Nairobi. An Executive Committee, with 7 representatives each from Article 5 and non-Article 5 Parties oversees the work of the Multilateral Fund, which was established in 1992 to help Article 5 Parties cover the incremental costs of phasing out ozone depleting substances. Since its creation, the Multilateral Fund has disbursed over US$1.3 billion.

Leading up to the negotiation of the ozone regime, several large scale international assessments examined the question of ozone depletion, and at it's first meeting in 1989, MOP established a Scientific Assessment Panel, an Environmental Assessment Panel and a Technology and Economic Assessment Panel (TEAP) to provide Parties with science advice. The TEAP's work is subdivided into several Technical Options Committees (TOCs), which have been reorganized several times to meet science advice needs of the MOP. These TOCs are tasked with reviewing Parties' critical use exemptions for chemicals scheduled for phase out for which no suitable alternatives exist.

For example, in the case of methyl bromide, several developed-country Parties, committed to a methyl bromide phase-out by 2005, have submitted critical use nominations to the Methyl Bromide Technical Options Committee (MBTOC), outlining specific uses for which no suitable alternatives to methyl bromide are available. The MBTOC is tasked with reviewing these nominations, and forwarding to the MOP recommendations for granting critical use exemptions to the applicant Parties. Since beginning to review these nominations, the MBTOC has approved the bulk of these exemptions, and in fact many environmental non-governmental organizations

have highlighted the fact that some Parties' critical use exemptions as approved by the MOP signify a steady increase in their methyl bromide use. This issue of critical use exemptions for methyl bromide has been the most contentious focus of negotiations in the ozone regime. It has spurred the convening of two extraordinary meetings of the MOP prior to approving the exemptions, as the MOP has twice turned to the MBTOC for clarification prior to approving exemptions.

Biodiversity Regime

The rapid extinction of species worldwide has long been noted as an issue of great concern, and many have underscored its implications not only for ecosystem health, but also for economic development, especially with regard to increased vulnerability of food stocks and lost opportunities to identify economic and medicinal uses of extinct species.

In 1992, at the UN Conference on Environment and Development (also known as the Rio Earth Summit), countries adopted the Convention on Biological Diversity, which aims to promote "the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of genetic resources." The Convention entered into force in 1993, and as of December 2005 has 188 Parties. In 2000, the Convention was supplemented by the Cartagena Protocol on Biosafety which entered into force in 2003 and as of December 2005 has 130 Parties. The Cartagena Protocol focuses on living-modified organisms[31] (LMOs), addressing in particular their safe transfer, handling and use by establishing an advance informed agreement procedure for imports of LMOs. Many of the obligations under the biodiversity regime relate to the development and ratification of national legislation and action plans to further the goals of the Convention and Protocol.

[31] outside of the MEA realm these are most commonly referred to as genetically-modified organisms.

The COP meets every two years, while the MOP meets annually. The Biodiversity Secretariat is administered through UNEP, and oversees COP and MOP meetings as well as several *ad hoc* working groups. These smaller working groups are granted limited mandates (both in terms of the number of times they are to meet, and the scope of the issue they are to address), and bring together legal, technical or scientific experts to focus on issues such as indigenous knowledge, access and benefit sharing, liability and redress and protected areas. Two clearing-houses (the Clearing-House Mechanism and the specialized Biosafety Clearing House) have been established to facilitate capacity building and the transfer of information among Parties. These entail web-portals that serve as a platform for Parties to make available information on their implementation (for example models of legislation and action plans) or more specific information on their biodiversity (for example taxonomic information) for consultation by other Parties and observers. The Clearing-House Mechanism also maintains a database to catalogue opportunities for partnerships for capacity building and technology transfer.

Under the biodiversity regime, the main conduit for science advice is the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA), which meets twice in between COP meetings in plenary style with no constraints on participation. This body is supplemented by a Roster of Experts, which is maintained by the Secretariat. Names can be added to this Roster, again without limitations, and the Roster is available online (with information on experts area of specialization, nationality and location) for consultation by Parties seeking expert advice. A great deal of science advice is also generated through the work of the many *ad hoc* groups described above.

Large-scale biodiversity science assessments have alaso been undertaken, although not directly under the control of the COP. Most recently, the Millennium Ecosystem Assessment concluded in 2005 that biodiversity loss is occurring at unprecedented rates worldwide and identified several drivers for this biodiversity loss, including climate change.

Climate Regime

Since the industrial revolution, there has been a rapid increase in atmospheric concentrations of so-called greenhouse gases, gases that have heat-trapping properties and accentuate the natural occurring greenhouse effect. It is widely expected that these unprecedented concentrations of greenhouse gases are contributing to long term climate change. This in turn can have significant long-term impacts, including extreme weather events, glacial melting and sea level rise. The most notable of these "greenhouse gases" are CO_2 (carbon dioxide- the result of combustion reactions, and of particular concern in this case the use of fossil fuels such as petroleum and coal), CH_4 (methane – the product of anaerobic decomposition, mostly arising from agricultural production), and N_2O (nitrous oxide – also arising from agricultural production and in particular chemical fertilizer use).

This phenomenon was examined by a series of international science panels in the 1980s, and in 1988 the World Meteorological Organization (WMO) and UNEP jointly established the Intergovernmental Panel on Climate Change (IPCC), a scientific body open to all country-members of either WMO or UNEP.

The IPCC released its First Assessment Report in 1990 (it is now preparing its Fourth Assessment Report). This served as the basis for negotiations for a UN Framework Convention on Climate Change, which was adopted in 1992 at the Earth Summit. The UNFCCC entered into force in 1994 and its objective is the "stabilization of greenhouse gas concentrations in the

atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." The UNFCCC was supplemented by the Kyoto Protocol, which was adopted in 1997 but only entered into force in February 2005. It sets out emissions reduction objectives for developed countries[32], for an aggregate emissions reduction level of 5% below 1990 levels by 2008-2012. The UNFCCC COP meets on an annual basis, and the Kyoto MOP-1 took place in early December 2005, during which Parties began discussions for a framework for negotiating post-2012 emissions reduction commitments for developed countries but also for some rapidly growing developing countries.

The text of the Convention does not explicitly make reference to the IPCC, and instead establishes a Subsidiary Body on Scientific and Technological Advice (SBSTA) to "undertake work on methodological and scientific matters as they relate to the Convention and the Kyoto Protocol process[33]."

Nevertheless, the IPCC has continued to operate in parallel to the climate regime and in practice its ongoing work is closely tied to the UNFCCC and the Kyoto Protocol. For instance, the IPCC has taken a lead role in developing guidelines for assessing how changes in land use (for example through reforestation) affect the global carbon cycle (for example by stocking or releasing more carbon unit equivalents), and more specifically how to measure these effects. The IPCC is administered by its own small secretariat, hosted by the WMO. It is funded through government contributions to the IPCC Trust Fund and through the provision of in-kind services by governments and institutions.

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[32] As of December 2005, the UNFCCC has 189 Parties, while the Kyoto Protocol has 157.
[33] http://unfccc.int/methods_and_science/items/2722.php

Rotterdam Prior Informed Consent (PIC) Convention

The growth in the international trade of chemicals since the 1960s and 1970s coincided with growing awareness of the threat many of these chemicals posed to both the global environment and human health. Today world trade in chemicals is described as exceeding US$400 billion per year[34]. The Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade was adopted in 1998 and entered into force in 2004, as of December 2005 100 countries are Party to the Convention. The PIC Convention was negotiated under the auspices of both the UN Environment Programme (UNEP) and the Food and Agriculture Organization (FAO), building upon a voluntary information exchange program put in place in the mid 1980s.

The Rotterdam PIC Convention applies to "banned or severely restricted chemicals and severely hazardous pesticide formulations." Parties aim to "promote shared responsibility and cooperative efforts" in protecting human health and the environment and to contribute to the environmentally sound use of certain hazardous chemicals. This latter goal is achieved through the facilitation of information exchange about characteristics of listed chemicals; a national decision-making process on their import and export; and the dissemination of a Party's decision relating to a chemical's import to other Parties.

While the PIC Convention does not regulate, control, or restrict the production or use of the chemicals under its purview, the listing of chemicals under the PIC Convention requires their standardized labeling in international trade, and requests Parties to decide whether, and under what conditions, to authorize the import of a listed chemical.

The Secretariat administering the Convention is divided between UNEP and the Food and Agriculture Organization (FAO), with the UNEP branch of its Secretariat also assuming

[34] http://www.ril.com/media/speeches/mda/nm_speechesmda_futureofchem.html

administrative oversight of the Stockholm Persistent Organic Pollutants Convention (this "sister" convention is described in greater length below). The PIC COP meets on an annual basis, and its subsidiary science advisory body is the Chemical Review Committee (CRC), which meets annually as well.

The review of the proposed listing of a chemical, and the drafting of the Decision Guidance Documents (based upon which a Party decides whether to allow a chemical's import), both fall under the responsibilities of the CRC. Even prior to the Rotterdam PIC Convention's entry into force, the CRC was convened in an interim form. This Interim CRC (ICRC) reviewed many applications for expanding the Convention's scope, and at the COP's first meeting, Parties approved the addition of 13 chemicals based on the ICRC's recommendations.

Stockholm Persistent Organic Pollutants (POPs) Convention

Persistent Organic Pollutants (POPs) are chemicals that are known to bio-accumulate in living organisms (the best known of these is perhaps DDT whose nefarious effects were famously documented in the 1970s by Rachel Carson), yet more recently it has come to light that many POPs are transported long-distances in the atmosphere and have been found to disproportionally affect populations living in northern latitudes. A focus on POPs at the global level was first initiated in 1995 when UNEP's General Council launched a global scale assessment on POPs, which was followed by negotiations for a Convention. The Stockholm POPs Convention was adopted in 2001 and entered into force in 2004. As of December 2005, The Stockholm POPs Convention has 114 Parties.

The Stockholm POPs Convention aims to protect human health and the environment from 12 persistent organic pollutants (often called the "dirty dozen"). These twelve POPs are described as falling into three categories of chemicals: pesticides, industrial chemicals and unintentional by-

products. As of December 2005, the pesticides covered under the POPs Convention are aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex and toxaphene; the industrial chemicals are hexachlorobenzene (HCB) and polychlorinated biphenyls (PCBs); and dioxins and furans are the unintentional by-products identified under the Convention. The POPs Convention provides for the elimination of nine of those chemicals, restrictions on the production and use of DDT, and guidance on the best available techniques and best environmental practices for preventing or reducing the release of unintentional by-products.

The Convention is administered by a Secretariat, which operates jointly with the PIC Secretariat. The Convention text provided for the establishment, at POPs COP-1 of a POPs Review Committee (POPRC). The POPRC is charged with reviewing nominations for listing additional POPs under the Convention. The POPs Convention also draws on other subsidiary *ad hoc* groups for science advice, including an Expert Group on Best Available Technologies and Best Environmental Practices (BAT/BEP).

THESIS STRUCTURE

This thesis argues that the most important output of science advisory bodies like the ones described above is the generation of a valid and sustainable scientific consensus, which can serve as a basis for MEA policy negotiations. I propose that such a consensus necessitates representative membership and a transparent and flexible process. Chapter II discusses the dynamics of science advice for global environmental policy-making and describes the necessary attributes of a global science consensus. Chapter III presents the diversity considerations that I think might be taken into account in ensuring an SAB's representative membership. Chapter IV explains how transparency and flexibility in the SAB's organization of its work bolster both the validity and the sustainability of the resulting science consensus. In Chapter V, I offer

recommendations for designing a better system for providing science advice to MEAs. I then illustrate how a "three-tier science advisory body" might work in the context of the biodiversity regime.

CHAPTER II: SCIENCE IN GLOBAL ENVIRONMENTAL POLICY-MAKING

"I NEED SCIENTISTS!" This emphatic call blared across the cover of the November 5th, 2001 issue of Newsweek magazine as Tom Ridge, the newly appointed head of the US Department of Homeland Security, sought to reconcile conflicting expert views for dealing with evidence of anthrax in the US Senate.

Public policymakers have long been focused with harnessing science for policy needs, and this interest has traditionally been focused in science policy, identifying means of influencing scientific endeavors to best cater to policy needs (Kuehn and Porter, 1981). In parallel, the science community has also sought to ensure that its output is tailored to such policy needs, through the pursuit of what Charles Lindblom called "usable knowledge" (Lindblom, 1979).

This client-driven approach to the science policy interface has spawned the development of a myriad of decision-making tools, such as cost-benefit analysis, as a means of facilitating public decision-making (MacRae Jr and Whittington, 1997; Barker and Peters, 1993; Guston, 2000; Bardach, 2000). In a national policy context, this scientific input is often mediated through the establishment of panels or consultations, where a subset of experts is consulted for answers (Switzer, 2004).

A growing segment of scholarship, rooted in the field of science and technology studies (STS), has been questioning this notion of science providing clear answers to policy questions. In 1986, Collingridge and Reeve challenged this notion of science "speaking truth to power," highlighting both policymakers' "myth of rationality" – whereby policymakers seek the one answer based on "all relevant facts" – and the science community's "myth of the power of

science" – whereby it is assumed that science can indeed "fulfill this role" (Collingridge and Reeve, 1986).

These myths of the power of the science community, including the myth of authoritativeness, are quite evident in the context of science advice for environmental problems (Sarewitz, 1996; Sarewitz, 2000). Environmental threats often fall under the realm of what Funtowicz and Ravetz call "post-normal science," problems of high uncertainty and high decision-stakes that are not easily resolved through traditional concepts in science (Funtowicz and Ravetz, 1992; Saloranta, 2001). In addition, STS scholars have been highlighting the extent to which the scientific process is "socially constructed," subject to norms and preconceptions, thus further questioning the notion of "objective" fact (Jasanoff, 1990; Schackley, 1996; Jasanoff and Wynne, 1998).

In addition to the complexities arising from environmental challenge's high levels of uncertainty and high decision stakes, their transboundary nature and the management implications of what are often common pool resources (Ostrom, 1990; Keohane and Ostrom, 1995), have prompted the global community to enter into a variety of multilateral environmental agreements (MEAs) as a means of brokering coordinated global action.

These global environmental negotiations are technically intensive, and there are essentially three options for providing science advice to a MEA process. The first would be to allow each negotiating stakeholder to rely on their own science advisors – although this has the potential of bringing adversarial science debates into MEA policy-making. The second calls for independent international science assessments on overarching global environmental issues. These include, for example, the recently completed Millennium Ecosystem Assessment. However, these are multi-year endeavors that are often criticized for their lack of policy responsiveness. The third would involve the establishment of science advisory bodies specifically tailored to each MEA. It is this

latter option that has been the preferred option for most MEAs, and I propose here that these SABs are essential to the MEA policy process. They help to broker a consensus on the state of the science that serves as a basis for policy negotiations.

SCIENCE IN MEAs

Multilateral environmental agreements are only recently the subject of scholarship, and the bulk of the research to date has focused on assessing the effectiveness of these regimes and understanding obstacles to and sources of their success (Young, et al, 1999; Young and Demko, 1996; Miles et al, 2002; Wettestad, 2001). While little of this research focuses exclusively on the provision of science advice in these MEAs, several scholars have identified science advice as one of the key ingredients in successful MEAs.

Young and Demko identify the integration of scientific knowledge, as one of the necessary components of an effective international environmental regime[35]. Patricia Birnie highlights the failure to obtain scientific advice as one of the weaknesses of the original International Convention for the Regulation of Whaling[36]. She emphasizes the importance of "independent scientific groups" and "commonly agreed-upon scientific data" for developing effective environmental regimes. Similarly, Nicholas Guppy identifies a "lack of understanding of the biosphere and its functioning" as one of the underlying causes of failure of international land resource regimes[37].

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[35] p. 237 in Young, OR and Demko, GJ. (1996). Improving the Effectiveness of International Environmental Governance Systems. In Young, OR, Demko, GJ and Ramakrishna, K (Ed.). Global Environmental Change and International Governance (pp. 229-246) Hanover: University Press of New England.

[36] p. 66 in Birnie, P. (1996). Regimes Dealing with the Oceans of All Kinds of Seas from the Perspective of the North. In Young, OR, Demko, GJ and Ramakrishna, K (Ed.). Global Environmental Change and International Governance (pp. 47-92) Hanover: University Press of New England

[37] p. 152 in Guppy, N. (1996). International Governance and Regimes Dealing with Land Resources from the Perspective of the North In Young, OR, Demko, GJ and Ramakrishna, K (Ed.). Global Environmental Change and International Governance (pp. 136-165) Hanover: University Press of New England

The necessity of incorporating science has been particularly emphasized in the context of global action on climate change. In their 1996 article, Tim O'Riordan and Andrew Jordan provided an institutional definition of science as "an articulation of knowledge, a structure of self-examination, and a product of dominant political and social interests." They also identified scientific knowledge as one of the triggers of policy change. They further identify the Intergovernmental Panel on Climate Change (IPCC) and the "impartial" scientific knowledge it provided as a great influence on the United Nations Framework Convention on Climate Change (UNFCCC)[38].

Much of the existing scholarship on science in MEAs has focused on the role of scientists in placing an environmental problem on the global policy agenda, and to scientists as contributors to civil society input into MEA negotiations (Haas, 1990; Corell, 1999; Lohan, 2003; Dimitrov, 2003). The International Council for Science (ICSU) has also prepared several special reports focused on harnessing the ability of the world science community to meet MEA needs.

There is rapidly evolving scholarship focusing specifically on the institutional features of the science advisory process for MEAs. Many of these are in-depth case studies of specific regimes that examine how science advice is taken up by policy-makers. Several research endeavors arising out of Harvard's Global Environmental Assessment project have focused on how different institutions have incorporated science into policy-making for sustainable development, emphasizing in particular the importance of enhancing the salience, credibility and legitimacy of the information being produced (Cash, 2003; Litfin, 1998).

There are also research efforts focusing on the science advisory process associated with the Ozone Regime (Parson, 2003), the Biodiversity Regime (Gupta, 2004), and the Climate Regime

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[38] p. 91 in O'Riordan, T. and Jordan, A. (1996) Social Institutions and Climate Change in O'Riordan, T. and Jäger, J. (Eds.) Politics of Climate Change: A European Perspective (pp. 65-105) London UK: Routledge

(Miller and Edwards, 2001). Over the last five years, there have been several overviews cataloguing the myriad of science advisory bodies associated with MEAs (Fritz, 2000; National Research Council, 2002; House of Lords, 2005). In 2000, Andresen et al. also carried out a systematic comparative overview of science and politics in five international environmental regimes, which concluded that while institutional factors were important, the state of knowledge "seems to be a more important determinant [of success] than organization and procedure."

SABs AS SITES OF KNOWLEDGE PRODUCTION

Once an MEA enters into force, it is typical to establish a science advisory body to meet the COP's decision-making needs (see Chapter I). At first glance, and in most examinations of SABs in MEAs, the SABs are identified as "assessors" of knowledge. For example, the IPCC describes its role as "assess[ing] on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation[39]." In fact, the official description of the IPCC further limits its mandate by specifying that "the IPCC does not carry out research nor does it monitor climate related data or other relevant parameters."

Similarly, under the Convention on Biological Diversity, the first tasks explicitly assigned to the Subsidiary Body on Scientific, Technical and Technological Advice in the Convention text (Article 25) apply to "provid[ing] scientific and technical assessments of the status of biological diversity" and to "prepar[ing] scientific and technical assessments of the effects of [...] measures taken." In the same vein, under the Vienna Convention for the Protection of the Ozone Layer, the need for scientific and technical information stresses the collection and exchange of information, while under the Ramsar Wetlands Convention, the Scientific and Technical Review Panel was

[39] About the IPCC, www.ipcc.ch

established to "review," and in some cases "evaluate," aspects of the work of the Convention's Bureau, Standing Committee and COP.

Yet, even if the mandate of the SABs focuses on a review of existing knowledge, in carrying out their work the experts taking part in the SAB are in fact doing much more, even if this aspect of their work is not always explicitly acknowledged by those carrying out this work (van der Sluijs et al., 1998). Nevertheless there is an emerging field of scholarship acknowledging the extent to which these science advisory bodies, at the national and global level, are acting as more than mere compilers of scientific information, but are in fact sites of knowledge production (Jasanoff and Wynne, 1998; Miller and Edwards, 2001; Jasanoff and Martello; 2004). In taking a closer look at this production of knowledge, it is useful to consider three broad types of knowledge production: framing and agenda setting; classification and standards; and methods. Of course there are many interlinkages among these, and while they are by no means independent of each other, they can provide useful lenses for shedding light on how these SABs are more than just assessors of knowledge.

Framing and Agenda Setting

In the realm of policy analysis, there is an increasing recognition of what are often tacit frames in shaping public policies (Schön and Rein, 1994). And just as framing shapes laws at the national level, it also comes into play in the realm of global environmental policy, first in setting an MEA's objective and scope, but also in reshaping concepts as MEAs are implemented.

As the UN Framework Convention on Climate Change was being negotiated, policy-makers decided to focus regulation efforts on several greenhouse gases with differing global warming potentials (Miller and Edwards, 2001). This concept of global warming potential, which allows the conversion of greenhouse gases to be expressed in terms of carbon emissions, was first

formally introduced in a 1990 issue of Nature, and its definition was then taken up under the Intergovernmental Panel on Climate Change. This concept was embraced by both scientists and policymakers in examining the question of climate change (Jasanoff and Wynne, 1998) and helped further the notion that carbon was "fungible" – basically that any reductions of emissions converted to tons of carbon through their global warming potential would be equivalent regardless of their source (Ramakrishna, 1999). Even though the method for assessing this global warming potential continued to be debated in the scientific realm long after its development (for example Smith and Wigley, 2000), it rapidly influenced the development of tools under the global policy framework designed to take advantage of this feature, for example the creation of markets for trading carbon internationally (Greenwire, 7/11/2005). Yet, this framing has not been without criticism, for example in 1991 the Centre for Science and the Environment based in New Delhi highlighted the ethical implications of putting what it called "luxury emissions" (for example arising from the use of an SUV in a developed country) and "survival emissions" (for example emanating from cultivating rice paddies in a developing country) on the same footing.

Furthermore, by emphasizing emission levels of a target substance, be they greenhouse gases or ozone depleting substances, any framework for action will implicitly favor policies which regulate producers, thus avoiding directly regulating the consumers of the goods and services whose production generates the target compounds. In contrast, experts to the Convention on Long-Range Transboundary Air Pollution, which most centrally addresses problems of acid rain in Europe and North America, developed a concept of "critical load" which takes into account the conditions of the receiving environment and transport patterns in setting thresholds for certain chemicals (Wettestad, 2000). Such a frame requires ongoing collaboration between

scientists and policy-makers as they negotiate appropriate emissions reductions, and can be summarized as an "effects-focused" rather than "production-focused" approach.

Under the more recent chemical-related PIC and POPs Conventions, negotiators stepped away from a chemical production or even consumption framework, instead framing their efforts as relating to "chemicals management." In negotiating the terms of reference for these Conventions' expert groups (the PIC Chemical Review Committee, the POPS Review Committee and the POPs expert group on Best Available Techniques and Best Environmental Practices), the need to call upon "experts in chemical management" was a clear focus of negotiators. Some interviewees even emphasized the distinction between "scientists" and "experts in chemicals management." This latter notion values practical experience in using or supervising the use of the relevant chemicals, their alternatives and in monitoring their effects (especially on health and the environment). Logically, this concept of chemicals management was framed by those active throughout the negotiation process, which were mostly government administrators (often from agricultural or pesticides divisions) or representing the industrial sector (where a lot of knowledge in developing, using and applying pesticides and other chemicals is garnered). Consequently, maintaining this notion of expertise as a standard for participation in the relevant SABs might not only hinder participation by "outsiders" with differing areas of expertise, but may also delay expert-driven reframing.

Framing is not limited to an MEA's development phase, and re-framing repeatedly occurs throughout the implementation phase. Under the ozone regime, while the initial framing for the Vienna Convention and the Montreal Protocol focused on reducing the production and use of CFCs and halons, amendments were adopted in 1990, 1992, 1995, 1997 and 1999 reframing the regime to address a broader "basket" of ozone depleting substances, such as HCFCs and methyl

bromide (Parson, 2003). In particular, broadening the regime's scope to include methyl bromide, especially when it is used as a fumigant in the agricultural sector, not only reframed the ozone concern away from what had been perceived as an atmospheric concern arising from industrial activities, but also affected the range of stakeholders taking part in activities of the COP and the Methyl Bromide Technical Options Committee.

Under the Wetlands Convention, the Scientific and Technical Review Panel (STRP)'s relative freedom of operation has given its members the opportunity to coordinate efforts among the wider wetlands-research community to reframe concepts applicable to the global protection of wetlands. For example, leading up to the 12th meeting of the STRP Heather McGray spearheaded the development of an integrated framework for water resource management, even though it "was not in the original mandate" (STRP-12 Report, 2005). Such reframing has the potential of redefining wetlands approaches at the more local scale.

In the day-to-day operation of an MEA, reframing is often signaled in the setting of agendas for future work of the COP and its SAB. Under the most prevalent approach to science policy (emphasizing government's influence on the science sector more than the reverse), the process of setting research priorities is seen as falling squarely under the responsibility of the policymaker (Barker and Peters, 1993; Guston, 2000). According to many models of science policy, the government drives the research focus and productivity through the allocation of funds, which emphasizes more socially desirable areas of research. At first glance the research agenda of SABs at the global level faces similar drivers, with limited manpower and financial resources influencing the amount of work that can be carried out. And, indeed, it is often the COP to an MEA which will set the priorities among the tasks assigned to the SAB.

Since its 1993 establishment, the Wetlands Convention's STRP, throughout its many incarnations, has played an important role in driving the agenda for future areas of work under the Convention. The STRP members are central in identifying thematic areas warranting further research. At the end of each triennium, STRP members identify topics warranting investigation during the upcoming triennium[40]. These are reviewed by the Standing Committee and forwarded to the COP for its adoption – under the revised *modus operandi*[41] (adopted by COP-9 in November 2005), this agenda-driving role of the STRP is further enhanced by specifically including the identification of high priority areas of work for the next triennium as one of the Panel's many responsibilities.

The STRP has significantly influenced the agenda-setting process by developing new terminology for distinguishing the relative importance of tasks in its Work Plan. In particular, tasks are divided into those deemed of immediate priority ("which should be initiated by the STRP as early as possible in the 2006-2008 triennium using available resources") and those of high priority ("which should be initiated during the 2006-2008 triennium as and when the resources available to the STRP permit"). The STRP workplan often also identifies tasks of lower priority, tasks that fall under the ongoing work of the STRP, and even tasks that should be postponed to a subsequent triennium.

Yet, it is interesting to note that even as the Wetlands Convention has the most explicit mechanism for agenda-setting through the SAB, when discussing the issue of agenda-setting, the Convention's decision-makers and higher-ranking administrators were more likely to paint a picture of a clear-cut top-bottom approach to agenda setting, whereas those directly involved in

[40] interviews with STRP members and administrators
[41] RAMSAR COP9 DR12

the STRP more openly acknowledged the indirect ways in which the STRP drives agenda-setting.

Standards and Classification

Much as framing comes into play in defining an MEA's scope and objectives prior to implementation, the mere naming of the issue and its components can play a critical role in creating new standards, classifications and categories for organizing an MEA. As Geoffrey Bowker and Susan Star have explained in Sorting Things Out, classification and standards can have far reaching impacts, even if they are often "ordinarily invisible."

Nominalism can happen throughout the negotiation and implementation of MEAs, and can vary in its implications for the broader world beyond the administration of a particular MEA. For instance, under the climate regime, assigning the label of "greenhouse gas" to a naturally-occurring gas such as carbon dioxide (previously considered inert and inconsequential in the realm of pollution) forces it under the scope of regulation and can help to focus attention on its emissions. Similarly, under the Rotterdam Convention on PIC, the Interim Chemical Review Committee, in examining nominations of several new chemicals for inclusion under the Convention's scope, agreed that three should in fact be treated as one class of chemical for the purposes of the Convention (ICRC Report, 2002). In this particular context, it is foreseeable that such a development would impact not only procedures of global trade but also each Parties' chemicals management as well.

Again under the PIC Convention, negotiators introduced a requirement of "risk evaluation" in the Convention's requirement for listing new chemicals. In its interim incarnation, the Chemical Review Committee determined that this "risk evaluation" related neither to hazard assessment nor to risk assessment – but "something in between." The Interim CRC generated a

note trying to define this notion, which was forwarded to the INC, to the COP and then back to the CRC. In preparing such explanatory materials, the expert Committee is making judgments as to which risks are reasonable justification for action, and as to the appropriate norms for assessing these risks (discussed in greater detail under methods).

Yet, nominalism can also hinder implementation progress in the long-run. In the negotiations leading up to the Cartagena Protocol on Biosafety, the Expert Group arduously defined a concept of "living modified organism (LMO)" (as opposed to the widely-used "genetically modified organism") (Gupta, 2004). In her work, Gupta emphasizes the importance of "ambiguity and openness to flexible interpretation," and this same ambiguity contributed to achieving the delicate balance necessary for brokering an agreement on the Protocol text, and has also carried through to continuing negotiations now that the Protocol has entered into force.

For instance, at the 2nd Meeting of the Parties to the Cartagena Protocol in June 2005 delegates revisited the issue that had, by most accounts, threatened to derail what were already delicate negotiations for a Protocol text. The final consensus forged as negotiations threatened to collapse related to retaining ambiguity as to the requirement for thresholds for certifying whether international shipments contain "LMOs for food, feed or processing (LMO-FFPs)." In this case, this ambiguity and flexibility for interpretation led to further confusion as Parties at MOP-2 lengthily, and to no avail, deliberated trying to reach common ground as to how to determine whether shipments should be labeled as containing these LMO-FFPs.

Yet, an important obstacle to classification by SABs relates to what is often the limited applicability of categories developed to fulfill the needs of a specific MEA. Under the Wetlands Convention, the STRP has contributed over its tenure to the development of what it refers to as "Ramsar terminology." Indeed, at the 12th meeting of the STRP, in reviewing the wetlands-

related output of the Millennium Ecosystem Assessment, the STRP acknowledged the limits to including this "Ramsar terminology" in a report from another body. Yet, the limitations to such classification is illustrated by the STRP's discussion of the evolution of the term "wise use" under the Wetlands Convention, and the parallel yet divergent evolution of the "wise use" concept in the context of the Millennium Ecosystem Assessment and the Convention on Biological Diversity.

Similarly, under the climate regime, the IPCC has been instrumental in setting norms for classifying the appropriateness of carbon capture projects through the preparation in 2000 of a special report on land use, land use cover and forestry. This classification is expected to have lasting implications for the implementation of the Kyoto Protocol , and especially the potential for emissions trading through the Clean Development Mechanism.

Methods

Through their work, SABs are building upon and evolving existing norms for assessing and validating methods for knowledge production. The evolution of standards of proof, especially in the context of courts, has been well documented at the national level (Jasanoff, 1990 and 1995), and at the global level SABs are permanently assessing and re-assessing these means of producing knowledge, including those arising from experimental investigations, from broader assessments and analyses, and from reviews of existing knowledge. Just as framing and nominalism is contingent on contributors' values and policy judgments, SAB participants are often incorporating their unique combination of perceptions not only of these methods but also of broader issues (such as underlying attitudes towards risk) in deciding how to vouch for and include the array of different methods relevant to their work.

At the international level, these divergences over risk have come to the fore in a variety of fora, most visibly in the context of a dispute under the World Trade Organization over the EU's decision to delay the approval of genetically modified crops (Winickoff et al, 2005). In addition, several MEAs have had to openly tackle reconciling what are often widely varying notions of risk as they have incorporated structures or requirements for risk assessment as part of their implementation, and is generally up to the SAB to ensure these risk assessments are carried out appropriately.

The text of the Stockholm POPs Convention lays out guidelines for risk assessment as part of the process for adding chemicals to the Convention's scope and it is the POPs Review Committee that determines whether the burden of proof has been met. In effect, Committee members are deciding whether long-term risks outweigh short-term benefits, for example contrasting the health and environmental implications of long-range transport with the socioeconomic implications of regulating or reducing a chemical's use or switching to an alternative chemical. This is in turn closely linked to the SAB's membership (discussed at greater length in Chapter III), as it is reasonable to expect for example that participants representing arctic indigenous communities will give more weight to long-term health effects of DDT use while those representing health managers in tropical zones may be more concerned with finding, in the short term, viable alternatives to DDT for disease vector management.

Nevertheless these very individual variations in approaches to risk are impossible to generalize according to institutional, disciplinary or national affiliation and are furthermore difficult to reflect or account for in any declarations of interests. It is also very challenging to reflect these competing frames in the SAB's final output. For example, under the Rotterdam PIC Convention, Parties nominating new chemicals for listing are required to submit a risk

evaluation, but are also given the opportunity to submit risk assessments prepared by another body or another Party. Yet, in this latter situation the Party needs to include "bridging" information so that the "Committee might determine if the regulatory action was based on a risk evaluation involving prevailing conditions in the country." The Chemical Review Committee's is not given a framework for assessing the equivalence of prevailing conditions, an assessment, which again is linked to just as personal and tacit framings for dealing with uncertainty.

In some regimes, SABs are also called upon to examine the validity of specific techniques and practices, generally through the development of sanctioned best available techniques. Such a targeted approach to regulation has also been well-tested at the national level, for example through the setting of best available technologies under the Clean Air Act (Switzer, 2004). Yet, regulation through the prescription of specific technologies is not without its limitations. For example, in the US context, the setting of technology standards has been blamed as a deterrent to innovation. In effect, the inevitable regulation lag precludes the availability of markets not only for testing and developing these new technologies, but also for making their use economically viable. In addition, such prescriptive regulatory approaches can make the decision-making and evaluation process susceptible to special interests (Switzer, 2004).

Under the Stockholm POPs Convention, the role of evaluating and recommending best available techniques (BAT) and best environmental practices (BEP) is entrusted to the *ad hoc* BAT/BEP Expert Group, which has a short-term mandate to develop guidelines for reducing the production of unintentional POPs (dioxins and furans). When the expert group was established in 2001, it was broadly acknowledged that much of the necessary expertise relating to these cutting–edge technologies rested with many developed country experts and industry representatives, and in the end developed country delegates represented 50% of the panel.

Industry and environmental groups were also each granted two observer seats at the Group's meetings, yet several of the Parties' representatives also had strong industry ties. Furthermore, the way in which the Expert Group carried out its work differed in many respects from the more traditional and transparent SAB process, as prominent members of the Group acted as knowledge brokers, in many cases contracting consultants to carry out the necessary research.

This industry and developed country emphasis came to the fore as Parties to the Convention renegotiated and extended the Expert Group's mandate at POPs COP-1 and developing countries highlighted their concern that the Expert Group was not focusing enough on the more affordable BATs and BEPs. As the Expert Group continues its deliberations (with a new membership with greater developing country participation), it remains to be seen how the experts will reconcile these differing interests and develop the necessary guidelines for reducing the production of unintentional POPs.

The most public aspect of the work of many of these SABs relates to the review and compilation of the "current state" or "state of the art" of knowledge and research on the issue. Yet, as it carries out this task each of these SABs faces several decision moments where judgments and assessments of knowledge occur and can in effect signal the legitimation of forms and avenues of research. Perhaps the most readily accepted source of knowledge lies in that produced through the peer-review process, and these considerations are discussed in greater detail in Chapter IV.

In some SABs, like those of the PIC and POPs Conventions, there is more control over the knowledge considered by the CRC and POPRC. When the POPRC and the CRC begin their deliberations it is therefore based on the notifications or nominations presented by Parties. While the structure of these applications is laid out in the Convention, the Parties have a great deal of

latitude in deciding what to include, and the sources on which they rely. Annex II of the PIC Convention requires that the document demonstrate that the data generated for the application have been generated "according to scientifically recognized methods" and that data reviews are performed and documented "according to generally recognized scientific principles and procedures."

Under the PIC's interim phase, the ICRC took the lead in developing the forms to guide Parties' reports and notifications, and set bounds to what constitute such "recognized" methods and principles. At ICRC-1 a task group was established to examine the format and guidance of notification of final regulatory action. Five members of the ICRC were assigned to the task group. In its report, the task group notes: "it is therefore of importance to the Committee that the information submitted in the notifications is of sufficient quality and relevance to their review of the criteria found in annex II of the Convention." The work of the task group was carried out "off-line" prior to ICRC-2, with a draft work plan and the available documentation circulated to the task group members via e-mail – only very few comments were gathered and the Secretariat used them to prepare a document as a starting point for further discussion at ICRC-2.

Under the Ramsar Wetlands Convention, the STRP, especially in its later incarnations, has relied on each experts' network of contacts and colleagues to broaden its knowledge base. The reach of these networks is extended by the formal involvement of not only the Wetlands Convention's international organization partners (such as Wetlands International and BirdLife) but also the increasing number of other international organizations that have been invited to take part in STRP meetings. The influence of the knowledge production process by the STRP reaches beyond the scope of the Wetlands Convention – as the STRP is increasing its involvement in

other science assessments (for example the Millennium Ecosystem Assessment) or in cooperative ventures with other Conventions (in particular the CBD).

These SABs are also playing a significant role in validating methods and practices. Under the Ozone Regime, the role of the Methyl Bromide Technical Options Committee in reviewing the suitability of critical use nominations in practice is validating specific methods for agriculture and fumigation. Similarly, the IPCC has played a key role in driving the methodology for compiling greenhouse gas inventories under the UNFCCC.

A GLOBAL SCIENCE CONSENSUS

Throughout all of these aspects of knowledge production, the most significant outcome of the SAB is in fact the brokering of a consensus on the science that is used as a basis for policy negotiations in the COP. The UN system has long operated under consensus decision-making rules (see box II.1) and research on consensus building has emphasized the importance of decision-making based on agreed-upon information (Sebenius and Geanakoplos, 2005) – especially in the context of technically complex problems (McCreary, 1999; O'Riordan and Jordan, 1996).

Box II.1: Consensus Decision-making Rules in MEA

Decision-making by consensus has long been the norm in MEAs, and calls for all Parties need to be in agreement for a decision to be accepted. Such an approach favors the *status quo*, since it requires all Parties to be in agreement to accept a change, and also insulates the decision-making process from outside (non-Party) influences (Susskind, 1994).

This approach to decision-making is often criticized for bringing about a so-called "lowest common-denominator" approach whereby agreement is only brokered to reflect the lowest standard of all Parties involved.

Some have expressed frustration with this requirement for consensus, blaming it for only being able to effectuate change through "baby steps," and many of the more recently brokered MEAs include provisions for 2/3 majority decision-making in their rules of procedure. Yet, in a

catch-22 situation, consensus among Parties is required for such a rule to take into effect and even if the issue has been opened for discussion in several fora, the proposed rule remains bracketed (i.e. it is still on the table as an option, but not agreed upon) in most MEA's rules of procedure[42].

Similarly, most SABs to MEAs also provide for consensus decision-making, although some do include the opportunity for 2/3 majority rule (for example the PIC and POPs Conventions), and such a step then requires special attention to be paid to the inclusion of minority views.

This expectation of consensus is in fact denounced by Collingridge and Reeve as one of the myths of powerful science, and at its root the scientific process is often set up in an adversarial mode (van Buruen and Edelenbos, 1990; Jasanoff, 1990; Jasanoff, 1995), where diverging streams of knowledge compete with consensus cast as what some see as an unattainable goal (Jasanoff and Wynne, 1998).

Under more controlled consensus-building efforts, problems arising out of adversary science are most often dealt with through "joint fact finding." As described in the Consensus Building Handbook, stakeholders are involved – with vetted experts – in framing the research question and often oversee necessary data collection (Ehrman and Stinson, 1999).

BROKERING A SCIENCE CONSENSUS

In the global context, several scholars have underscored the importance of MEA SABs as consensus brokers (Carruth and Gordstein, 2004), especially as relating to their impacts on climate negotiations (van der Sluijs et al, 1998; Shackley and Skodvin, 1995). While the outcome expected from SABs is a consensus on the state of the science, the process of arriving at this consensus involves overcoming constraints rarely addressed in the study of negotiation and consensus building. There are in fact many challenges to be overcome as SABs strive to produce not only a science consensus, but a science consensus that will be valid and sustainable.

[42] for example see UNEP/POPS/COP.1/31

The notion of crafting agreement on "objective" facts is an established means of resolving disputes (Fisher and Ury, 1991), yet most environmental challenges warranting action by MEAs deal with problems for which the separation between "objective science fact" and "subjective policy option" is rarely clear. Indeed, issues such as climate change, ozone depletion, biodiversity depletion, biosafety, wetlands and chemicals management fall largely in the category of post-normal (high uncertainty, high decision stakes) knowledge (Funtowitz and Ravetz, 1992). As a result, policy considerations will inevitably be drawn into many of the SAB deliberations for a science consensus, and furthermore, many of the more politically-salient aspects of the consensus will be vulnerable to renegotiation under the COP's policy-negotiations.

Also, while negotiation theory often encourages efforts to broaden the universe of possible outcomes, negotiations for a science consensus will be limited by the constraint of achieving a valid outcome, or what William Moomaw describes in his commentary on joint fact finding in the Consensus Building Handbook as "scientifically accurate" (Susskind et al. 1999). Indeed, while it is possible that political pressures within an SAB could generate consensus on an invalid output, such an output would be too vulnerable to expert-based criticism to be able to serve as a basis for MEA decision-making.

In addition, to serve as a useful basis for decision-making, a science consensus needs to be sustainable, or what Moomaw describes as a "politically acceptable." To be sustainable, a science consensus must benefit from sufficient buy-in from stakeholders so that it will maintain credibility in the decision-making process and not require full renegotiation under the COP process. One could envision an output which, while valid, does not benefit from the support of stakeholders involved in the COP and thus will not be viable as a basis for decision-making.

In brokering this science consensus, SAB participants are operating in a manner similar to that of the National Academy of Sciences in the United States, where, as Stephen Hilgartner describes, committees in the end present "a single, unified voice [ ] forged out of many, diverse ones" (Hilgartner, 2000). Different SABs have taken varied paths in striving for a consensus outcome, yet in most cases SAB members to begin, in one format or another, by presenting their views and positions to other members, and identifying common ground.

Most often, the Secretariat, in some cases in close cooperation with the SAB leadership, will compile information and prepare a starting point, akin to a conflict assessment, for the SAB's "negotiations." This will generally outline areas of agreement, or at the least areas of perceived agreement. The SAB members then have the opportunity to present their views on this starting point, reinforcing areas of agreement, and presenting areas of disagreement.

Beyond the presentation of disagreements, rather than dive into the details of these divergence of view points, most successful SABs will next, instead of seeking agreement on contentious issues, set out to find an accord on a means of evaluating, assessing or classifying the matter at hand. This can often occur through the creation of boundary concepts (Guston), tools (for measurement or classification) that are often collaboratively developed and can be used by experts from different disciplines.

For example, under the Rotterdam PIC Convention, members of the Interim Chemical Review Committee, and now those of the Chemical Review Committee, have collaborated on the development of guidelines for assessing requirements for "risk evaluation" as required in the Convention text. The ICRC determined that this related neither to hazard assessment nor to risk assessment – but "something in between." The ICRC generated a note trying to define this notion, which was forwarded to the INC, to the COP and then back to the CRC. In preparing

such explanatory materials, the expert Committee is first developing agreement on the means of evaluating the risks of these chemicals, and it is then based on this common ground that they will evaluate country's nominations for chemical listings.

Such interim negotiations also include, for example, the widespread use of the concept of Global Warming Potential (GWP) in the IPCC's work. In addition, much of the work of the IPCC is based on predictions arising from Global Circulation Models, and experts first had to reach agreement on norms for these models and the emission targets to use in running these models. Similarly, under the Ramsar Wetlands Convention, the STRP has contributed to the development of what they call "Ramsar Terminology," which has been used in their development of advice on management plans, and in particular in defining the concept of "wise use."

Once these common concepts have been crafted, SAB experts can apply them to areas of disagreement. The resulting science consensus in fact often involves agreement about likelihoods or risks associated with specific outcomes or actions. SABs also vary in the way in which they deal with dissenting views in brokering and presenting this science consensus. In negotiating the terms of reference of the POPs Convention, delegates discussed a procedure for including minority views. In effect, some aspects of the consensus outputs of some these SABs also constitute a "dissensus reports," outlining agreement on areas of disagreement (Hilgartner, 2000).

Representative membership and a flexible and transparent process are two organizational aspects of an SAB which will help ensure that an SAB can produce a valid and sustainable science consensus, and these are described in greater detail in Chapters III and IV.

LIMITATIONS OF A GLOBAL SCIENCE CONSENSUS

Even if a valid and sustainable science consensus is achieved, it does not guarantee successful uptake in the policy arena. Under the consensus driven UN, it is possible for even just a few Parties or a minority coalition to stall proceedings (Sebenius, 1994). Nevertheless, a more valid and sustainable consensus will make it more difficult for those minorities to successfully present their concerns as relating to the science process (Hilgartner, 2000), and in a world where the same delegates and Parties are engaged in many parallel negotiations it will become difficult for Parties to stall negotiations if they can not present what others would perceive as legitimate concerns.

Under the Rotterdam PIC Convention, an otherwise successful science consensus met resistance from a small number of Parties when it came to approving the addition of chrysotile asbestos to the PIC procedure. In its interim incarnation, the Interim Chemical Review Committee (ICRC) reviewed nominations for 19 chemicals over five meetings. For some chemical notifications forwarded to them by the Secretariat, the ICRC members agreed that the nomination did not meet all the requirements set out under the Convention. In such cases, the ICRC Chair reported to the INC on the Committee's work relating to that chemical but did not forward any recommendation as to its listing. When the ICRC members reviewed a chemical's nomination and agreed to recommend the chemical for inclusion in the interim PIC procedure, they then prepared draft decision guidance documents for each chemical and forwarded the document to the INC for its adoption. In some situations, the ICRC recommended that the chemical they reviewed not be included in the interim PIC procedure.

From the perspective of decision-makers, the stakes in preventing or ensuring the listing of a chemical differ between the PIC and POPs Convention. At first examination, making a chemical

subject to the PIC procedure should not have many implications for contracting Parties, as listing only leads to notification and documentation requirements and does not set limits on the production, use or trade of chemicals. Yet, many delegates see a chemical's listing under the PIC Convention as recognition of a chemical's hazardous nature and consider it a "first step" towards further restrictions on its production and use. The inclusion of a chemical in the PIC procedure can also impact negotiations under way in other fora, for example relating to trade disputes under the World Trade Organization[43].

In contrast, listing a chemical under the Stockholm POPs Convention does imply the setting of restrictions on its production and use and could have clear socio-economic and even health implication, especially as relating to the availability and affordability of alternatives[44]. In addition, there is a provision under the POPs Convention which allows Parties who chose to do so to be automatically bound by the addition of chemicals to the POPs Convention without having to ratify the amendment, and as such many Parties are likely to scrutinize all the more closely any proposals for additions to the Convention.

In most instances in the course of the ICRC's mandate, these draft Decision Guidance Documents were adopted by the INC with minimal debate. At INC-7 in November 2000, delegates adopted Decision Guidance Documents on ethylene dichloride and ethylene oxide. At INC-9 in October 2002, delegates adopted Decision Guidance Documents on monocrotophos. At INC-10 in November 2003, delegates approved the inclusion to the interim PIC procedure of: amosite, actinolite, anthophyllite, and tremolite asbestos; DNOC (Dinitro-*ortho*-cresol) and its salts; and dustable powder formulations of benomyl, carbofuran and thiram. At INC-11, held

[43] http://www.wto.org/english/tratop_e/envir_e/envir_backgrnd_e/c8s2_e.htm

[44] Of the POPs "dirty dozen," the need for alternatives to DDT for malaria-vector control led to the inclusion of special provisions in the Convention text.

immediately prior to PIC COP-1 in September 2005, delegates approved the Decision Guidance Document for the inclusion of tetraethyl and tetramethyl lead into the interim PIC procedure.

However, the inclusion of chrysotile asbestos in the interim PIC procedure was discussed at both INC-10 and INC-11 without achieving consensus. The issue of chrysotile asbestos was first taken up by the ICRC at its third meeting, along with the addition of the other four forms of asbestos noted above, based on notifications of final regulatory action from Australia, Chile, the European Community and the Czech Republic. A task group was established at INC-8 to review the notifications, and after discussing their report and deciding to recommend the five forms of asbestos for inclusion in the interim PIC procedure, ICRC-3 established a drafting group to prepare the Decision Guidance Document for approval at ICRC-4. This recommendation and draft Decision Guidance Document was next considered for approval at INC-10.

At INC-10, after the Secretariat introduced the ICRC's communication on asbestos, many countries and observers[45] supported including amosite, actinolite, anthophyllite, tremolite and chrysotile forms of asbestos in the interim PIC procedure. However, Canada supported postponing a decision on chrysotile asbestos, so as to enable the completion of its national consultations on the substance. The Russian Federation, the Ukraine and several developing countries were of the position that the chemical not be included in the interim PIC procedure on the basis of insufficient scientific information.

At ICRC-5, a contact group was convened to focus in particular on alternatives to chrysotile asbestos, and at INC-11, the draft Decision Guidance Document on chrysotile asbestos was resubmitted to delegates for their review. Many countries supported listing chrysotile asbestos, especially as all criteria for inclusion had been met and procedures had been followed

[45] NGO support for listing chrysotile asbestos on this case expanded beyond the traditional coalitions of environmental NGOs to include trade unions as well.

correctly. Yet, a coalition of countries with economies in transition (the Russian Federation, Ukraine, Kazakhstan, and Kyrgyzstan) opposed the inclusion of chrysotile asbestos, on the basis of the lack of scientific data, especially relating to threshold levels and effects on human population. Canada also opposed the inclusion of chrysotile asbestos, citing especially the lack of scientific evidence pointing to safer alternatives to the substance. In the end, compromise was unattainable, and the substance was not listed in the interim PIC procedure. As delegates informally discussed this impasse, many acknowledged the high economic significance of chrysotile asbestos to a handful of countries but were concerned that such concentrated economic interests might, in the long run, undermine the goals of the PIC Convention.

After COP-1, three new notifications on chrysotile asbestos (from Australia, Latvia and Switzerland) were received by the Secretariat, and a task group on the substance was established prior to the first meeting of the CRC. Again, the Committee decided to recommend the Chemical's listing and prepared a decision guidance document for submission to PIC COP-2, at which Ukraine cited the CRC process as a reason for not including chrysotile asbestos in the PIC procedure (underlining that CRC decision-making should only occur by consensus, while its present terms of reference allow for two thirds-majority rule). At the CRC meeting, two experts opposed the recommendation to include chrysotile asbestos, with one expert proposing any decision await the release of an expected report on the chemical from the World Health Organization.

At PIC COP-2, consensus was again impossible on this contentious issue but it is likely that, since the large majority of Parties support this inclusion, the issue will continue to be revisited and as the scientific process (within the CRC, but also under other international bodies) gains

legitimacy, and as political pressures are put to bear, the position of minority opponents is likely to become more difficult to present.

CONCLUSION

SABs to MEAs are more than simply assessors of knowledge tasked with communicating a review of information to the COP. Rather, in fulfilling their mandate SABs generally become sites of knowledge production in themselves, contributing to the framing of questions and to the developments of standards, classification and methods. In addition, perhaps the foremost role of SABs as knowledge producers has become their importance as a loci for brokering a consensus on matters of science.

Parties are looking to SABs to produce a consensus as a basis for negotiations in the COP. While of course SABs will vary in their organization and in their success, most often this consensus is brokered by first identifying areas of common ground, and then these SAB members (who bring to the table different backgrounds, disciplines and theoretical groundings) often develop means and methods which they can then apply to areas of "dissensus." The norms and procedures drawn upon in reaching this consensus can vary, and include the rigors of peer review and the development of a common metric for assessing uncertainty.

This thesis proposes that the key role of the SAB relates to brokering a consensus on the science which is both valid and sustainable. This output is dependent on both a flexible and transparent process and representative membership among experts involved. This latter requirement is described in Chapter III.

CHAPTER III: REPRESENTATIVE MEMBERSHIP

The growing awareness of the social construction of science (Wynne, 1996; Jasanoff, 1990) has drawn increasing attention to the individuals involved in providing science advice for policy-making. This marks a significant shift from the long-standing norms of the science community, which in practice encourages the decoupling of the scientist from her output – most clearly evidenced by he process of blind peer-review. Furthermore, when the science community seeks its most qualified contributors, it again relies on long-standing criteria[46] of excellence that rarely capture scientists' more personal attributes.

There are several reasons why such an elitist approach to science advice does not generate a sustainable consensus to serve as the basis for global environmental decision-making. The first relates to the limitation of relying on publication records as a metric for expertise. Albeit ingrained in modern scientific practice, the process of peer-review also suffers from often highlighted drawbacks, including a systematic prejudice to non-mainstream views (Edwards and Schneider, 2001; Jasanoff, 1990)

In addition, the use of publication in prestigious peer-reviewed publications as a metric for success constitutes a bias towards English language output and against interdisciplinary scholarship which may not be as readily accepted by well-established (and often discipline specific) journals. Furthermore, the recognition of a scientists' affiliation with renowned academic institutions leads in practice to an underrepresentation of experts from most countries[47].

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[46] These criteria include a scientist's publication record and prestige of affiliation.

[47] According to the 2005 World Ranking of World Universities published by the Institute for Higher Education of Shanghai Jiao Tong University, the top 20 universities are all in the USA, except for the 2 in the UK and one in Japan; in the top 60 there are no institutions from the developing world listed in the top 60, which is again dominated by US institutions.

The identity of those providing science advice also becomes a crucial element of the SAB, especially when acknowledging the SAB's central duty of brokering a global science consensus (see Chapter II). Indeed, ensuring that all stakeholders are represented in a negotiation is one of the tenets of consensus building. (Forester, 1999; Susskind, 1994; Susskind and Thomas-Larmer, 1999).

This chapter will investigate whether representative membership is indeed crucial to achieving a valid and sustainable consensus on science advice in the MEA context. I propose that several aspects of diversity can lead to increases in both the validity and sustainability of the resulting consensus. Striving for representative membership of the SAB composition, in effect seeking to reflect interests of a broad range of relevant stakeholders, could include ensuring representation from a broader array of countries and institutional affiliations, while ensuring as well disciplinary diversity, input from local and traditional knowledge, and a variation in experts' more personal attributes (including for example age, gender and political views).

CONSTRAINTS TO REPRESENTATIVE MEMBESHIP

If representative membership is necessary for a sustainable consensus, one could envision that the SAB output will be accepted by all stakeholders – as long as all stakeholders take part in the SAB! Yet, MEA administrators face significant logistical and financial hurdles in establishing SABs, which in practice require the making of choices between different levels of diversity. The first of these constraints is the size of the SAB, and decision-makers are often keen to cap the size of science bodies, with a variety of justifications.

The first of these justifications is grounded in negotiation research – a larger group is certain to become unruly in trying to negotiate a consensus on matters of science. In addition, larger panels can preclude benefits arising from less structured dialogues. This notion of small

committee work is well established at the national level, where experts are quick to highlight the potential for resolving differences in a more personal context, and the benefits arising from the flexibility to meet in smaller groups are discussed at greater length in Chapter IV.

This logistical freedom is also highlighted as the justification for keeping such deliberations to a single language and avoiding the necessary structure and formality of simultaneous translation. While many developing countries in particular highlight the need for providing such interpretation, opponents highlight not only the logistical concerns of such a measure but also its budgetary implications (see box III.1).

Box III.1 : What Is the Universal Language of Science ?

Throughout the 1980s and 1990s, the prevalence of English as the language of choice for international science meetings was rarely questioned. Beyond the underlying budgetary and logistical concern favoring unilingual deliberations, this preconception was reinforced by the assumption that individuals with the required level of expertise and academic recognition would *de facto* be sufficiently proficient in English so as to be published in leading journals in their field. As processes such as the IPCC, the MBTOC and the chemicals regimes have increasingly emphasized participation by developing country experts, experts' language skills are increasingly scrutinized[48].

As countries select candidates for nomination to these science advisory bodies, many developing country representatives deplore the need to trade off between those experts with the most relevant specific expertise and those who could interact most successfully in English. For example, under the Ramsar Wetlands Convention the lack of full participation by some of the STRP members (including through the web interface prior to meetings and during the meeting itself) was blamed in great part on those experts' limited English skills.

In the context of the negotiation of the terms of reference for the PIC and POPs Conventions' Review Committees, operating language was again an issue that was difficult to resolve, in fact developing countries' strong stand on this point surprised several veteran negotiators. In the

[48] In several interviews, this lack of language skill has been flagged as the key constraint to effective participation by developing country experts.

negotiations on the terms of reference for the POPs Review Committee (deliberations began in 2002, only to be resolved at the 1st meeting of the COP in May 2005), participants in the contact group had reached consensus in 2002 that POPRC meetings would be held in English only. Yet the issue was reopened at the next meeting of the INC in July 2003. Similar disagreements on language of operation arose at the 1st COP meeting of the Rotterdam PIC Convention.

At PIC COP-1, even though the Interim CRC had carried out its work only in English, developing countries pressed for interpretation at meetings. Developed countries underscored the costs of such services, highlighting as well the difficulty of providing competent interpretation for such highly technical material.

In the end, PIC COP-1 delegates agreed that "the operational arrangements relating to language used for the interim Chemical Review Committee, having worked well, shall continue for the Chemical Review Committee." Indeed this compromise solution agreeing that deliberations be carried out in a single language, but without specifying that that language be English, satisfied demands of francophone and hispanophone delegations in particular. A similar compromise was reached in June 2005 at the 2nd Meeting of the Parties of the Cartagena Protocol on Biosafety, agreeing that the language of operation of the Compliance Committee be one of the six UN languages, without specifying which one.

The issue of language of operation was again raised at POPs COP-1 in May 2005. In the contact group deliberations on the issue, the Chinese representative argued that English only operation would limit full and effective participation by some experts, and noted that it would dilute the expertise taking part in the Committee's work – asking if a degree in English Literature should be considered on par with adequate scientific credentials as a prerequisite for participation. Nevertheless, on the strength of budgetary concerns the issue was seemingly resolved in the contact group – which opted for English as the language of operation.

However, the issue was again raised in plenary. On this issue, many developing countries, with the unexpected support of Canada, argued that simultaneous translation should be provided in light of the significant policy and economic implications of POPRC decisions. After forwarding these concerns to a parallel budget group, delegates agreed to provide simultaneous translation into the 6 UN languages, on the condition that POPRC meetings be held in Geneva, the seat of the Secretariat where the necessary qualified interpreters could be hired at minimum cost (by avoiding the expense of transportation and per diem).

This 11th hour development surprised many, yet confirms the trend of providing simultaneous translation for science deliberations perceived as being more prone to "policy contamination." Indeed, this model is replicated in the context of the IPCC – where the bulk of Working Group work is carried out in English only but where plenary meetings and deliberations to approve summaries for policymakers and synthesis reports are carried out with simultaneous translation.

Budgetary concerns over the size of these SABs relate not only to operational costs, but also are tied to the proportion of the body's experts from developing countries or countries with economies in transition. As is the case of committees at the US national level for example, experts participate under a *pro bono* arrangement- and their employers are expected to account for the time necessary for their participation in such efforts. At the MEA level, experts' nominating countries or employers are also expected to bear their cost of attendance. Since this was often blamed for the lack of participation by developing country experts, many MEAs have committed to covering the cost of attendance for experts from developing countries and from countries with economies in transition. Consequently, discussions on the size and membership of SABs have clearly laid out these budgetary implications. Furtermore, this is often framed as an inevitable trade-off between the "best" expertise and the buy-in from Parties (Cash et al, 2003).

The availability of experts can also challenge efforts to convene a representative SAB. The burden of time and effort put on each expert is further accentuated by the fact that many experts will often serve on multiple SABs, and that SAB work can conflict with preexisting commitments related to their full-time employment (be it in academia, the government, the private sector or civil society).

Nevertheless, participation in these SABs does confer prestige and can assist experts in developing essential networks and, similarly to what occurs in the context of academic peer

review, already over-extended experts will still accept membership on multiple SABs. These many commitments can also hinder the possibility of scheduling face-to-face meetings. For example, under the Biodiversity Regime, the proliferation of *ad hoc* expert groups has limited opportunities for meetings to be held – to the point that at a June 2005 meeting of legal experts only one five-day window was available for scheduling a follow-up meeting in the next ten months[49].

Experts' potential conflicts of interests can also complicate any discussions of diversity, as it can significantly decrease the pool of available experts – this is particularly relevant for SABs of MEAs whose decisions have implications especially for the industrial sector (Krimsky et al, 1996).

The notion of size as a validator of science advice is most visible in the work of the IPCC. With each assessment released by the IPCC, the increasing number of contributing authors has been heavily underscored[50]. This is perhaps linked to the theory that the best indicator of the scientific consensus and its legitimacy relates to the buy-in by the science community. In Protecting the Ozone Layer, Edward Parson introduced the notion of critical mass, while in Saving the Mediterranean, Peter Haas used the notion of epistemic communities to explain the impetus arising from consensus from a broad scientific community. This focus on size as an indicator of consensus is further bolstered by the fact that claims about the number of contributing authors to the IPCC are the first to be attacked by so-called "climate skeptics" – most notably Bjorn Lomborg who in The Skeptical Environmentalist notes that: "The IPCC's reports are often referred to in the press as the result of the work of 2,000 scientists, but if you

[49] This was discussed at the First meeting of the *ad hoc* Working Group on Liability and Redress in May 2005.
[50] Based on Secretariat documents distributed at IPCC-22, November 2004.

count, there are only some 80 main authors – and only a smaller number of these actually worked on the climate models."

Limits to the size of SABs also arise out of delegates' political concerns. From a strategic perspective, if the SAB produces an output which counters a Party's or a coalition's interests, it is much easier to oppose the outcome if it is possible to blame the lack of representation on the SAB (Hilgartner, 2000). This type of "insurance" is most easily achieved by limiting the size of the SAB[51].

Yet, even if a larger SAB can strengthen the durability of a science consensus, it will always be constrained by considerations described above, and as such characteristics of the restricted number of experts taking part in the SAB become essential in addressing a SAB's output. The goal then becomes to ensure that all the key stakeholders' interests are reflected in some way in the SAB's membership. It is important to underscore here that stakeholders apply to more than just an MEA's contracting Parties, but applies more broadly to those affected not only by the environmental problem, but also by its potential solutions, interests often represented by non-governmental entities.

ACHIEVING REPRESENTATIVE MEMBERSHIP

There are many criteria according to which experts could be selected or defined as representing specific stakeholders. Each of these criteria have, in cases described in greater detail below, have contributed to increases in the SAB outcome's validity and sustainability, and conversely, deficiencies relating to each of these types of diversity have hindered both validity and sustainability. In practice the negotiation of representativeness guidelines is limited by the fact that each expert will exhibit different combinations of criteria (for example a male expert

[51] This tactic was highlighted by several interviewees (from the secretariat and from Parties) discussing SABs under the POPs Convention.

from an arid African developing country, working for an industrial organization, specializing in the use of DDT) and first brokering a consensus on the body's membership is key to achieving a consensus on the science. Even if agreement is reached on what would be the ideal make-up – the nomination process is often not designed to best achieve is the desired outcome. Indeed, how is one nominating party or coalition putting forth candidates for only one or a few slot expected to achieve "representation" on so many levels?

When deciding on how a small group of experts can provide advice suitable for a much broader population, it is difficult not to think of these experts' roles in terms of their delegated authority similar to that seen in democratic governance (as presented in Sheila Jasanoff's "(No?) Accounting for Expertise"). And, even though there is limited equivalent of global democratic governance, the question of experts' representativeness at the MEA level is no less salient. Indeed, every time an SAB is put in place, its creators face the challenge of ensuring such a small committee represents the whole world- or at least is constituted in such a way that the whole world recognizes the legitimacy of the SAB's output.

In negotiating the diversity of an SAB, the discourse stretches to varying degrees across MEAs beyond mere national representation. Yet, even if the bulk of negotiations of SAB composition have focused on issues of geographic representation (and more specifically national and economic diversity), I propose here that several kinds of diversity can enhance (and their absence can hinder) the outcome's validity and sustainability, and these include national and economic diversity, regional diversity, institutional diversity, disciplinary diversity, and "personal" diversity (including gender, age and political views).

National and economic diversity

Two concepts commonly used to achieve diversity are based on experts' nationalities: national and economic diversity, and indeed an expert's nationality, and the economic development of that expert's country of origin have been the central consideration for negotiation an SABs membership in all the cases studied for this thesis. This emphasis on an expert's geographic region of origin is closely tied to the UN-system of ensuring geographic representation at all stages of governance, even if, as described in Box III.2, there is a variation in the way in which regions are classified in different intergovernmental organizations.

BOX III.2: A Regional Basis for Membership

Before discussing the distribution and extent of membership of the CRC, delegates at COP-1 had to reach agreement on the composition of the PIC regions. Deciding to use the FAO regions as the interim PIC regions had been an uncontroversial decision – and many at COP-1 were taken by surprise when the notion of using FAO regions as the PIC regions met with substantial resistance at the outset of COP-1.

This opposition to the notion of FAO regions was based on several factors. First of all, several countries voiced concerns relating to how these regions would combine in effect with the limited number of Parties to the Convention at COP-1. Due to the Convention's early state of ratification, in practice it would mean that some regions might have only a handful of Parties vying for seats. This in turn led to concerns of fairness – member Parties from regions with fewer Parties would essentially be guaranteed a seat on any CRC based on FAO regions, while those from regions with many Parties would rarely have a chance to send a member to the CRC.

The second root of resistance to using the FAO regions stemmed from the fact that many delegates new to the PIC process attended COP-1, marking the Convention's entry into force and preparing for the high-level segment scheduled for the last two days of the COP. Many of the delegates sent were in fact attached to their country's UN mission in Geneva and as such were less familiar with the concept of FAO regions.

Many of the developed countries favored the use of FAO regions as they saw their use as facilitating the trigger process, which requires notifications from two separate regions before a

chemical is considered by the CRC, asserting that this requirement would be met more rapidly if developed countries were spread across more regions. Nevertheless, early into PIC COP-1 Parties reached a compromise to use the UN regions as guidelines for the PIC regions and this was the starting point for the deliberations of the contact group on establishing the CRC.

Assurances for national and economic diversity among an SAB's experts can increase the resulting outcome's sustainability by facilitating buy-in from a wide range of stakeholders. In addition to increasing the apparent legitimacy of the process, such diversity can also heighten the likelihood of Party negotiator's having access to experts who have served on the SAB and can in turn report directly report on the SAB process. Diversity of experts' developed- or developing-country status can also impact the validity and sustainability of the resulting science advice by increasing the likelihood that any resulting advice will be better tailored to developing country needs and particular conditions.

By focusing on national diversity, policy-makers will seek an appropriate model for representing all the Parties to the MEA – often proportionate to the number of Parties from any given regional division under the MEA. This falls under the model of direct representation where each entity is at the national level – i.e. no matter the size, or role played in the environmental problem concerned, each country will be granted equivalent access to the SAB. Economic diversity relates to representing the interests of groups of countries according to their level of economic development, rather than the countries themselves. Under this scheme, one might seek to give equivalent voices to developed and developing countries, and to ensure all levels of economics development are represented. Such consideration often ensures that the broad negotiation coalitions playing out in COP negotiations are replicated in the science negotiations, for example through sufficient representation by experts from countries of the Group of 77/China.

The MEA system is inevitably country-based, and the easiest way to develop the SAB is to have countries directly nominate members – with the underlying assumption that countries will ensure that any predefined norms of "expertise" are met prior to the nomination. Any other aspects of diversity become more difficult to apply as countries as nominators are not conducive to achieving disciplinary, institutional or gender diversity. When each country is only nominating a few experts (in most cases one[52]) how then can they practically strive for such diversity?

The recent negotiations to establish chemical review committees for both the PIC and POPs Conventions illustrate how these concerns over both national and economic diversity can play out in practice and affect the outcome. Prior to the PIC Convention's entry into force, an Interim Chemical Review Committee (ICRC) was established, using the FAO regions as a framework for membership (see Box III.1). The success of this interim process was unprecedented, as the COP was in a position, at its first meeting already, to approve the addition of 14 chemicals and pesticides to the purview of the Convention. And, as delegates negotiated the membership of the permanent Chemical Review Committee, many acknowledged the importance of replicating the success of the ICRC, with several using this "right balance" of experts as a basis for negotiating the composition of the CRC.

However, just as ongoing negotiations to finalize the composition of the POPs Review Committee under the Stockholm POPs Convention had struggled to reconcile the Convention requirement of "equitable geographic distribution, including ensuring a balance between developed and developing nations." Sharp differences predictably arose when the time came to reconcile their differing notions of "equitable geographic distribution" and "balance between developed and developing countries" in both the PIC and POPs setting. At POPs INC-6, contact

[52] Under the PIC and POPs Conventions, all Parties within a regional group need to first agree on which Parties will nominate experts to serve on the Review Committee.

group delegates wrestled with the concept of "equitable geographic distribution," and did not even get to the point of negotiating specific numbers until PIC COP-1[53]. One cannot ignore that in parallel to these deliberations on the POPRC, INC-6 delegates did reach agreement on the establishment of a time-limited expert group on the BAT/BEP guidance[54], with a membership of 37 experts (with 15 from developed countries, 18 from developing countries, and four seats for observers shared equally by industry and environmental NGOs). Yet, when it was suggested that equitable geographic distribution in the POPRC might be fulfilled through a similar near 50/50 split between developed and developing country representatives, several prominent representatives made it clear that such a membership scheme would never be considered "geographically representative of the world today" – signaling that indeed such an arrangement would not benefit from the necessary buy-in from developing country Parties.

These concerns played out at POPs COP-1 where the results of the *ad hoc* Expert Group on BAT/BEP were not readily accepted by Parties and the terms of reference for such an expert group were instead renegotiated on the basis of the compromise composition of the PIC CRC and POPRC. Several developing country Parties resisted acknowledging the results of the BAT/BEP group on the grounds that the recommended technologies and practices did not reflect an awareness of developing country conditions, constraints and feasibility. Similarly, under the Ozone regime, whose goal of 50/50 participation of developed and developing country experts was use as inspiration for those BAT/BEP terms of references, the outcome of committees, especially of the Methyl Bromide Technical Options Committee (MBTOC), were poorly received by the COP, with the lack of participation by developing country experts often raised as problematic.

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[53] Based on attendance of contact group deliberations at POPs INC-6, POPs INC-7 and PIC COP-1.
[54] This expert group was tasked with preparing a report on best practices and alternatives for avoiding dioxins.

At the PIC COP-1 negotiations of the CRC membership, delegates came up with several options for distributing membership across the regions, based on a variety of rationales (see table III.1), with the "successful" model of the ICRC serving as one of the starting points for discussion. In the end, the contact group reported these many options for distributing membership to the administrative plenary session at COP-1 (the Committee of the Whole (COW)), and a small group of the Friends of the Chair was tasked with achieving a compromise, agreeing on a formula for a numerical outcome which, in the words of Maria Celina de Azevedo Rodrigues, Chair of the COW, left all Parties "equally unhappy[55]." Having devoted much of their time coming to an outcome on the numerical make-up of the Committee (and on the rotation of such members – the contact group got caught up in surreal discussions of how to divide odd numbers of experts by 2), little attention was devoted at PIC COP-1 to other aspects of the CRC's functioning.

Proposal \members per region	Latin America and the Caribbean	Africa	Asia	Western Europe and Others	Eastern Europe	Total
Contact Group Chair's proposal (loosely based on the # of countries in each regions)	5	8	8	5	3	29
ICRC (as presented by Secretariat)	5	8	7	7	2	29
By # of Parties in each region (Developed country)	4	8	6	8	4	30
Assume each seat represents 6 Parties ("mathematical" approach)	5	9	8	5	4	31
Based on ICRC, but more for CEITs (ICRC member)	5	8	7 or 8	7	3 or 4	30 – 32
Even numbers (latin American country)	6	8	8	8	4	34

[55] While the discussions at the surface focused only on the number of experts from each region, the discussions were also constrained by two developed-country Parties who, while not having any preference relating to regional representation, did prefer limits to be placed on the size of the committee due to budgetary concerns.

More representation from each region (southern hemisphere country)	7	9	9	9	5	39
Compromise solution	5	8	8	7	3	31

Table III.1: The evolution of proposed membership for the PIC Chemical Review Committee

In contrast, at POPs COP-1, a contact group was established to tackle the POPRC terms of reference, based on the deliberations at INC-6 and INC-7 and comments submitted by countries and organizations in preparation of the meeting. While delegates did begin by reopening the numerical wranglings of PIC COP-1, Parties soon came to a compromise to use the same "formula" as for the PIC CRC, thus meeting general expectations[56]. This enabled POPs COP-1 participants to devote much more attention to other aspects of the POPRC terms of reference (which are discussed in greater detail below).

Meanwhile, under the Convention on Biological Diversity, the SBSTTA is held in plenary format, much as a regular COP of the Convention, and each party is able to send as large a delegation as desired. Furthermore, the same rules of procedure apply to the SBSTTA as to the COP for granting observer status to non-Parties, including other governments[57], and as a result the membership of the SBSTTA emphasizes foremost national diversity (and the same applies to the CBD's *ad hoc* working groups).

Yet, the lack of limitation on delegation sizes nevertheless has led to concerns over equitable access concerns, as the majority of developing country Parties only receive funding to send one or two delegates, who often are not able to participate fully in all the negotiations, often underway in informal settings, during a typical meeting. This latter concern has been addressed in recent years by restricting CBD meetings to a maximum of two parallel events at any given

[56] This was so expected, that one participant even noted he "would have bet [his] house on it"
[57] http://www.biodiv.org/convention/sbstta.asp

time, but this has in practice only led to an increase in informal consultations, of which many can be occurring in parallel.

The UNFCCC's subsidiary science body, its Subsidiary Body for Scientific and Technological Advice, operates in a very similar fashion to the CBD's SBSTTA, and the same national an economic diversity considerations largely apply. Yet, the UNFCCC case is exceptional through the continued influence of the IPCC on the Climate Regime, which predates the negotiation of the Convention itself. The IPCC too has increasingly focused on its experts' national and economic diversity (Siebenhuner, 2003). While early IPCC reports emphasized authors' academic affiliations, experts' nationalities are now underscored, and there are also systematic efforts to increase participation by developing country authors. In particular, most chapters now have co-"lead authors", one each from a developed and a developing country.

Since its inception, the Scientific and Technical Review Panel (STRP) of the Ramsar Convention on Wetlands has based its membership on the basis of geographic representation, yet in the most recent redesign of the STRP's *modus operandi* (adopted by COP-9 in November 2005) national and economic diversity is no longer the prime consideration for selecting STRP experts.

In its first incarnation, the membership of the Wetland Convention's Scientific and Technical Review Panel (STRP) was very restricted, and from 1993 to 1999, the STRP had only 6 members, with one expert from each of the Ramsar regions. In 1999, COP-7 modified the terms of membership of the STRP, modeling participation on that used for the Wetland Convention's Standing Committee, whose membership is proportionate to the number of Parties in each region. These members are nominated by Parties – but it is provided that these experts serve in their own capacities and not as representatives of their respective countries. While operating

under this arrangement the STRP was credited with producing valid and sustainable science advice, yet several complained that its work was carried out by only the few most qualified experts on the committee, and that this emphasis on national diversity did not lead to the selection of those experts most qualified or most available to carry out the work of the STRP. And indeed, in terms of the exact composition of the panel, the requirements laid out in the revised *modus operandi* relate to areas of expertise relevant to carrying out high-priority tasks of the STRP. The revised *modus operandi* provide for eleven experts with specific areas of expertise and two globally-recognized experts with a broad scope of wetland conservation and wise use expertise and experience of the scientific and technical operations and issues of the Convention. The revised *modus operandi* do specify that: "wherever possible, experts on a particular theme will be appointed from different parts of the world, for example people based in different Ramsar countries or regions and/or from northern and southern parts of the world, and gender balance will be sought." Yet, it is emphasized that "[h]owever the overriding priority for appointments will be to secure the best expertise available, wherever the expertise is based."

Disciplinary Diversity

Many SABs also include provisions for disciplinary diversity, acknowledging that global-scale environmental concerns are often interdisciplinary in their scope and require a broad range of fields of expertise. The original mandate for an SAB is central to establishing a framework for achieving the appropriate disciplinary diversity, but once the SAB begins carrying out its work – and fulfilling what can be rapidly changing advice needs, a great deal of discretion comes into play in tailoring experts' disciplinary specialty to the needs of the SAB's agenda.

Disciplinary diversity can have improve the outcome's validity as it may help to consider far reaching implications of the solutions often discussed by SABs, and will likely be examined by

Parties' own experts to determine if the appropriate disciplines have been brought to bear on an issue, thus strengthening the outcome's sustainability. Disciplinary diversity reaches beyond mere academic distinctions of fields of study, but can also involve areas of study not necessarily recognized in mainstream research fields (such as those relating to traditional knowledge or interdisciplinary study). Participation by experts from different disciplinary frameworks can help the SAB act as a boundary organization where "boundary objects[58]" or common concepts are created and can help communication among distinct disciplinary streams (Guston, 2000).

Participation by experts from disciplines not directly, or only tangentially, involved in the initial framing of the problem can help to identify opportunities for synergies with SABs to other MEAs, or even aid in flagging potential deleterious effects of one SAB's recommendations on other environmental efforts, thus strengthening the outcome's validity. For example, the IPCC and the Ozone Regime's Technical and Environmental Assessment Panel have been cooperating on assessing the global warming implications of HCFCs, one of the original CFC substitutes, whose use has increased exponentially in recent years and which has been found to have a significant global warming potential.

The IPCC has dealt with requirements for disciplinary diversity through the establishment of its three working groups: Working Group I addresses the scientific aspects of the climate system and climate change; Working Group II focuses on the vulnerability of socioeconomic and natural systems to climate change, negative and positive consequences of climate change, and options for adapting to it; and Working Group III examines options for limiting greenhouse gas emissions and otherwise mitigating climate change.

[58] These boundary objects can not only span two disciplines, but can also be used as a tool for communicating between the science and policy realms.

Similarly, as described above, Ramsar's new *modus operandi* for the STRP first emphasizes disciplinary needs. In contrast, there have been several complaints over the lack of disciplinary diversity in the context of the MBTOC under the Ozone Regime, with several observers highlighting the lack of expertise on application and use of methyl bromide alternatives for example. And indeed, the new Working Procedures for the MBTOC adopted in December 2005 by MOP-17 were accompanied by a call to recruit new experts to the MBTOC, and earmark in particular the need for expertise emphasizing: "weed scientists, wood disinfection specialists, quarantine and pre-shipment, alternatives practitioners, technology cooperation, agricultural extension, recapture and recycle, agricultural economists, and regulatory processes & registration[59]."

In the context of the CBD, at the recent Review of Implementation of the Biodiversity Convention, the need to control that "adequate" delegates take part in the SBSTTA reflect a growing concern that the SBSTTA brings together more policymakers than scientists, and indeed there are no disciplinary guidelines in place dictating the expertise of SBSTTA delegates, or even delegates to *ad hoc* groups. The range in size and expertise of these "adequate" delegations at SBSTTA are described in greater detail in box IV.2, yet they do show that several Parties are likely to emphasize legal and international affairs specializations over expertise more tailored to the scientific basis of biodiversity management for example.

Just as no set guidelines relating to disciplinary specialties were laid out in soliciting nominations to the ICRC, the final decisions establishing both the CRC and the POPRC only reiterate that members shall be "experts in chemical management." Even if in contact group negotiations some lobbied for specific references to expertise in health and environmental

[59]Invitation to Help Protect the Stratospheric Ozone Layer as an Expert on the Technology and Economic Assessment Panel (TEAP) and Its Technical Options Committees (TOCs). Posted on http://www.unep.ch/ozone/teap/TEAP-Nominations.asp (accessed January 2006).

aspects of chemical management, in the end Parties are encouraged to nominate their experts keeping in mind the need for disciplinary diversity, even if under the POPRC Parties are encouraged to "take into account ... the need for balance between different types of expertise" in nominating experts[60].

This output has now been applied in practice. The first POPRC meeting took place in November 2005 and the first PIC Chemical Review Committee met in February 2005. While both bodies were established based on the same consensus regarding national, economic and geographic diversity, the final outcome, as described in table III.2, does actually differ in practice. While the impact of these variations on these Committees' output has yet to be determined, it is likely that differences in disciplinary diversity are most likely to affect differences in their output's validity, especially as this emphasis on chemical management continues to favor participation by those experts who have traditionally been involved in the negotiation of these conventions, namely government administrators and industrial representatives.

[60] POPRC Terms of Reference, adopted at COP-1 in May 2005.

	PIC CRC[61]	POPRC[62]
Economic diversity		
Developed country	7	8
Developing country	17	20
Country with economy in transition	2	3
Gender diversity		
Male	18	26
Female	8	5
Institutional diversity		
Government	22	16
Academia	4	13
Industry	0	0
NGO	0	1
Disciplinary diversity		
Health	6	5
Environment and risk	6	10
Chemical use and management	14	15

Table III.2: Application of Review Committee membership guidelines in the PIC and POPs Conventions

Institutional Diversity

Institutional diversity refers to the experts' source of full-time employment and this variation in the institutional affiliation of SAB members of any given MEA can often be traced to the MEA's negotiation process and the MEA's cultural context. In addition, different MEAs have varying levels of openness to observers in their proceedings. This institutional diversity is most relevant when examining institutional affiliation of appointed SAB members – but also carries over into the participation by observers in the SAB process. Institutional affiliation has also been documented as introducing bias into experts' framing (for example in the nicotine addiction debate, Murphy, 2001), which can hinder both the outcome's validity and sustainability. Making provisions for institutional diversity may help alleviate such concerns and strengthen the outcome's sustainability.

[61] Of 31 nominated experts, only 26 CRC members attended the CRC's first meeting.
[62] Institutional affiliation and disciplinary specialty are assessed based on experts' CVs - only 30 were submitted in preparation of the POPRC meeting.

Participation by non-Parties in any given MEA is regulated by the COP's Rules of Procedure – and such observers can include other countries (non-Parties), but also intergovernmental organizations (other global-scale entities such as the World Bank, the International Labor Organization, or the World Health Organization), environmental non-governmental organizations, industrial organizations, academics and indigenous groups.

Institutional breadth in developing science advice can be reflected in the validity of the outcome (especially in terms of identifying synergies for improving SAB outcome across several MEAs) and also in strengthening the sustainability of the consensus, by reducing pressure from what are often observer stakeholders to denounce the science advice and the policy action based upon them. Generally the Ramsar Wetlands Convention, and this also applies to the STRP, has had a long-standing relationship with institutional organization partners: BirdLife International, IUCN-The World Conservation Union, Wetlands International and the World Wide Fund for Nature International. Representatives from those institutional partners are granted membership on the STRP, and several representatives from related intergovernmental organizations are invited to take part in STRP meetings as well. This has been particularly beneficial in helping the Ramsar Convention cement its standing as science advisors not only with its own Parties, but also in the setting of other biodiversity-related Conventions. Indeed, it is the Ramsar Convention which has taken the technical lead in the Biodiversity Convention's inland water programme[63].

The openness to outside observers in the negotiation and day-to-day operation of the MEA often carries over into the SAB's membership. For example, under the ozone regime, the panels and technical options committees have historically had significant active participation by industry representatives. One explanation is that such reaching-out to industry experts ensured

[63] The benefits of such arrangements were highlighted by several participants reviewing the inland ecosystems work programme at SBSTTA-11.

access to the state of the art of knowledge being developed by industry – often proprietary knowledge which would not otherwise be included (Parson, 2002; Parson, 2003). Yet, it is such overrepresentation of industrial interests that was a key contributor to the poor reception of MBTOC reports from 2003-2005. In fact, at Ex-MOP-1, this lack of institutional breadth was highlighted as a central cause for concern by an expert member of the MBTOC who distributed pamphlets outside the Plenary hall detailing the MBTOC's vulnerability to industry lobbying and denouncing its outcome report. As a result, in the latest MBTOC report which already took into account some of the new MBTOC Working Procedures discussed and adopted by MOP-17, the list of MBTOC experts contributing to the report include institutional affiliation (as is discussed in greater length in Chapter IV under transparency of participant information).

In the SAB negotiations for the PIC and POPs Conventions, institutional affiliation was never explicitly raised as an issue, though negotiations for the POPRC's establishment did discuss the role of observers. In particular, negotiators disagreed as to whether specific provisions be included in the Terms of Reference to encourage participation by countries or industries who would be adversely affected by a proposed listing. In contrast, at POPs COP-1, within the same regime, those negotiating the Terms of Reference for a time-limited *ad hoc* Expert Group on Best Available Techniques and Best Environmental Practices for avoiding the production of unintentional POPs set an uncommon scene as observers from both industrial groups and from environmental NGOs mingled indistinctly with Party representatives and were involved in the drafting of compromise text[64].

In contrast, under the IPCC, participation by industry representatives is restricted in great part to observer participation at IPCC Plenaries, placing a premium instead on participation from academia and government scientists. This latter input can be traced to the computational

[64] Based on participant observation in the BAT/BEP contact group at POPs COP-1, May 2005.

requirements of early climate modeling and institutional benefits of long-range data sets, which both favored a significant input from government agencies and academia (Miller and Edwards, 2001). Yet, as the IPCC prepares its Fourth Assessment Report, there has been a deliberate effort to include greater input from industry-affiliated scientists.

Meanwhile, the Convention on Biological Diversity has, in some respects, employed the broadest interpretation of institutional diversity, especially as related to the privileged role granted to local and indigenous communities in the context of the Working Group on Article 8(j) (Traditional Knowledge), where their representatives are granted equal access as Parties to the Convention. However the impact of such inclusiveness is limited by the restriction to this approach to the 8(j) Working Group, and indeed these indigenous communities, highlight, for example, the need for their voices to be heard in ongoing discussions of an Access and Benefit-Sharing Regime.

Regional diversity

The issue of regional diversity is in fact quite different from ensuring proportional representations from Parties in each region. Rather, regional diversity refers to reflecting, on the SAB, the particularities of specific regions on the panel – regions defined more by their geographic characteristics rather than by their distribution into spatially distributed regions. The more prominent of such regional interests include those shared by small island states, arid areas, southern hemisphere states, or even areas whose biomes might be particularly vulnerable to the issue at hand (for example countries with artic zones contaminated by POPs). This emphasis on regional diversity also arises out of increased acknowledgment of the potential contributions of local, traditional and even lay knowledge in environmental decision-making. (Jasanoff and Martello, 2004; Wynne, 1988). These stocks of knowledge, which so often do no meet *a priori*

standards of expertise (for example an advanced university degree or extensive peer-reviewed publications) are now beginning to be recognized as necessary for an effective SAB process. Regional diversity is important in achieving a diversity of knowledge, this contributes to a most scientifically accurate result, but also helps ensure that the work of the SAB remains relevant to all Parties to the Convention, thus ensuring the output's sustainability.

The increasing emphasis on involvement of experts from small island states in the context of the work of the IPCC is an example of where seeking this knowledge, and other sources of local knowledge (for example emphasizing knowledge of arid areas, or alpine climates) have been instrumental in broadening the acceptance of the IPCC.

Conversely, in the context of the Stockholm POPs Convention, while arctic countries were drivers in negotiating the Convention itself (as POPs' bioaccumulating nature has been found to disproportionally affect arctic populations, which are often indigenous communities as well), and even as arctic indigenous groups and coalitions often attend the policy-oriented meetings of the Stockholm Convention, the POPRC Terms of Reference as they now stand do not include provisions for ensuring that those interests are reflected among those experts nominated to the POPRC.

Similarly, under the Rotterdam PIC Convention, in negotiating the membership of the PIC Convention Chemical Review Committee, the Australian delegation repeatedly emphasized the need for any membership scheme to ensure representation by southern hemisphere Parties, yet these concerns were only addressed by expanding the number of experts from each UN region so as to increase the likelihood of southern-hemisphere Parties among them to have the opportunity to nominate an expert. Also, Under the Ozone, Climate and chemicals regimes, the discussions of technological alternatives in particular have been criticized for their lack of regional diversity,

which is attributed with the development of solutions that are often impractical on the field or else do not take advantage of existing stocks of knowledge.

By extension, this concern to ensure regional diversity should also be tied to efforts to ensure that the interests of broad political coalitions central to the MEA's issue be given the opportunity to be reflected in the membership of the SAB, so as to avoid those Parties' to perceive the SAB as a strategic tactic to weaken their negotiation stance. For instance, while under the Biodiversity Convention's Cartagena Protocol on Biosafety a dedicated SAB is yet to be established, one can assume that the interests of the "Miami Group," a coalition bringing together Argentina, Australia, Canada, Chile, the US and Uruguay which emerged as the most "pro-biotechnology" group during the Protocol negotiations, would have to be reflected in any successful SAB membership scheme so as to avoid the Miami Group's dismissal of any SAB results.

Under the Ramsar Wetlands Convention, the importance of regional diversity has proved to be less evident as the Convention, in its aim, is inherently on local concerns shared by its Parties, that is the management and preservation of wetlands.

Personal Diversity

There are many aspects of the more intrinsic attributes of any individual scientist, including a scientist's age, gender and personal and political views, which can also affect the output's validity and sustainability, but which can be difficult to screen for on *curriculae vitae*[65], and even more difficult to negotiate as components of an SAB's membership. At present few SABs include provisions to ensure this kind of diversity.

Of these personal characteristics, gender is the only one being discussed in the context of MEA SABs, albeit to a limited extent. Gender diversity is not raised as an issue in all SABs but

[65] while age and gender may appear on some CVs, in North America especially the practice is no longer considered appropriate. Listing of political and personal views is quite generally taboo thus further hindering any efforts to achieve that kind of representation.

has increasingly been proposed as a consideration for membership. An experts' gender has been shown to affect the framing of questions and can also enhance the legitimacy of the process (Fox, 1995). For example under the POPs regime, where specific segments of the population are known to be more vulnerable to POPs contamination (for example breastfeeding mothers and their infants), participation by women on the POPs Chemical Review Panel may be expected to weigh risks to those populations more heavily than male experts and produce a more valid outcome. Furthermore, in terms of sustainability of SAB output, participation by women in the POPRC may help to assure some stakeholders that the concerns of these vulnerable populations have been taken into account. Yet, as the contact group discussed a suggestion to "take into account gender" in the nomination of experts, several negotiators questioned the need and impact of such a provision, although it was ultimately included in the Terms of Reference. Stockholm Convention Parties have now nominated their experts for the first meeting of the POPRC, and of 31members nominated, only 5 are women. This disparity, beyond being a mere reflection of Parties' commitment to gender diversity, is perhaps more likely evidence of the difficulty of taking into account gender diversity when of the only 31 Parties nominating experts, each Party is only nominating one expert.

The importance of gender diversity has also been recently highlighted under the IPCC process. At the 22nd session of the IPCC where preparations for the Fourth Assessment Report were on the agenda, the IPCC Secretariat distributed statistics emphasizing not only the enhanced participation by authors from developing countries, but also the increased incidence of contributions from women authors. Another aspect of personal diversity coming to the fore is the active role of the IPCC leadership in attempting to balance political views. For example, the

leadership has the latitude to nominate experts that have not been nominated by their own countries, most likely due to divergences over political issues.

In the case of the Methyl Bromide Technical Options Committee (MBTOC) under the Ozone Regime, the new working procedures of the MBTOC adopted by the MOP in December 2005 (following several years of dissatisfaction with the work and membership of the MBTOC by Parties) emphasizes broadcasting information on MBTOC members. The most recent report submitted by the MBTOC, lists information about participant experts in an annex, and includes experts' gender, developing country status and length of involvement. Conversely, gender or other personal considerations have yet to be explicitly raise as criteria for membership in SABs associated with the Biodiversity and the Wetlands Conventions.

Under the Ramsar Convention on Wetlands, there has been to date little emphasis on diversity of such personal criteria, as in the CBD where no criteria for personal diversity are set out. At the opposite of the spectrum, both the PIC and POPs Conventions have put in place procedures for experts to declare potential conflicts of interest which can help guard against, or at least bring to light, any financial interests for example that might influence any given expert's judgment.

CONCLUSION

Representative membership on an SAB is essential for ensuring the validity of the SAB's outcome. For example, disciplinary diversity can have implications for the outcome's validity as it may help to consider far reaching implications of the solutions often discussed by SABs and participation by experts from disciplines not directly, or only tangentially, involved in the initial framing of the problem can help to identify opportunities for synergies with SABs to other

MEAs, or even aid in flagging potential deleterious effects of one SAB's recommendations on other environmental efforts.

Representative membership also plays a key role in contributing to the sustainability of the SAB's outcome, as this is often what stakeholders will look to in assessing the SAB's work and process. For example, regional diversity helps ensure that the work of the SAB remains relevant to all Parties to the Convention, thus ensuring the output's sustainability.

Accordingly, then in the context of SABs to MEAs, it would be necessary to ensure representation from a broader array of countries and institutional affiliations, while ensuring as well disciplinary diversity, input from local and traditional knowledge, and a variation in experts' more personal attributes (including for example age, gender and political views). Indeed, every time an SAB is put in place, its creators face the challenge of ensuring such a small committee represents the whole world- or at least is constituted in such a way that the whole world recognizes the validity of its output.

However, it is clear from the examination of diversity in membership of SABs across the six MEAs studied for this thesis that different aspects of diversity will have the greater impact on the resulting outcome's validity and sustainability. For example, it is clear from the problems encountered by the MBTOC in its work in the past 3 years that a greater emphasis on economic diversity will go a long way towards alleviating concerns over generating a sustainable consensus on science advice, while current discourse within the IPCC in preparing its fourth assessment report signals that a greater emphasis on institutional diversity has been identified as a means of shoring up the sustainability of its outcome among industrial interests. The variation of the interplay between membership and the resulting consensus across the cases is summarized in Table III.3.

Table III.3: The Relationship between membership and consensus across the cases

CASE	**MEMBERSHIP & CONSENSUS**
Ramsar Wetlands Convention	**STRP output valid and sustainable** Accepted by Ramsar COP Trickle down to field implementation Broad reach of "ramsar terminology" **Until 2005: Emphasis on national, disciplinary and institutional diversity** Focus on national diversity blamed for not bringing together "best" experts, and especially resulting inefficiency Disciplinary diversity especially applied in organizing agenda in working groups Institutional diversity and input from other IGOs and MEAs - key to success in cooperative ventures **2005 new *modus operandi*** Shift to expertise/network focus Change to nomination process so Standing Committee concerned with national and other diversity
Ozone Regime	**2003-2005: MBTOC output not sustainable** Repeatedly sent back to MBTOC Blamed on lack of developing country expert input Concerns of vulnerability to industrial lobbying Validity in doubt: "unable to assess" (concern over appropriate expertise) **Long term implications** Increase in use of MBTOC in developed countries Participation concerns vis-à-vis developing-country commitments **Revised working procedures** Call for new experts with developing/transition status Emphasis on specialization/required expertise
Biodiversity Regime	**Concern over validity of output** Disciplinary diversity and "adequacy" of expertise Law/international affairs vs. scientific and technical expertise Detailed textual negotiations **Equitable access concerns – geographic disparity** Variation in delegation size Disparate access – especially to smaller contact groups and informal negotiations
Climate Regime	**SBSTA** Many of the same limitations as CBD SBSTTA **IPCC** Overall valid and sustainable outcome *Different types of output, different levels of scrutiny and acceptance* *Technical output in particular relied upon in UNFCCC implementation* *Expectation of reliance on AR4 for post-2012 negotiations* Attributable to historical emphasis on: *Disciplinary expertise (organization of work into WGI, II, III)* *National diversity (increasingly economic)* *Scale of assessment effort* *Institutional affiliation (prestigious affiliation as validator of expertise)* **Vulnerabilities of IPCC (addressed in preparing AR4?)** Addressing concerns of lack of local/traditional knowledge Diversity in personal attributes (gender, beliefs) Broadening institutional variation

CASE	**MEMBERSHIP & CONSENSUS**
Rotterdam PIC Convention	**ICRC output: valid and sustainable** Satisfaction with recommendations and decision-guidance Easy approval of procedural recommendations from ICRC Exception of chrysotile asbestos *high political/economic stakes* *limited avenues of attack* **CRC membership** Equitable geogr. representation vs. balance of developed/dev'ing countries Little emphasis on disciplinary expertise *"chemical management": bias away from alternatives, health, environment* **Limits of nomination process** Little oversight of expertise How to achieve diversity with one nomination?
Stockholm POPs Convention	**Output yet to be tested** High-economic stakes of outcome (some Parties bound by addition) Small committee: strategic vulnerability to attack **POPRC membership** Same as PIC CRC + "taking into account gender and the need for balance between different types of expertise" Added emphasis on expertise in health and environment Same nomination limitations, but supplemented by roster of experts **BAT/BEP membership** Output of 1st incarnation: rejected by dev'ing Parties *Validity concerns: proposed alternatives /recommendations seen as unsuitable to developing country needs and constraints* Redesign: move from 50/50 to national focus

The many kinds of diversity described above that can come into play in establishing an SAB's membership should therefore be taken into account to meet an MEA's specific needs – and emphasized and de-emphasized to reflect the COP's expectations and concerns. And furthermore, as the COP attempts to negotiate a membership balance suitable to generating a valid and sustainable outcome, those selecting SAB members will have to seek out scientists that fulfill more than one diversity variable as it is not desirable, or even practicable, for instance, to have a geographical diverse, gender balanced assortment of experts representing each disciplinary specialization.

In addition, the dynamics of any MEA are likely to evolve over time and as such any SAB *modus operandi* should include provisions for regularly revisiting guidelines for representative

membership. While a coordinated membership strategy is warranted at the SAB level, the SAB should be granted the flexibility to assess whether, for example, some of its more specialized investigations warrant at least temporary adjustments to its membership scheme.

While the first step to achieving a valid and sustainable science consensus arises out of the recognition that science is an inherently social construct, representative membership alone is not sufficient, and decision-makers will also be looking to the SAB's transparency and flexibility in assessing its output – considerations that can also impact the consensus's validity, and that are discussed in greater detail in Chapter IV.

CHAPTER IV: A FLEXIBLE AND TRANSPARENT PROCESS

In terms of institutional design, the UN system is prone to coercive isomorphism (DiMaggio and Powell, 1983), whereas new institutions replicate those traditions perceived as "most legitimate," and this is often emulated in negotiating the establishment of new MEAs. The UN Framework Convention on Climate Change and its Kyoto Protocol are perhaps the most striking example of such isomorphism – it is well established that as the climate regime was being negotiated, framers were seeking to emulate the success of the Vienna Convention and its Montreal Protocol (Parson, 2002).

This phenomenon of institutional isomorphism also commonly occurs in the establishment of science advisory bodies (SABs). For example, under the Stockholm Persistent Organic Pollutants (POPs) Convention, negotiations on the establishment of the POPs Review Committee were initiated by requests that the Secretariat closely examine SABs of other MEAs and that this review serve as the basis for any negotiations on the issue[66]. More recently still, several stakeholders involved in the biodiversity regime have been proactively campaigning for the establishment of a "biodiversity IPCC" – this proposal is discussed in greater detail in Chapter V.

Yet, as MEA negotiators gain experience in implementing these agreements, the institutional criteria that are emulated have evolved. Several regime theorists have sought to identify institutional design features to which a regime's success can be attributed, but scholars have struggled to develop clear metrics for assessing the effectiveness of environmental regimes (Young, 1999; Miles et al, 2002). Nevertheless several components are often highlighted as factors of success, including the development of rules of procedure and the transparency of proceedings.

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[66] Based on attendance in the contact group at POPs INC-6, July 2002

I propose in this chapter that transparency is essential not only for guarantying a certain level of political buy-in and sustainability of the SAB's outcome, but that transparency can also help to enhance the validity of this SAB outcome. In examining the role of a transparent process in contributing to a valid and sustainable consensus on the science, I am including more than just the traditional definition of transparency, most often assumed to be limited to the amount of information on the SAB's work made available to outsiders. The latter is often further simplified as defining a "transparent" meeting as one that conducts its work in an "open-door" fashion. However, in examining the cases for this thesis, several means of producing transparency (and subsequently increasing the validity and sustainability of the consensus) have emerged. These include of course holding public meetings open to observers, but also emphasizes the type of information made available in documenting the SAB's work and in broadcasting information about the SAB's meeting, process, and participants.

Furthermore, I propose that a flexible process is also crucial to ensuring full participation by the expert community, thus necessary for a sustainable and valid consensus. A closer examination of the cases studied for this thesis demonstrate that this flexibility granted to an SAB in organizing its work can include flexibility not only in the day to day running of meetings, but also in providing opportunities for expanding the network of contributing experts, for adapting norms and procedures and ensuring continuity and retaining institutional memory.

Examples of how these types of diversity and flexibility can enhance, or hinder, the outcomes' validity and sustainability are discussed below.

TRANSPARENCY

In Science on Stage, Stephen Hilgartner uses the metaphor of performance to discuss the role of "stage management – that is, techniques for controlling what is publicly displayed and what is

concealed" in constituting a science advisory panel's expert authority (Hilgartner, 2000). Transparency relates to what is revealed to those not directly taking part in SAB proceedings, and the management described by Hilgartner calls for enhancing the outcome's sustainablity through transparency, without compromising the output's validity.

For example, making all scientific deliberations open to observers and transcripted as matters of public record has been attributed with limiting the scope of deliberations and hindering innovation in the long run, as some participants may be more reluctant to broach what may be "politically incorrect" concepts. At the national level, such deterrence was illustrated by the controversy following the public disclosure of Harvard President Lawrence Sumners' comments - in a private committee meeting - on gender and scientific ability[67]. At the MEA level, such fears of transcription can preclude candid discussions of the limitations for implementing certain technological fixes in developing countries (for instance if it involves acknowledging, on the record, difficulties due to corruption or lack of capacity).

In the United States, the Federal Advisory Committee Act (FACA)[68] was put in place to enhance the transparency of federal agency advisory committees (Spielman, 2003), yet this increased scrutiny on official proceedings has, according to some accounts, prompted the most contentious discussions to be shifted to informal moments, such as meals, of the committee's agenda. Moreover, Hilgartner describes the National Academy of Sciences' struggle to preserve its confidentiality procedures and not be subject to FACA, and emphasizes in particular the implications for such public scrutiny and government oversight for the outcome's perceived independence.

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[67] AP. Transcript shows Harvard president arguing intrinsic differences between genders play a role in science careers. By JUSTIN POPE, AP Education Writer. February 18, 2005.

[68] The Federal Advisory Committee Act calls for federal agencies establishing committees to report on the committee'composition, approve of all meetings and agendas, and send government officials to chair or attend each meeting (Hilgartner, 2000).

Transparency relates not only to the access to meetings granted to outsiders, but also to the amount of information on the SAB's work made available, including the type of information, the way in which it is presented and its responsiveness to decision-makers' needs. Therefore, the way in which a SAB manages each of the different kinds of transparency described in greater detail below has implications for the outcomes' validity and sustainability.

Access to Meetings

The most traditional definition of transparency may likely focus on the literal notion of avoiding "closed-door" meetings, and granting observers (those interested stakeholders, in some cases even Parties, that are not members of the SAB) access to SAB proceedings. As described in Chapter III, the composition of SAB membership is often carefully negotiated. Yet participation by observers is most often controlled under the applicable Rules of Procedure[69] adopted by Parties. By virtue of their status as "observers," those onlookers to the SAB proceedings won't have a direct input in any SAB decision or outcome, yet in practice the extent to their participation in deliberations vary across MEAs.

The transparency afforded to observers at meetings of the SAB can strongly contribute to its outcome's sustainability as it can generate more trust in the process – concerned Parties and observers will be able to monitor what exactly happens at the SAB meeting and this in turn can help them assess the SAB's outcome. However, there have also been concerns that increased access may in effect be granting unequal access to SAB proceedings. Furthermore, too much access to meetings can reduce the validity of the outcome by precluding the consideration of information that might not be suitable to open door discussions.

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[69] Most generally, the Rules of Procedure adopted for the COP will also apply to subsidiary bodies (which often include Science Advisory Bodies). However, some MEAs, such as the Wetlands Convention and the POPs Convention have also set out specific terms of reference for the operation of the SAB. References to the applicable Rules of Procedure are included in the bibliography for each case.

This challenge of balancing access with the discussion of proprietary information has come to the fore in discussions of the Chemical Review Committee (CRC) of the Rotterdam PIC Convention. According to the Terms of Reference negotiated at PIC COP-1 in September 2004, the CRC is subject to the Rules of Procedure as relating to attendance by observers, and therefore public meetings are the expected norm. However, the CRC has also put in place provisions for considering in their deliberations confidential information (most often from industry relating to chemical processes, or form Parties relating to chemical management strategies). It is likely, that the CRC, in an effort to retain both the output's validity (by including this confidential information in its deliberations) and the output's sustainability (by not appearing to take away access that observers feel entitled to according to the Rules of Procedure), will have to manage the amount of information released about these confidential consultations (and these types of diversity is discussed in greater length under documentation and process).

Under the Convention on Biological Diversity, SBSTTA also operates under the COP's Rules of Procedure whereby observers include non-Party governments, intergovernmental organizations, industries and non-governmental organizations, including academic, environmental and indigenous groups. Under the COP Rules, these observers are allowed to take the floor, but at the Chair's discretion, and in practice this generally occurs if there is sufficient time at the end of a discussion on any given agenda item. In practice, coalitions are often given the opportunity to take the floor, and preference is often granted to intergovernmental organizations (such as representatives of the Secretariat of a biodiversity-related Conventions) to intervene in the course of debate if the topic is particularly related to their focus of attention. And in fact, at SBSTTA-11, as experts were reviewing the inland water ecosystem programme of work of the CBD, representatives from the Ramsar Secretariat often took the floor throughout

the discussion. This openness of proceedings does contribute to strengthening the sustainability of the SBSTTA outcome by shielding it from criticisms about the openness of the process, and especially can contribute to its validity when it ensures that those most qualified experts (in the case of wetlands, those from the Ramsar Secretariat) can contribute to the outcome.

Of course, access to meetings alone is not always alone a prerequisite of a transparent process and, by extension, a valid and sustainable consensus. For example, under the Ramsar Convention, access to the STRP is technically limited to members and invited experts, but these invited experts do include representatives from a broad range of intergovernmental organizations (for example from the Secretariats of other MEAs). Such broadening of institutional diversity expands the range of observers who can testify to the process of the STRP. In addition, as described below, the STRP has successfully managed its transparency by emphasizing other types of transparency of its operation.

In sharp contrast, the Methyl Bromide Technical Options Committee (MBTOC) under the Ozone Regime does not grant access open access to its meetings, and furthermore did not, until the adoption of its revised Working Procedures, provide much information on any aspects of these meetings. While the lack of access in itself is not entirely to blame for the MBTOC outcome's poor reception by the MOP[70] and in effect its lack of sustainability, this lack of access in conjunction with the lack of the other types of diversity described below were a central element of the MBTOC's failure, and indeed, the December 2005 revised Working Procedures of the MBTOC repeatedly emphasize this need for transparency.

The issue of access to observers was also one of the issues of debate under both the Rotterdam PIC Convention and the Stockholm POPs Convention, as Parties negotiated the terms

[70] from 2003 to 2005 as the MBTOC reviewed nominations for Critical Use Exemptions for specified methyl bromide use by developed countries as the methyl bromide phase-out target neared, and the MOP's disapproval of the MBTOC report was at the center of the need to convene two extraordinary MOPs

of reference for their Chemical Review Committees. While several chemical-producing Parties strongly supported including special provisions for ensuring observer access to those Parties most likely to be affected by a chemicals' nomination, in the end Parties agreed to grant equal access to all observers, encompassing in this definition even Parties (as both CRCs require Parties to nominate specific individuals).

Under the Rotterdam PIC Convention's Interim Chemical Review Committee, despite the process being open to all observers, the observing population was heavily skewed towards industrial and commercial interests and towards observers from countries most likely to be affected by the chemical's listing. In the interim PIC process, NGOs and trade unions were also vocal in highlighting the impediments to their attendance[71]. In addition to concerns that developing country Parties and environmental NGOs may not be benefiting from the same uptake of information likely to result from attendance, several negotiators highlight the potential for these observers to influence the outcome of the SAB by granting them privileged access to the SAB members.

Under the Climate Regime, access to meetings under the SBSTA process is similar to that applied under the CBD's SBSTTA, but under the IPCC transparency in terms of access to meetings is adapted to the different levels of meetings. As such, meetings of the Working Groups are less open to scrutiny by outside observers while it is only at the Plenary meetings of the IPCC that access is granted to observers, including for example representatives from industry (including for example petrochemical corporations but also large insurance companies) and from civil society. This access to meetings is a stated component of a much larger transparency stategy, which, as described below, emphasizes more document and process transparency.

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[71] while the ICRC compensated the expenses of developing country experts' participation, no such facilitation mechanism is in place to facilitate developing country or NGO attendance. The same now applies to the PIC CRC and the POPs CRC.

Documentation

Another important option for managing the SAB's transparency relates to making documents available to a broader audience, a step facilitated in recent years by the ease in posting documents in digital formats on Convention websites. This is increasingly becoming the official means of making documents available to delegates, in addition to the regular distribution of CD-ROMs and paper copies to Parties in order to ensure access to such documents in countries, especially least developed countries in Africa, with limited access to the Internet[72]. And indeed, under the revised *modus operandi* of the Scientific and Technical Review Panel of the Ramsar Wetlands Convention, highlights experts' "full access to e-mail and web-based communications systems for intersessional work" as a required criterion for Panel membership.

In terms of enhancing transparency, it is also helpful to grant access, not only to the SAB's output, but also to supporting and preparatory documents upon which the SAB deliberations were based. This is especially essential for the sustainability of the resulting outcome as it will serve as an additional check or reference of the process followed in carrying out the SAB's work.

Under the Stockholm POPs Convention for example, the Secretariat makes available, on its website, the nominations for listing chemicals as they are submitted by Parties. It is on the basis of these detailed applications that the POPs Review Committee members will discuss the merits of adding a chemical to the Convention's purview. Similarly, the Rotterdam PIC Convention Secretariat posts all the documents distributed to its Chemical Review Committee members prior to their meetings, in addition to submitting to the COP a report of the CRC meeting (summarizing the organization of work) and the CRC's recommendations. This helps non-SAB members not only to understand the supporting evidence used in decision-making, but can also,

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[72] For more on the global digital divide, which affects least-developed countries in particular, see: http://www.itu.int/osg/spu/ni/ipdc/

when such information is distributed, as is the case in the POPs Convention, prior to the actual SAB meeting, can give interested stakeholders the opportunity to monitor the process and intervene through formal and informal channels in preparation of the SAB meeting. Of course, this latter aspect can also reduce the SAB outcome's sustainability if this is seen as a means for facilitating some stakeholders to influence (in non-transparent manners) the SAB outcome.

Under the Ozone Regime, the Methyl Bromide Technical Options Committee does not post documents considered at its meetings, and instead releases only a single report recommending Critical Use Exemptions to the MOP. This lack of transparency (along with other sources of perceived secrecy described below) was heavily criticized, by NGOs and developing country representatives in particular, and blamed in part for the deep-seated disagreements which necessitated the convening of two extraordinary meetings of the MOP (Ex-MOPs). In fact, at the 1st Ex-MOP, in March 2004, one MBTOC member (a consultant from a developed country) was so dissatisfied with the MBTOC proceedings, highlighting especially the lack of open discussion and a decision-making process, that she not only attended Ex-MOP-1 but also set up a makeshift stand outside the Plenary hall to express her dissatisfaction to delegates. In addition, the MBTOC report submitted to Ex-MOP-1, included an annexed clarification and revision proposed by the TEAP, the latter which also included a minority view submitted by a TEAP member which read:

> ***Minority View of TEAP Member***
> *The TEAP regrets to advise Parties that Mr. Gary Taylor (Chair of the Halons Technical OptionsCommittee) is not satisfied with the Clarification and Revision submitted by the majority of TEAP members (above) and he has advised TEAP that he is resigning his position effective 30 June 2004.*
> *Minority View Submitted to the TEAP by Mr. Gary Taylor*
> *"Mr. Taylor disagrees with both the procedures followed in preparation and the content of the destruction credits section of the report. Mr. Taylor agrees with the concept of destruction credits asprovided in the 2002 Assessment Report of the Halons Technical Options Committee and the 2002Assessment Report of the TEAP. He is of the opinion that the destruction credits section of the 14February TEAP/MBTOC Report is seriously flawed and that TEAP has grossly exceeded its mandate of providing analyses and technical information relevant to policy."*
> *Date: 1 March 2004*

In effect, this lack of documentation made the MBTOC process all the more vulnerable to criticisms, which seriously eroded the output's sustainability, and furthermore lead to doubts as to its validity. In December 2005, at the 17th Meeting of the Parties, Parties agreed to more detailed working procedures for the MBTOC, and some of these have already been applied to aspects of the MBTOC's work described below.

In the context of the IPCC, the reference section of IPCC reports cites the sources of information consulted in preparation of the report, and the IPCC Review Process[73] sets out guidelines for making these sources available, especially when dealing with information which is not published in peer-reviewed publications. Also, the IPCC Secretariat is entrusted with maintaining an open archive of "all written expert, and government review."

There are however situations where the release of all information considered by an SAB might be detrimental to the output's validity, as such scrutiny might preclude the consideration of proprietary information. Especially under the Ozone and Chemicals regimes, SABs are often called upon to examine new technologies and their suitability as substitutes, and their work will be most relevant if they are able to consider the latest technologies. As such, they rely on full cooperation from industrial stakeholders to release information they wish to keep confidential. This can also affect the outcome's sustainability, as stakeholders are more likely to take into account science advice based on the state of the art of knowledge.

Meeting Information

The broadcasting of meeting information can also enhance transparency by giving observers advance notice of SAB schedules, and by distributing information on matters to be considered at

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[73] Appendix A to the Principles Governing IPCC Work. PROCEDURES FOR THE PREPARATION, REVIEW, ACCEPTANCE, ADOPTION, APPROVAL AND PUBLICATION OF IPCC REPORTS
Adopted at the Fifteenth Session (San Jose, 15- 18 April 1999) amended at the Twentieth Session (Paris, 19-21 February 2003) and Twenty-first Session (Vienna, 3 and 6-7 November 2003)

any given SAB meeting and on who will be taking part. This can significantly enhance the sustainability of the outcome by giving observers the opportunity to not only closely monitor the SAB's outcome, but also, as necessary, take steps to contact participants and perhaps even communicate their special interests as appropriate. Conversely though, this can foster concerns over the outcome's validity if the extent of such steps are not controlled for under the process guidelines (described below).

Lack of transparency in advertising the agenda of the meeting can also hinder the output's validity (as not all delegates well be sufficiently prepared for fruitful deliberations, or as some delegations might not even have sent the relevant experts), but can also affect the outcome's sustainability as stakeholders may perceive discussions not original scheduled for an SAB meeting as having been "sneaked in" to the regime.

Under the Stockholm POPs Convention, in addition to being announced at COP meetings and posted on the Convention website, meetings of the POPRC are announced to observers through communication fora targetted at those interested in global chemicals management. For instance, an announcement and call for observer registrations at POPRC-1 was sent out to the Chemicals-l listserv maintained by the International Institute for Sustainable Development. The documents for the meeting, including the agenda, are posted on the POPs website, and in fact Parties' nominations of chemicals for listing under the Convention are posted to the website shortly after they are received by the Secretariat. In preparation for the 1st meeting of the POPRC, the Secretariat also posted a list of registered observers.

Again, the MBTOC rarely announced its meetings, and did not provide many channels for gathering information, before the fact, on the meeting's date, location, agenda or participation. This secrecy even extended to the reports of the MBTOC, which, until the latest report

considered at MOP-17, did not provide any background information on the MBTOC or its meetings. In contrast, under the CBD, reports of any *ad hoc* working groups, and SBSTTA reports, will always outline how long the body met, along with additional information, for example pertaining to who chaired the meeting.

By operating by the same rules of procedure as their respective COPs, the schedule and agenda of the CBD's SBSTTA and the Climate Regime's SBSTA are announced with several months notice, and all necessary preparatory documents are also disseminated three months prior to the meeting, with all official documents made available in the 6 UN languages[74]. Similarly, under the 2005 Working Procedures of the MBTOC, calls for the preparation and release of "an annual work plan [which] will enhance the transparency of, and insight in, the operations of MBTOC,[75]" and notes that this should include, *inter alia*: envisaged meeting dates of MBTOC, the timing of interim and final reports, and "clear references to the timelines relating to nominations."

Yet, in the context of the Biodiversity Regime, there have been increasing complaints that the SBSTTA Programme of Work is set too far in advance, preventing the SBSTTA from being truly reactive to urgent COP information needs. This was discussed as part of the review of the SBSTTA at the September 2005 meeting of the Working Group of the Review on Implementation[76], where some Parties suggested COP-8 (in March 2006) consider reducing the programmed work-load for upcoming SBSTTA meetings and allowing time for consideration of last-minute agenda items. Such a step might prevent the transparency concerns spurred by the addition of last-minute agenda items, as was the case at SBSTTA-11 when one Party requested

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[74] references to the relevant Rules of Procedure and *modus operandi* are available in the official documents listed at the end of this thesis.
[75] Annex I, UNEP/OzL.Pro.16/17
[76] based on interviews and the ENB report of the meeting.

re-examining the language of a previously negotiated goal for the Convention's monitoring. Since this issue was only proposed at the meeting's opening Plenary, several delegates had not been briefed as to their countries position on the issue, and led to significant confusion in negotiating the issue.

Advance information of meetings is also the norm under the IPCC, where work is organized according to a well–publicized work-plan, and Working Group meetings are well publicized. Under the Ramsar Convention, meetings of the STRP are announced on the Ramsar website, just as are meetings of the Standing Committee (the administrative Bureau which serves in between COP meetings).

Process Information

If for the reasons described above, including logistical limitations (not all observers could attend SAB meetings if they wanted to), stakeholders are unsure of the validity of the SAB's outcome, providing information on the SAB's guidelines of operation, along with more detailed information of SAB meetings themselves, has proven a successful measure for reassuring stakeholders as to the safeguards, sources and process used in producing the SAB's output.

Even if stakeholders only have access to the SAB's output submitted to the COP, they can still assess the robustness and inclusiveness of the SAB's work by examining it *modus operandi*. These terms of reference, are often negotiated by Parties (as was the case in the POPs and PIC Convention, see Chapter II), but can also be prepared by the SAB and merely approved by the COP. For example, the recently approved *modus operandi* of the STRP under the Ramsar Wetlands Convention, were prepared by the STRP and the Secretariat, and then submitted to the COP for adoption.

Yet not all SABs have clearly defined working procedures, and indeed, under the Ozone Regime, Parties only approved detailed working procedures for the MBTOC at the December 2005 MOP-16. This move was in reaction to increasing criticisms of the MBTOC and its lack of transparency in particular. And indeed, these working procedures repeatedly emphasize the need for transparency and accountability, and request the MBTOC to specify many aspects of its work.

Meanwhile, under the Climate Regime, the IPCC provides detailed guidelines for procedures for the preparations of its assessments and technical reports. In addition, the IPCC has developed a specific outreach strategy, which emphasizes transparency and strives to provide accounts of IPCC Plenaries at least. At the 22nd meeting of the IPCC Plenary in November 2004, delegates agreed to grant access to the Earth Negotiations Bulletin so that it would provide daily reports and summaries of IPCC Plenaries as the main component of their transparency efforts[77]. The administration of the IPCC is also widely involved in communicating its authorship process to the broader academic community, and in preparing the Fourth Assessment Report currently underway, Rajendra Pachauri, Chair of the IPCC, embarked on several trips to university campus' across the world to publicize the IPCC process and discuss the scoping of the Fourth Assessment Report. The IPCC strategy also includes a public outreach effort to describe the IPCC's elaborate review process. In a brochure aimed at the general public and at negotiators, the IPCC describes this review process as follows:

> *"Review is an essential element of preparing IPCC reports and is governed by three principles. First, IPCC reports should represent the latest scientific, technical and socio-economic findings and be as comprehensive as possible. Secondly, a wide circulation process should aim to involve as many experts as possible from all regions of the world. Thirdly, the review process should be objective, open and transparent.*

[77] IPCC-XXII/Doc.7

> *Review generally takes place in three stages:*
> *1. Expert review of the first draft of the report*
> *2. Government/expert review of the second draft of the report and the draft Summaryfor Policymakers*
> *3. Government review of the revised draft Summary for Policymakers.*
> *Review periods are normally eight weeks. Review Editors ensure that all substantive expert and government comments are afforded appropriate consideration and advise authors how to handle contentious/controversial issues." (From the IPCC brochure: "Procedures: the Preparation of IPCC Reports")*

Detailed minutes of SAB meetings can also provide stakeholders insight into the way in which the SAB carried out its work, and in particular into providing insight into dissenting views which may not necessarily be reflected in the SAB's final output. For example, in its meeting reports the Chemical Review Committee to the Rotterdam PIC Convention summarizes discussions and describes how the Committee organized its work, specifying in particular which CRC members took part or even took leading roles in reviewing distinct nominations.

Similarly, the Ramsar Wetlands Convention Secretariat has long made available detailed minutes of STRP meetings, and through this means provided information about how the STRP organizes its work plan into three separate working groups, and also gives the audience insight into other aspects of process, for example, into how minority views are dealt with in brokering the consensus outcome. For instance, the excerpt below (edited to focus on discussions of one small issue for illustrative purposes) from the minutes of the STRP's 12th meeting[78] shows the level of detail provided to stakeholders as background to what are, in fact, very concise recommendations to the COP.

> *"**Agenda item 10: Ramsar site designation (Working Group 4)***
> ***71.** The DSG [Deputy Secretary General] drew attention to the extract from the CBD's Decision VII/4 on the inland waters programme of work, which invited the STRP to elaborate the existing Ramsar Criteria in several aspects.*

[78] available at: http://www.ramsar.org/strp/strp12_report.htm

[...]

73. *David Stroud [Chair of Working Group 4 of the STRP] reported that the Group is recommending a number of additions and changes to the Strategic Framework for the Ramsar List and seeks the Panel's guidance on a number of issues. The terminology still must be harmonized with other terms being recommended by the other WGs, and the conceptual linkage of the proposed Criterion 1 usage must be made to the broader definition of ecosystem services.*

74. *[...]On the rolling review of the Criteria (Task 4.3), the WG proposed Strategic Framework text for Criteria 5 and 6 on waterbirds and recommended that the COP adopt an additional Criterion 9 on "aquatic megafauna", for which a Technical Report will be produced in summer 2005 providing background for the use of the 1% threshold. [...]*

78. *There was considerable discussion of the use of 1% threshold in relation to aquatic megafuna in the proposed Criterion 9. Questions were raised about where the population estimates needed for determining 1% would come from, and David Stroud cited the cooperation of Mariano Gimenez-Dixon and IUCN-SSC's non-avian specialist groups. Tobias Salathé wondered whether a great deal of new work might fall to the Secretariat, and the SG expressed similar doubts that there would not be enough solid data for many species, leading to extra work and contentious arguments. David Stroud explained that the proposed Criterion would be linked to an annex of species about which there is sufficiently reliable data and would thus taxonomically limit the application of the Criterion, and the annex would be updated in harmony with IUCN-SSC's specialist groups and others.*

79. *The SG [Secretary-General] inquired about where the line would be drawn in determining "mega"-fauna, and the DSG [Deputy Secretary-General] preferred the term "non-avian wetland-dependent species". David Stroud thought the Criterion could include non-mega fauna, but only if there were good biogeographic and site population estimates. The DSG noted that the 1% threshold would not be appropriate for some taxonomic groups because of their life histories. David Stroud noted that this was also the case for waterbirds with respect to Criterion 6.*

80. *It was suggested that the annex should include a list of appropriate species, in order to get it moving, and more could be added as increased data becomes available. David Stroud noted that the waterbird population estimates are not complete, either, but that does not impede the utility of Criterion 6.*

[...]

83. *Tobias Salathé reiterated his doubt that the proposed annex will only list the species but not provide the data, and he wondered who will pay for doing that? David Stroud promised to discuss that issue with IUCN and report back later in the meeting [see para. 104].*

[...]

87. *There was discussion about whether the suggested changes to the Strategic Framework text should be brought to the COP in an entire new edition of the SF, some parts of it only, or just a listing of the proposed additions and changes.*

Decision STRP12-20: *The STRP determined to bring the rationale for the STRP's proposed changes to the Strategic Framework to the COP as an INFO paper, to propose the adoption of a new Criterion 9 on aquatic fauna, and to recommend additions and changes to the Strategic Framework, all subject to the amendments suggested by this meeting. Only the proposed changes should be communicated to the COP, and the COP should be asked to mandate the Secretariat to perform the editorial tasks of incorporating the changes it adopts.*

Agenda item 10, report back by Working Group 4 on use of the 1% threshold

104. *David Stroud reported back [para. 83 above] on his discussion with IUCN's Mariano Gimenez-Dixon, in which they devised a procedure for establishing a list of population*

> *estimates of wetland-dependent fauna and mega-fauna soon and updating it in future via the IUCN's Web-based Species Information Service (SIS). It was urged that a first list should be published as a Ramsar Technical Report at low cost.*
> ***Decision STRP12-25:*** *The STRP endorsed the proposed process for providing updated population estimates for wetland-dependent species via the IUCN's Species Information Service.*

Exchanges such as the one cited above allow interested stakeholders to glean from these minutes the more specific nature of experts' concerns as relating to the establishment of a new criteria, providing interested stakeholders not only a fuller discussion of the issue that will ultimately be forwarded to the COP, but also information as to which experts to contact to gain greater information on these specific issues.

Yet, in addition to the benefits arising from providing detailed minutes or summary reports of SAB meetings, stakeholders are, reflecting the increased awareness of SAB membership discussed in Chapter III, increasingly looking to SABs to shed light on those actually providing expert advice.

Participant Information

A further dimension of transparency is achieved by making available information on SAB participants, beyond their name and the Party or region they represent. The importance of diversity criteria such as institutional affiliation, disciplinary expertise and potential conflicts of interest (as described in greater detail in Chapter III) is closely linked to whether the end-users of the SAB's work are provided information on member' diversity characteristics.

The composition of an Advisory Committee can be a key focus of opponents' attacks, and Hilgartner describes how Committees' disciplinary diversity have been used to criticized Committee's work in the US context. Yet, if insufficient information about such criteria is provided to stakeholders, then the SAB output is all the more vulnerable to dismissal.

For example, under the Ramsar Wetlands Convention STRP, the Secretariat makes available on their website a list of STRP members, including their national and institutional affiliation, as well as a brief listing of their areas of expertise, and provides interested Parties an easily analyzed snapshot of the expertise coming available to the STRP in completing its work.

As Parties to the Ozone Regime struggled to reach agreement on the MBTOC's recommendations for Critical Use Exemptions, several noted the paucity of information on MBTOC members. In particular, developing countries bemoaned the lack of experts from their group on the Committee, a reality confirmed by an informal interview with a TEAP Co-chair even if no listing of MBTOC participants was readily available to Parties. In fact, while the MBTOC reports prepared in October 2003 and February 2004 did include a brief overview of the MBTOC review process, they provide no information on the MBTOC membership, not even identifying the group's co-Chairs.

Yet, in the latest report prepared by the MBTOC for the December 2005 MOP, an annex to the report includes a detailed list of MBTOC members, including their gender, institutional affiliation, areas of specialization, the length of time of service on the MBTOC, and their country and its status as an Article 5 Party (this is how the Ozone Regime refers to developing countries). The matrix employed by the MBTOC to allay concerns over its membership is illustrative of the many options available to SAB leadership in describing their membership, and often SABs have chosen to emphasize some criteria over others.

Under the IPCC, while emphasis has historically been placed on authors' institutional affiliation (most often their employing university or government agency) and more recently on their nationality, as it prepares its Fourth Assessment Report the IPCC Secretariat is now also emphasizing statistics relating to author's gender and developed- or developing-country status.

As was evidenced in the report on membership characteristics presented by each Working Group at IPCC-22.

Yet, even within the IPCC's work there is variation in the amount and type of information disseminated. At IPCC-22, as each Working Group reported its progress on its first draft, Working Group III[79] (mitigation) presented summary statistics of its authors' geographic distribution[80], economic diversity (distinguishing authors coming from developing countries, developed countries, and from countries with economies in transition, the groups' gender distribution, and their previous involvement in the Third Assessment Report. Meanwhile, Working Group II[81] (adaptation) also reported on gender balance, but only provided the number of developed or developing/in transition countries, along with the proportion of authors from developed countries, from developing countries or countries with economies in transition, or from intergovernmental organizations. Furthermore, in its progress report, Working Group I[82] (scientific aspects of climate and climate change) only provides the number of authors involved in the preparation of the WGI first draft of the Fourth Assessment Report. While upon its release the IPCC reports to provide information on its authors (usually with their name and institutional affiliation), it can be expected, based on interviews with stakeholders and discussions at IPCC-22, that the IPCC products are more likely to emphasize gender, economic and institutional diversity in the future.

Meanwhile, under the Biodiversity Regime, the Secretariat has introduced the norm of making available, most often on the last days of a meeting, a list of participant listing

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[79] IPCC-XXII/Doc. 11
[80] The WG-III report separates authors from: Africa, Asia developing, Europe, Japan/Korea/Oceania, Latin America/Carribbean, and North America. 31% of the author team is from Europe, while 19% is from North America.
[81] IPCC-XXII/Doc.10
[82] IPCC-XXII/Doc.9

institutional affiliation and addresses for all meeting delegates, be it a COP, a SBSTTA or an *ad hoc* Technical Expert Group. This information however does not provide any insight into delegates' expertise or qualifications, and is in fact targeted to serve as a means of exchanging contact information rather than a targeted instrument for enhancing transparency. Furthermore, at the recent Review of Implementation of the Biodiversity Convention, the need to control that "adequate" delegates take part in the SBSTTA reflect a growing concern that the SBSTTA brings together more policymakers than scientists. The range in size and expertise of these "adequate" delegations and described in greater detail in box IV.2.

Box IV.2: Selecting "adequate" delegates to take part in SBSTTA.

The Biodiversity Convention has long struggled with SBSTTA's identity and mandate as a science body. As delegates at SBSTTA-11 discussed the future role of SBSTTA, and the potential establishment of another international body for biodiversity advice, Parties were divided in how they saw the role of SBSTTA in fulfilling the CBD's mandate. Some, including in particular Latin American countries, viewed SBSTTA as a science body in its own right, qualified to generate science and technical advice for the COP. Meanwhile, others emphasized the political nature of the debate within SBSTTA and highlighted the need for an assessment process to feed into the SBSTTA.

This divide is also reflected in the disparity among the size and make-up[83] of delegations sent to SBSTTA-11. While Canada (the host country) sent the largest delegation of 26 representatives, the bulk of these occupy posts as science advisors and technical specialists. Meanwhile, the Netherlands's 3 person-delegation included only policy advisors, as did New Zealand's 9 delegates. Among developing country Parties, the bulk of them sent only one or two delegates, and these often included that country's Biodiversity Convention National Focal Point (who in small countries is often responsible for policy and science aspects of the issue). In contrast, Saudi Arabia's 7-strong delegation's only clear policy negotiator was its representative to Saudi embassy in Canada. Meanwhile, among observers, the United States (not a Party to the Convention on Biological Diversity) sent 17 delegates, half of which were

[83] gleaned from their job title and institutional affiliation

policy specialists. For the most part IGOs sent technical specialists, while the bulk of NGOs, indigenous groups and industry representatives were policy advisors.

Such disagreement as to which qualifications will ensure "adequate" delegates are sent to SBSTTA meetings is sure to be discussed as COP-8 examines the SBSTTA's mandate in March 2006, yet as long as SBSTTA meetings are conducted in a policy-oriented plenary setting (and indeed following the same Rules of Procedure as the COP), Parties and observers are bound to find the need to include at least one policy negotiator on most delegations.

In contrast, the PIC and POPs Convention have made available to the COP submissions by Parties containing Review Committee members' CVs and declarations of interests. However, these latter CVs do not follow specific guidelines, and in practice the amount of information provided ranges from a brief summary of biographical information, to multi-page detailed CVs outlining experts' qualifications, work experience and publication records. While on the surface this provides much more detailed information about the Committees' memberships, in effect it is much more time-intensive for observers to consult these listings and get a sense of the variation on the Committee, as opposed to rapidly visiting the STRP website or consulting the MBTOC report and getting a quick snapshot of diversity in membership. In addition, information on membership is likely to be more meaningful to stakeholders if it is provided in combination with information on the SAB's process which can in turn provide insight as to which experts carry out the bulk of the work[84] reflected in the SAB's output advice.

As described above, transparency of the SAB's work can be achieved through a variety of strategies, which include holding meetings with an open-door policy, but also other approaches that may be more or less practicable according to each MEA's specific needs, such as keeping stakeholders informed of meetings and deadlines, providing detailed reports of meetings,

[84] It is not surprising that SAB members often in the end take disproportionate roles in carrying out the SAB's work, but in some cases it is really only a very small percentage of those involved that take an active role, prompting one Secretariat administrator to identify many of those inactive members as "dead wood."

granting access to output documents but also to source information, presenting a clear picture of the deliberation process and of those involved in that process. Indeed, these different types of transparency all impact the resulting SAB consensus' validity and sustainability. In seeking out science advice MEAs face different challenges, and provisions to enhance the transparency of their SABs should be tailored to their specific needs. Ultimately, it is stakeholders' assessment of this transparency which will influence both the outputs' validity (as transparency can influence participants' willingness to take part in these science efforts), and its sustainability (as transparency can increase political buy-in to the SAB outcome.

In a sense, SAB administrators are often called upon to exercise flexibility in identifying means of improving their overall transparency, for example by opting to hold closed-door meetings to ensure participation by industry groups wary of disclosing proprietary information, while also opting to release information on the institutional affiliation of those consulted by the SAB in this process and developing and presenting clear norms and procedures to guide the SAB's work. Yet, the establishment of such rigorous norms and procedures may be perceived, at first examination, to limit the flexibility necessary for SABs to carry out their work. In fact, as described in the next section, flexibility too can present many facets which in concert will also enhance the outcome's validity and sustainability.

FLEXIBILITY

The flexibility granted an SAB in organizing its work is crucial to the outcome's validity. In fact, too rigid a process (which can often be seen as a straightforward means of ensuring transparency) can deter the validity of the outcome by alienating some experts who may be more accustomed to operating in what are often more informal settings and interactions, which are more common in the academic community. The scientific process often relies heavily on

informal interactions (Knorr Cetina, 1999), which has been credited with spurring innovation and enhancing bridging activities. Indeed, efforts to find ways of fostering some informal interaction can positively impact the SAB outcome's validity. Validity can be further enhanced if for instance the SAB is granted the flexibility to adapt its work to react to new developments in scientific inquiry or the emergence of urgent questions.

And, as much as the SAB output's transparency can benefit from stakeholders knowing that the SAB is carrying out its work according to rigorous, and agreed upon, norms and procedures, examination of the cases studied for this thesis highlight how granting SAB administrators some flexibility in organizing their work, calling on qualified experts and maintaining institutional history will not only contribute to improved validity, by ensuring that experts are not alienated by the process' rigidity, but will also improved sustainability, by ensuring the approval of both the policymaker and expert communities.

Just as the examination of these cases highlighted the existence of different types of diversity and of transparency, I propose that there are several aspects of flexibility whose application will contribute to this increase in validity and sustainability of the SAB consensus, these include flexibility afforded to the running of meetings, but also encompasses the expansion of the network of contributing experts, the adaptation of norms and procedures, and provisions for ensuring continuity and retention of institutional memory.

Organization of Work

SABs often have well defined Rules of Procedure[85] guiding the way in which SABs organize their work. These rules will generally specify administrative requirements (i.e. chairing requirements), and also rules for the holding of meetings. Several SABs have also exercised

[85] The Rules of Procedure governing each of the MEAs studied in this thesis are identified in the official documents section of the bibliography.

flexibility in distributing the work before them among its membership, a step which can enhance the output's validity by ensuring that those most qualified self-select to serve as appropriate, and can improve the output's sustainability by contributing to the SAB's efficient operation.

Under the Ramsar Wetlands Convention, experts are distributed among working groups entrusted to carry out intersessional work on different agenda items and report back to the whole STRP, and as a result dedicated small groups of STRP experts have taken the lead in developing their area of work, including in developing concepts applicable to broader applications. Also under the Ramsar Wetlands Convention, the STRP has been successful in providing the COP more immediate guidance. For example, at the Ramsar COP-9 held in November 2005, delegates were able to discuss the implications for wetlands management of the, at the time, much publicized impending threat of an avian bird flu pandemic.

Under the Biodiversity Regime the SBSTTA operates under the COP's Rules of Procedure, and meetings are held in plenary setting, with simultaneous translation into the 6 UN languages. SBSTTA generally divides its work into two parallel working groups also held in plenary settings with interpretation. However, such organization of work may not lead to the most efficient use of delegates' time, since not all experts can be expected to intervene equally on all items. SBSTTA Chairs do often exercise their discretion in establishing other fora for reaching agreement, including contact groups (small groups in more informal settings open to all Parties and observers, but without interpretation), informal consultations (involving Parties only), "friends of the Chair" groups (bringing together a limited number of Parties), or even by deferring to bilateral negotiations.

Such administrative leeway can help in brokering agreement on contentious issues, yet even in the context of policy debate these recourses have also been blamed with compromising the

process' transparency and, in the long run, its sustainability. At the December 2005 MOP of the Ozone Regime in fact, observers noted the marked increase in informal consultations and bilateral negotiations. They noted that such organization of work had indeed precluded the need to convene a third Ex-MOP (concerns over the MBTOC's recommendations for Critical Use Exemptions were in fact resolved bilaterally between the United States and the European Community), but may have slowed the progress of the Ozone Regime overall and compromised its tradition of an open and democratic process[86].

Under the Rotterdam PIC Convention, the Chemical Review Committee also sets up working groups to consider nominations for listing– with the Committee as a whole designating the Chairs or co-Chairs for these groups. Committee members then decide which, and how many, committees in which to take part, and this work is carried out in parallel sessions at CRC meetings and also completed in between CRC meetings. The Committee as a whole (or a working group including almost all members) usually tackle the more contentious issues, while other considerations may involve only a small group of as few as 8 experts[87].

Flexibility in the organization of work also carries significant implications as to the validity and sustainability of the outcome arising from linguistic implications. The POPs Review Committee, SBSTTA, SBSTA and Plenary meetings of the IPCC all include simultaneous translation at meetings, and the decision to break out into small working groups most inevitably implies that most, if not all, of these sub-groups will continue their work in English only.

As expressed at COP-1 of the Stockholm POPs Convention (see Chapter III), but also as confirmed in interviews and surveys, there is a deep divide between developed and developing countries as to the impact of providing interpretation at SAB meetings. Developing countries

[86] A Brief Analysis of MOP-17, contained in ENB, Vol. 19 No. 47
[87] Report of CRC-1, and ICRC Reports available at:
http://www.pic.int/en/viewpage.asp?Id_Cat=70&mTitre=MEETINGS+%26+DOCUMENTS

adamantly maintain that it is only through such interpretation that the best experts, especially from their regional groups, will generate the most valid outcome. In addition, their strong stance on the issue suggests that the outcome's sustainability is likely to suffer without provisions to maintain some interpretation at SAB meetings. In contrast, developed countries, and most vocally those of the European Union maintain that such arrangements will hinder the outcome's validity by constricting discussion, and will hinder the process' sustainability by placing unnecessary financial burdens on the MEA administration.

Expanding Expertise

It is also common that, as SABs are consulted for science advice on a wide variety of topics, that the membership agreed upon by the COP does not include enough of the expertise most relevant to a given concern. In such situations, SABs that maintain the flexibility to consult those most qualified experts are in a better situation for producing a more valid outcome. Reaching out in such a way, either through the Secretariat or through members' existing networks, will help ensure the output's validity but will also shore up sustainability as stakeholders are unlikely to stand by an output which did not involve the consultation of those widely acknowledge as "world authorities" on a specific topic.

Under the Convention on Biological Diversity, the Secretariat is often called upon to provide background information to the SBSTTA on some of the more contentious issues before it. According to the SBSTTA *modus operandi*, the Secretariat usually sends out an invitation to Parties to forward the necessary information. However, this rarely occurs since most Parties struggle to submit the necessary reports on national implementation let alone find the time and resources to prepare necessarily broad overviews of the issue. Most often, the Secretariat is then

tasked with contracting out this task, and the SBSTTA entrusts the Secretariat with identifying consultants qualified for presenting the state of the art of knowledge on an issue.

Most SBSTTA meetings therefore include keynote presentations on topics under review according to the agenda. As such, as the Fourth meeting of the SBSTTA met in July 1999 to discuss the available knowledge on what many were calling "terminator" seeds (seeds with gene restrictive technologies which in effect preclude more than one year of growth), the Secretariat turned to Richard Jefferson, Chair of the Center for the Application of Molecular Biology in International Agriculture, to author an expert assessment and explain the scientific process involved. Similarly, under the Cartagena Protocol, when the *ad hoc* Expert Group on Liability and Redress sought guidance on issues of risk assessment for biosafety, the Secretariat called upon independent consultants (who had previously been affiliated with environmental non-governmental organizations) to present their knowledge and experience with risk assessment. I

Other processes prefer to entrust SAB members with the selection of consultants. For example, under the POPs Convention large sections of the BAT/BEP expert group report presented to COP-1 are readily acknowledge as having been prepared in large part by consultants[88]. At COP-1, the output of this group was perceived as developed-country biased and it remains to be seen to what extent consultants will be relied upon, and to what effect, in preparing the group's next report.

This notion of relying on experts' judgment and knowledge in reaching out to a broader expertise base for completing the SABs work is especially reflected under the revised *modus operandi* of the STRP approved in November 2005 at COP-9 of the Ramsar Wetlands Convention. Under these new proposed guidelines, the selection of experts (not exclusively by Parties, but based on party nominations by a small committee) will not only take into account

[88] as readily acknowledged in interviews with Convention administrators.

national, economic, geographic or disciplinary diversity, but will also seek to expand the STRP's reach among different networks of expertise, in order to allow a broader base of expertise to feed in to what is still (by most MEA standards) a small SAB.

Similarly, the recently approved detailed working procedures for the MBTOC note that "with a view to supporting a timely review process and ensuring additional expertise that may be required for a particular critical-use nomination, MBTOC may seek assistance from additional experts," yet this provision for flexibility in expanding the SAB's membership also tempered by the recommendation that: "[f]or reasons of transparency and accountability, the role and type of input of these consulting experts should be clearly set out."

Under the IPCC, the leadership of the Working Groups is granted significant leeway in nominating experts, as lead and contributing authors, but also as reviewing authors, to supplement those experts nominated by governments. Such flexibility is also credited (O'Riordan and Jordan, 1996) with shoring up the credibility of the IPCC output to ensure that no clear dissenting view is excluded from the IPCC process.

Adapting norms and procedures

The norms and procedures put in place to standardize and control the work of the SAB also can benefit from some elements of flexibility, especially in order to ensure that "non-conventional" sources of knowledge are taken into account. The most public aspect of the work of many of these SABs relates to the review and compilation of the "current state" or "state of the art" of knowledge and research on the issue. Yet, as it carries out this task, each of these SABs faces several decision moments where judgments and assessments of knowledge occur and can in effect signal the legitimation of forms and avenues of research (this is discussed in greater detail in Chapter II).

Perhaps the most readily accepted source of knowledge lies in that produced through the peer-review process; yet the flaws of journal peer-review are generally acknowledged (Jasanoff, 1995; Chubin and Hackett, 1990; Edwards and Schneider, 2001), and of particular interest, are concerns over blind-reviews, the difficulty in introducing non-mainstream views, and the biases which often hinder publication by developing country scientists (Mainguy et al, 2005). The under-representation of local and traditional knowledge in the peer review process are also generally acknowledged (Wynne; Jasanoff and Martello, 2004) and SABs vary greatly in the extent to which, and the means through, which they seek out this class of knowledge.

In this regard, SABs can exercise flexibility in engaging and seeking out classes of knowledge or considerations which may not be captured by the norms and procedures developed and approved by the COP. In compiling "existing knowledge," SABs are also faced with the English-language bias prevailing across much of academia today. SABs face numerous technical impediments to drawing on even peer-reviewed non-English language published information. The inclusion of so-called grey literature (produced by government or international agencies) also varies from MEA to MEA, and is further complicated by the fact that some countries' grey-papers may vary in their availability to the SAB members. Nevertheless, the flexibility to draw on non-published sources is afforded to IPCC authors since the review procedures allow for the review team to assess these sources and also includes a procedure for making these sources available for consultation in a central archive.

The flexibility to adapt prescriptive rules of procedure to ensure that all stakeholders' interests are at least considered in preparing the science advice can significantly improve the output's validity. Yet in order to retain the sustainability created by a rigorous and decision-communicate approved peer review process for example, it is helpful for the SAB to clearly

communicate the standards and aims of this flexibility to the MEA stakeholders. For example, under the POPs Convention, the POPRC has been entrusted with developing, for COP approval, guidelines for assessing the relevance and applicability of so-called "bridging information" so that Parties, in nominating chemicals for listing, can submit an assessment prepared for application to another country. Similarly, the PIC CRC is entrusted with preparing, also for review by the COP, guidelines for applying the concept of "risk evaluation."

Nevertheless, granting an SAB too much flexibility, especially when accompanied by a lack of transparency, can only enhance the lack of sustainability of the SAB outcome, and also creates doubts as to the outcome's validity. When the MBTOC first began reviewing Critical Use Nominations for methyl bromide use in developed countries, Parties had no information on the process used in decision-making, and the MBTOC was not bound by any guidelines in carrying out its work, which could have alleviated such concerns.

Under the Biodiversity Regime, to an extent such flexibility is reflected in the ease with which the COP and the SBSTTA have been able to establish *ad hoc* groups to address more problematic issues before them. However, there are doubts as to whether such flexibility has enhanced the validity of the outcome of these expert bodies. Several observers and participants have complained about the recent proliferation of such bodies, and a few have even implied that the most thorny issues are only being shuffled from group to group and are not at all contributing to consensus at all. In fact, this perhaps exemplifies, just as the lack of guiding procedures in the original MBTOC, the limitations of granting too much flexibility to a SAB.

Members of the Ramsar STRP are also granted the flexibility to identify areas of work beyond those initially set out by the COP. And indeed, in the latest triennium, this was exemplified by the STRP initiative to develop an integrated framework for water resource

management, even though it "was not in the original mandate" (STRP-12 Report, 2005). This has contributed to COP's satisfaction with the validity of the STRP outcome, and consequently strengthened the consensus' sustainability.

Ensuring Continuity

As the membership of these SABs rotate over time, several SAB's terms of reference have included provisions which set out details of the nomination and length of office, both to ensure rotation and facilitate membership diversity. At the same time, it is also necessary for the SAB to find means of ensuring continuity and institutional history. This has been achieved, for example, by maintaining, even if they are not released to non-members, records of SAB meetings, and also by taking steps that may include past members in perhaps an advisory manner, or making special provisions to extend terms of some experts whose leadership or expertise is too difficult to replace.

This emphasis on continuity was at the root of negotiations, in the terms of reference for the Rotterdam PIC Convention Chemical Review Committee, to stagger the nomination cycle of its members so that only half the membership would be subject to renewal or replacement every 2 years. This is complicated by the fact that SABs may not face the resource privileges of the IPCC, which generally retains its long-time authors while still bringing on board new contributors to its ever expanding author base, more generally facing size constraints and the need to maintain diversity and even rotations of experts.

This latter limitation is circumvented under the Stockholm POPs Convention, where it has become common practice, first for the interim UNEP Chemicals Programme and now for the POPs Convention Secretariat, to often employ individuals who have previously served as government delegates, some of whom have also been technical experts, but who, after several

years of service often return to the ranks of Party representatives. Such flexibility in blurring the line between administrators and Parties by ensuring that expertise is retained even as membership rotates can ensure the output's validity and, in the POPs context at least, has yet to affect the SAB output' sustainability, likely a result of the trust and goodwill which is the hallmark of the POPs and PIC negotiation processes and often commented on by Parties, administrators and observers alike.

The Biodiversity Regime does not benefit from such continuity, and in fact a large number of SBSTTA participants, and especially those from developing countries, are often attending their first SBSTTA, due to the rapid pace of post change in those ministries. Beyond the obvious detrimental effect to the sustainability of the outcome if SAB participants haven't been able to forge links with their policy counterparts, such high turnover can also impact the validity of the outcome as contributing experts will often need time to learn to navigate the SAB's operating process.

In contrast, the Ramsar STRP and Ozone MBTOC do not provide guidelines or term limits for their SAB members – which can ensure that continuity of expertise is retained, but can conversely lead to concerns of organizational sclerosis. Such a concern has begun to be acknowledged by the MBTOC, which, in its latest report not only provided information on its experts' gender, nationality, institutional affiliation and area of expertise, but also in the length of their involvement with the MBTOC.

CONCLUSION

Both transparency and flexibility in fact are made up of several types of transparency and several types of flexibility which are reflected in the SAB's organization of work. Examination of the cases studied for this thesis leads to the conclusion that the effective management of these

many types of flexibility and transparency are necessary to a valid and sustainable SAB outcome, yet their management must also be tailored to the needs and particularities of each MEA. The link between a transparent and flexible process and the resulting consensus are summarized for each of the six cases in Table IV.1.

Table IV.1: The relationship between process and consensus across the cases.

CASE	**PROCESS & CONSENSUS**
Ramsar Wetlands Convention	**Access vs. transparency of minutes** Access to STRP meetings limited (except for wide range of invited IGO partners) Detailed minutes of STRP meetings help sustainability of outcome **Flexibility: organization of work** STRP granted flexibility for most qualified experts to concentrate on relevant areas of work Leads to more valid outcome, more directly relevant to Parties' needs and counters concerns of national-centric STRP nominations at expense of expertise **Flexibility of nominations to STRP** Under new *modus operandi* shift to selection burden to Standing Committee, Secretariat, STRP Chair Transparent criteria for selection, ranked in order of importance
Ozone Regime	**2003-2005 MBTOC output not sustainable** Many Parties noted concern with lack of transparency of process *No understanding of procedure for review* *No understanding of basis for decision-making* Concerns over membership tied to lack of transparency of participation and meeting info. *No information on membership in MBTOC* *Little information on MBTOC meeting (where, when, who, how long)* Too much flexibility: MBTOC process = black box *High level of mistrust, even internal criticisms* **Dec. 2005 MBTOC Working Procedures** Emphasis on transparency Provisions for flexibility to consult wider expert pool, tied to transparency of process
Biodiversity Regime	**SBSTTA** Transparency of meetings *Open access to all Parties and observers* *Simultaneous interpretation* *Detailed meeting reports* Flexibility for informal deliberations *Often for more contentious issues, can help reach consensus – but is it most valid/sustainable consensus?* *Risk of excluding small delegations, non-english speakers (long term validity and sustainability implications)* Flexibility to bring in consultants *Increases efficiency – prepares starting point for negotiations* *Lack of oversight in consultant selection – vulnerability to attack* **Flexiblity to establish *ad hoc* groups** Most qualified experts can self-select for participation Concerns in overloaded meeting schedule (again risk of exclusion) Potential to shuffle contentious issue from group to group without resolution

CASE	**PROCESS & CONSENSUS**
Climate Regime	**Transparency of drafting/review process** Clearly set out norms and procedures *Compensates for lack of access to actual reviews (even if theoretically accessible)* Information and stats provided on contributors *Although beyond distinction of lead authors, little information on who wrote what à strengthens impression of unified consensus* Differentiation in levels of output *Different levels of review allow policy-makers to differently weigh outputs* **Transparency strategy** Includes reports of plenary, and production of brochures emphasizing review process (but concerns over their review, and broadcasting as "IPCC materials" **Flexibility (mixed record)** Some flexibility (for example in drawing on non-published research) follows strict norms and procedures Other flexibility (for example in selecting contributing authors) much less transparent and falls under "leadership discretion"
Rotterdam PIC Convention **Stockholm POPs Convention**	**Access to meetings** CRC and POPRC – invitations to observers but how to deal with proprietary info? BAT/BEP – subject to COP RoP Observer attendance vs. lobbying influence and interest declarations **Flexibility to organize work** Efficiency enhanced through small committee work (self selection of most relevant expertise) Implications for language in POPRC vs. working groups **Transparency of organization of work** Detailed meeting reports (prepared by Secretariat) Tied to development of norms and procedures *Devised by Committee, approved by COP, applied by Committee* *But limitations tied to policy constructs? Bridging, risk evaluation*

Both transparency and flexibility are essential for achieving a sustainable and valid consensus, yet at first glance too much of either of these might be considered detrimental. In fact, increased transparency is often presented as a trade-off for validity, while increased flexibility is assumed to reduce any resulting consensus' sustainability (Cash et al, 2003). In assessing which aspects of transparency and flexibility warrant special attention for a successful SAB, it is also necessary to examine the way in which transparency and flexibility may counter-act each other.

For example, it is foreseeable that over-emphasizing transparency as relating to carefully scripted review procedures may hinder SAB members' flexibility to seek out necessary sources of information. Yet, rather than framing this interconnectedness between transparency and

flexibility as a trade-off, the multidimensionality of each of these two components can be applied in concert to maximize both validity and sustainability.

The scientific process has a long-standing tradition of conducting at least some of its work behind closed doors, and in situations where the process' validity requires some of the work of the SAB to be "black boxed," SAB managers should seek to then shed light on other aspects of the SABs process, so as to guarantee a minimum threshold of transparency without which any findings will be vulnerable to criticism and are unlikely to be acceptable in the long run.

If SAB managers chose to move the deliberations of the SAB itself "backstage", then it is incumbent upon those managers (if they seek to enhance transparency), to make particular efforts to communicate information about the decision-making process and the SAB's organization of work to interested Parties and observers. Information on who chaired the SAB meeting, but also details of the review and drafting processes, or the organization of any working groups, will all contribute to shedding light on the rigor of the SAB process and on the process' insulation from political pressures which may affect its validity and sustainability.

The extent to which the SAB is granted the flexibility to deviate from its prescribed organization of work affects how easily SAB members will be able to take extraordinary steps to increase the output's validity when necessary and preclude any attacks to the SAB's sustainability (for example if it becomes clear that the most qualified experts have not been consulted). Conversely, granting too much flexibility in organizing work may decrease the accountability granted by transparently set out norms and procedures. A similar challenge arises from increased reliance among SABs on virtual fora for conducting work.

As discussions and drafting are not only delegated to smaller groups but also shifted "online" to e-mail exchanges and internet portals (as is the case with the Ramsar Wetlands Convention's

STRP Support Service which is restricted to STRP members and STRP National Focal Points[89]), in effect a significant portion of SAB's work is being moved "offline," and it becomes all the more essential to increase transparency at least as relating to how this work is being carried out and by whom. In order to contribute to a net increase in validity and sustainability, such flexibility should be accompanied by transparent disclosure of information on these experts, their selection, and any conflicts of interest.

The combination of a flexible and transparent process with representative membership contributes to the production of a valid and sustainable science consensus, and the examples discussed above can be used to extract lessons to inform the design of SABs which could operate successfully in practice. Chapter V highlights the lessons learned from this thesis and applies its result to the current discussions on the need for a new science advisory process under the biodiversity regime.

[89] The STRP Support Service is described in http://www.ramsar.org/sc/29/key_sc29_report_annex3.htm which details its terms of reference

CHAPTER V: A VALID AND SUSTAINABLE SCIENCE CONSENSUS

While science advisory bodies to MEAs fulfill a wide spectrum of needs – including agenda setting, public education and outreach, and monitoring and assessment – the core function of SABs in fact relates to their role in brokering a valid and sustainable consensus on the science of the issue at hand. This consensus facilitates negotiations for effective coordinated global action. Prior to discussing my recommendations for improving the provision of science advice, I will briefly provide an overview of the examination of the science advisory process presented in greater detail in chapters II, III and IV.

Science has been identified by many scholars as a key ingredient in MEA effectiveness (Young and Demko, 1996; Birnie, 1996; Guppy, 1996; O'Riordan and Jordan, 1996; Parson, 2003; Susskind, 1994; Social Learning Group, 2001; Haas et al, 1992) and, although there is no clear picture of what constitutes "effective science advice," I propose here that the most effective science input into policy negotiations is an agreed upon body of information describing a problem and analyzing possible solutions.

Yet, even if the mandate of the SABs focuses on a review of existing knowledge, in carrying out their work the experts taking part in the SAB are in fact doing much more, even if this aspect of their work is not always explicitly acknowledged by those carrying out this work (van der Sluijs et al., 1998). Nevertheless there is an emerging field of scholarship acknowledging the extent to which these science advisory bodies, at the national and global level, are acting as more than mere compilers of scientific information, but are in fact sites of knowledge production (Jasanoff and Wynne, 1998; Miller and Edwards, 2001; Jasanoff and Martello; 2004). In taking a closer look at this production of knowledge, it is useful to consider three broad types of knowledge production: framing and agenda setting; classification and standards; and methods.

Of course there are many interlinkages among these, and while they are by no means independent of each other, they can provide useful lenses for shedding light on how these SABs are more than just assessors of knowledge, and are in fact producing new knowledge as they produce this consensus on matters of science to feed in to the MEA decision-making.

A consensus on the science is not sufficient however for "effective" science advice – in order to at least facilitate effective regimes (there are a host of reasons why regimes will fail to be effective despite timely and accurate science advice (Miles et al, 2002; Young, 1999; Young, Demko and Ramakrishna; 1996)) this consensus needs to be valid (accurately reflect the scientific knowledge on the issue) and also needs to be sustainable (arise from an inclusive process so that stakeholders do not oppose it or require its permanent renegotiation).

Based on the in-depth examination of SABs of the six MEAs reviewed in this study, two components of an SAB's design and operation appear to be necessary to ensure a valid and sustainable consensus on matters of science: representative membership and a transparent and flexible process. And, while these two components are shown to be important in fostering a valid and sustainable consensus – the practical means of achieving representativeness, transparency and flexibility will vary according to the nature of the problem and the stakeholders involved. The second half of this chapter seeks to describe a new method of incorporating these findings into a better system for providing science advice to MEAs.

Representative membership is attained by ensuring that the limited number of experts on the SAB reflect the national, economic and geographic diversity of stakeholders (capturing interests of those benefiting and suffering from the problem or its solution), while also maintaining an institutional and disciplinary diversity suitable to the nature of the problem (including those directly or traditionally implicated in the study or management of the problem, while still

allowing input from other experts more tangentially-related who are likely to identify inter-problem linkages). Representative membership also applies to more personal attributes likely to influence an expert's frame, such as gender and political discourse.

Representativeness contributes to both the validity and sustainability of a consensus, and different types of diversity will impact the consensus' validity and sustainability. In terms of the consensus' validity, national, economic and regional diversity facilitate the inclusion of relevant local and traditional knowledge, while disciplinary diversity captures more of the state-of-the-art in assessing the problem. Institutional diversity helps include cutting-edge knowledge (for example proprietary information held by industry) and more practically-gained knowledge (for instance arising from the hands-on management on a broad scale by government agencies).

As to the consensus' sustainability, national, economic, regional, institutional and gender diversity help to ensure that all relevant stakeholders feel some ownership of the SAB's recommendations. To this end the appropriate balance of diversity will vary across MEAs. It especially needs to reflect the coalitions of interests surrounding a particular MEA's core focus and include the necessary types of expertise necessary to craft a valid outcome.

Yet, even if an SAB could take stock of representational needs, practical considerations limit the possibilities of acknowledging all underrepresented stakeholders through combinations of representation. Nevertheless, an SAB could institute at least discrete (less frequent but more targeted efforts) to include all relevant voices at key moments of the SAB's work. Accordingly, it would be necessary to ensure representation from a broader array of countries and institutional affiliations, while ensuring as well disciplinary diversity, input from local and traditional knowledge, and a variation in experts' more personal attributes (including for example age, gender and political views). Indeed, every time an SAB is put in place, its creators face the

challenge of ensuring such a small committee represents the whole world- or at least is constituted in such a way that the whole world recognizes the validity of its output.

These many kinds of diversity at play in examining SAB membership will vary in the way in which they interplay and affect the resulting consensus' validity and sustainability. Some aspects of diversity will necessarily gain prominence over others, as the COP attempts to negotiate a membership balance suitable to generating a valid and sustainable outcome. In light of what are often intractable size constraints, those selecting SAB members will have to seek out scientists that fulfill more than one diversity variable as it is not desirable, or even practicable, for instance, to have a geographical diverse, gender balanced assortment of experts representing each disciplinary specialization.

Striving for representative membership is complicated by the fact that it is difficult to predict which types of diversity are most likely to impact the resulting consensus. Furthermore, the dynamics of any MEA are likely to evolve over time and as such any SAB *modus operandi* should include provisions for regularly revisiting guidelines for representative membership. While a coordinated membership strategy is warranted at the SAB level, the SAB should be granted the flexibility to assess whether, for example, some of its more specialized investigations warrant at least temporary adjustments to its membership scheme.

The SAB's process, more specifically the transparency and flexibility of its organization of work, will also impact the consensus' validity and sustainability. Transparency of the SAB's work can be achieved through a variety of strategies, which include holding meetings with an open-door policy, but also other approaches that may be more or less practicable according to each MEA's specific needs, such as keeping stakeholders informed of meetings and deadlines, providing detailed reports of meetings, granting access to output documents but also to source

information, presenting a clear picture of the deliberation process and of those involved in that process. Indeed, in seeking out science advice MEAs face different challenges, and provisions to enhance the transparency of their SABs should be tailored to their specific needs. Ultimately, it is stakeholders' assessment of this transparency which will influence both the outputs' validity (as transparency can influence participants' willingness to take part in these science efforts), and its sustainability (as transparency can increase political buy-in to the SAB outcome.

Increased flexibility in carrying out the SAB's work can improve the output's validity by ensuring that the necessary sources of knowledge are consulted in generating the science advice and can ensure participation by experts by not putting in place rigid protocols that might alienate experts and deter their particpation. Furthermore, flexibility in the organization of work (for example in shifting to informal negotiations) can shore up the output's sustainability by making the process not only more responsive to decision-makers needs, but also more efficient in addressing the agenda items before it.

Both of these attributes are essential for achieving a sustainable and valid consensus, yet at first glance too much of either of these might be considered detrimental. In fact, increased transparency is often presented as a trade-off for validity, while increased flexibility is assumed to reduce legitimacy and any resulting consensus' sustainability. For example, making all scientific deliberations open to observers and transcripted as matters of public record has been attributed with limiting the scope of deliberations and hindering innovation in the long run. Similarly, granting too much flexibility in organizing work may decrease the accountability granted by set out norms and procedures.

In the end, I have found through the study of 6 cases is that those SABs that have presented representative membership and transparent and flexible process will achieve a more valid and

sustainable consensus. The following brief examples from cases described in greater detail in the previous chapters will illustrate how this relationship between consensus and membership/process has played out in practice.

The worst possible outcome under the theory described above arises from an SAB whose membership and process leave a lot to be desired, as had been the case with the Ozone regime's Methyl Bromide Technical Options Committee (MBTOC), which has been plagued with criticisms over its membership (critics are quick to highlight an industry-heavy, and mostly developed country participants list) and its process (the only product of the MBTOC is its report submitted to the COP and its detractors have no insight into its decision-making processes or the source of information being drawn upon for purposes of decision making).

This inability to generate a valid or sustainable consensus has paralyzed the MEA's process over the last two years (requiring the unprecedented convening of two extraordinary MOPs, events which place further logistical and financial burdens on the Parties), and has in fact prompted the MBTOC to undergo a review and reorganization, emphasizing in particular increased participation by developing country experts and enhanced transparency.

The CBD's SBSTTA is an example where representative membership is achieved by virtue of allowing it to function in the same way as a policy forum, and by extension replicating the CBD's model for access to what are often underrepresented interests, for example indigenous groups and environmental NGOs. However the SBSTTA also suffers from a clouded and rigid process which hinders the validity and sustainability of its outcome. The SBSTTA operates according to the same rules of procedure as the COP, and brings together policymakers for the most part. The deliberation of issues in two parallel working groups is not necessarily conducive

to discussing the substance of the science advice, and instead the delegates, most often policymakers themselves, revert to negotiating linguistic details of recommendations.

At SBSTTA-11 in December 2005, many participants complained about the politicization of, for example, negotiating the language of a recommendation describing the findings of the Millennium Ecosystem Assessment instead of providing substantial science advice for acting upon the Assessment's findings. Delegates were also often faced with two extremes of deliberation, delegates were either negotiating small textual details in Plenary (with simultaneous translation) or conversely a few Parties were taking part in informal consultations on the most contentious issues (for example on drafting a recommendation on positive incentive measures and valuation tools). This resulted in most of the science-relevant discussions being moved behind closed doors to most stakeholders.

The process also suffers from the confusion reigning at present as regarding science advice under the biodiversity regime – while the SBSTTA is the core SAB, the CBD has also spurred the creation of numerous *ad hoc* "expert" working groups, maintains a roster of experts (searchable by discipline or nationality), took part in the recently completed large-scale Millennium Ecosystem Assessment, and has yet to address a January 2005 proposal by France to establish an equivalent to the IPCC on biodiversity matters. The confusion arising out of these often ill-defined ventures only cloud transparency and weaken the outcome of any of these science efforts.

Yet other science advisory processes benefit from solid and well-respected process arrangements, but are often criticized when it comes to their membership. Two SABs exhibited such symptoms in their early days of existence: the IPCC and the Ramsar Convention STRP. In

both cases, membership concerns have been repeatedly addressed, and the validity and sustainability of the science consensus generated has been bolstered as a result.

When it was first established, the IPCC's legitimacy in academic circles was strengthened by its close adherence to strict principles of peer-review, yet its reliance on what were mostly western-trained scientists from a few disciplines weakened both the validity and sustainability of the resulting scientific consensus. And even if the early consensus produced by the IPCC were able to successfully feed in to the policy process (and have been highlighted as contributing to the negotiation not only of the UNFCCC but also of the Kyoto Protocol), the reach of the IPCC's output has been bolstered in subsequent years (for the production of the third and fourth assessment report and also of special reports), and the availability of the IPCC's Fourth Assessment Report has been a key consideration as countries prepare to negotiate post-Kyoto commitments. Indeed, the targets outlined in the Kyoto Protocol apply for the 2008-2012 range, and it is widely expected that negotiations on any post-2012 instruments would have to be well under way by the end of 2007, and at the 22nd Plenary of the IPCC in November 2004, some countries were keen to ensure its Summary for Policymakers would be released in time to feed into those negotiations (ENB, vol. 12 no.148).

In its more recent incarnation, the IPCC has not only expanded its authorship base, but has also expanded input from developing country scientists, access to local and traditional knowledge, and gender diversity (Siebenhuner, 2003; Agrawal, 1999; ENB, vol.12 no.148). The IPCC now places great stake in the fact that most chapters have co-"lead authors" from each a developed and a developing country, and highlights the steady increase in gender diversity among its broader author pool. In terms of tapping into traditional and local knowledge, the IPCC has emphasized the importance of relying on local knowledge in small island developing

States, especially as relating to mitigation and adaptation to climate change. These developments constitute a key element of the IPCC's public image and have taken away ammunition for some of the criticisms voiced against the early IPCC process.

Similarly, when the Ramsar Wetlands Convention first established the Scientific and Technical Review Panel in 1993, it already exhibited much of its transparency and flexibility but its membership was very restricted. In its original incarnation, in 1993, the STRP had only 6 members. In intervening years, the COP has adapted its membership in attempts to find a process, which generates the most valid and sustainable outcome, with varying measures of success. In 2003, the STRP was expanded, but did not provide for control on which experts regions nominated to serve on the panel. By the end of the 2003-2005 triennium there were complaints that previous efforts at expanding the STRP's membership had in fact hindered the outcome by reducing the stock of available expertise. Some interviewees actively involved in the STRP's work noted that only a few of the STRP members were carrying out the bulk of the Panel's work, while several other experts did not interact through the online interface in between meetings and sometimes did not even take part in the meetings themselves. These same interviewees however also highlighted that some participants, while perhaps not contributing actively to the Panel's advisory role had emphasized the importance, especially for some experts from developing countries, of their STRP membership from a capacity-building perspective. At its 9th meeting, the Ramsar COP approved yet another shift to the STRP's membership arrangement, based on revised *modus operandi* prepared by the Secretariat with consultation from the Ramsar partner organizations (described in greater length in Chapter III).

A NEW SYSTEM FOR SCIENCE ADVICE

In recent years, the limitations of the existing MEA science advisory structures have increasingly been the subject of policy debate[90] and have prompted some discussions of alternatives to the *status quo*. I will discuss some of the more prominent proposals before presenting the institutional innovations I suggest based on the findings of this thesis.

PROPOSED SOLUTIONS TO THE SCIENCE ADVICE QUANDARY

The "multi-IPCC" model

Many scholars and policy-makers have identified the IPCC as a successful model of science advice, and there have been proposals to emulate this example, at the thematic and global level. For example, in January 2004, delegates to the Intergovernmental Consultation on Strengthening the Scientific Base of UNEP[91] considered the creation of an intergovernmental panel of global environmental change[92], and many see the recently completed Millennium Ecosystem Assessment (MA) as the first step towards a biodiversity analog for the IPCC[93].

Nevertheless the disadvantages of establishing other thematic intergovernmental panels *à la* IPCC are many. The first consideration relates to the length of the process – from question framing to final approval, which reduces such an SAB's responsiveness to policy-making needs. For example, in preparing its Fourth Assessment Report, scoping discussions began in 2002 while the final product will not be released until 2007. Similarly, under the biodiversity regime, the SBSTTA's agenda is set several years ahead of schedule, which does not allow SBSTTA the opportunity to address issues which warrant more immediate attention, as was highlighted by

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[90] Discourse on the link between science and policy in MEAs is discussed at greater length in Chapter I.

[91] Earth Negotiations Bulletin. Summary of the Intergovernmental Consultation on Strengthening the Scientific Base of UNEP. Edited by Pam Chasek. Published by IISD. 2004. available at: http://www.iisd.ca/vol16/enb1631e.html

[92] In the end delegates could not agree on establishing such a panel, with the US highlighting that it would politicize the issue of scientific assessments and other countries calling instead for the strengthening of existing efforts.

[93] Based on discussion at a SBSTTA-4 workshop on the MA in June 1999 and interviews with delegates at meetings of the Biosafety Protocol in Montreal in June 2005.

participants at the Spetember 2005 Working Group on the Review of Implementation of the Biodiversity Convention. In contrast, at the November 2005 meeting of the Ramsar Wetlands Convention COP-9, delegates were able to address wetlands' implications of the recently exposed threat of a bird flu pandemic.

One can also question the availability of resources for so many parallel large-scale and long-term assessments. For example, until the delivery of the Fourth Assessment Report in 2007, the IPCC is scheduled to spend between 6 and 7 million US$ per year on its operations[94]. In contrast, in 2003 the Secretariat to the Montreal Protocol on Substances that Deplete the Ozone Layer had an operating budget of about 3.5 million US$, including its financial support of its science advisory process[95].

Some have also stressed the fear that such institutionalization would reduce the quality of the outcome over time due to "organizational sclerosis[96]." Indeed, several contributors to the MA reacted quite strongly against suggestions that the MA infrastructure and process be extended – explaining that the MA's success arose in part from the certitude that it represented a one-time commitment[97]. They propose that the best means for efficiently meeting decision-making needs is to design separate, time-bound, assessments, as this would ensure that only the most qualified experts are involved in addressing a well-scoped question. They fear that long-running assessment infrastructures, like the IPCC, would have trouble effectively adapting the scope of their investigations over time. Some interviewees also questioned the feasibility of framing as

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[94] IPCC. Draft report of the IPCC. Twenty-First Session, Vienna, Austria, 3 and 6-7 November 2003. available at: http://www.ipcc.ch/meet/drepipcc21.pdf

[95] Ozone Secretariat. Report of the 15th Meeting of the Parties. UNEP/OzL.Pro.15/9. 2003. available at: http://www.unep.ch/ozone/pdfs/15mop-9.e.pdf

[96] this consideration was vocalized by a high-level administrator, experienced in the management of both MEAs and science-focused organizations.

[97] From interviews with delegates at the Biosafety Protocol 2nd Meeting of the Parties, June 2005.

clear a question or mandate for other themes – noting that the IPCC benefits from having only one MEA as its core audience[98].

In addition to the obvious resource and logistical constraints of establishing several parallel large scale efforts to consult hundreds or thousands of scientists over several years from problem framing to the generation of recommendations, it is unlikely that such a process would succeed in generating a valid and sustainable consensus. It would be unlikely that Parties of each MEA would feel that such a structure was providing the most relevant and useful output for implementing the treaty in question. In addition, it is foreseeable that the long-response time from issue framing to "result" might be used as a negotiation tactic by some Parties for stalling progress in implementation through well-timed requests for additional information.

Science advice under a "Super-Secretariat"

Another proposed solution is closely associated with calls for more centralized environmental administration at the global level – what many call a Global Environment Organization and see as an answer to the prevalence of the World Trade Organization (Biermann, 2000; Esty, 1999). Yet, the difficulties arising in implementing the joint-Secretariats of the closely-related PIC and POPs Conventions illustrate the myriad of potential complications arising from centralizing all global environmental policy-making and science advice.

Negotiation of the POPs Convention closely followed upon the PIC Convention's adoption, both Convention's interim processes operated in parallel, and their first COPs were held within 8 month of each other. At that stage of deliberation, both Conventions were administered by the UNEP Chemicals Programme, and both at PIC COP-1 and at POPS COP-1 Parties agreed that the Conventions' share a joint Secretariat (Earth Negotiations Bulletin: vol. 15, No. 105; vol. 15,

[98] While the IPCC is technically independent from the UNFCCC, in carrying out its work policy-considerations of the UNFCCC regime are often invoked. In contrast, the MA was specifically geared at the CBD, Ramsar and also the UN Convention to Combat Desertification.

No. 117). Even at such a small level involving only two MEAs, discussions were complicated by the relative importance of the two Convention's mandates, and the agreement included provisions for a larger percentage of the Secretariat's work to be devoted to POPs matters (Earth Negotiations Bulletin: vol. 15, No. 105; vol. 15, No. 117). Nevertheless from the outset at POPs COP-1 confusion rapidly emerged in budget discussions as to exactly how the Secretariat was distributing its work between the two MEAs (Earth Negotiations Bulletin; vol. 15, No. 117).

And, even if some Secretariats have made efforts to improve coordination with other MEAs, this has resulted in few concrete outcomes, especially as relating to the provision of science advice. There is an effort in place to facilitate communication and information sharing among the biodiversity-related Conventions – a self designated group which includes the CBD, the Ramsar Wetlands Convention, the Convention on the International Trade in Endangered Species (CITES), the Convention on Migratory Species (CMS) and the World Heritage Convention (WHC). The main product of this initiative has been the creation of a joint website describing the information made available on their respective websites. More specifically relating to the provision of science advice, the Committee on Science and Technology to the UN Convention to Combat Desertification (UNCCD) in 1998 prepared a paper focusing on other science advisory bodies on "the work of other bodies performing work similar to that envisaged for the Committee on Science and Technology", yet little action has been carried out based on this report[99].

The creation of a one single oversight authority for all MEAs is most unlikely to facilitate the generation of a valid and sustainable consensus. First, if such an organization were to follow the lead of the UN and appoint a single, or small office, of science advisor to the Executive Secretary of such an overarching administrative entity, such an individual, or even a small group

[99] ICCD/COP(2)/CST/4.4

of individuals, are bound to be questioned in terms of their representativeness of all Parties. Second, even if this "mega-Secretariat" continues to administer each treaties science advisory process separately, and especially if science advice is similarly centralized to one umbrella authority, concerns over issue prioritization and resource allocation will inevitably become more politicized and influence the sustainability and validity of any outcome.

Abolishing MEA's science advisory bodies

Alternatively, some might even suggest that science advisory bodies are irreparably inefficient and that delegates should instead rely on their own internal science advisory processes, a course of action also supported by some theories of negotiation, according to which opportunities for issue-linkage should be maximized in order to achieve the optimal negotiated outcome (Fisher and Ury, 1991). As such, by doing away with the negotiation of a separate consensus on the state of the science, some might maintain that policy-makers would be able to broker a more creative consensus. For example, under the Cartagena Protocol for Biosafety, there is, as of yet, no dedicated science advisory body for the issue of transport of living-modified organisms (LMOs), and one can envision a situation whereby the final consensus on the labeling for the handling, transport, packaging and identification of LMOs for food, feed, and processing would be best addressed by a political body, despite its technical nature. Indeed, while a science advisory body may focus only on identifying the minimum threshold for detecting minute amounts of LMOs in a shipment, in the policy-arena one might expect Parties to incorporate into this decision pre-standing agreements to follow, for example, the precautionary approach.

Nevertheless, such a combined approach to negotiating science and policy aspects at once can also facilitate strategies for hindering a consensus outcome by providing a less transparent

means of justifying a negotiating position, while helping to shield the Party hindering consensus from public pressure. A t MOP-2 of the Biosafety Protocol in June 2005, as Parties were negotiating new text for labeling shipments that may, or may not, contain LMOs, New Zealand was very persistent in opposing any compromise text developed in contact groups, yet was able to do so without providing justification that could be accommodated by other Parties.

Similarly, another recourse would involve relying on the output of existing international science assessments, for example from intergovernmental organizations (some under the aegis of the UN, such as those arising from the Food and Agriculture Organization and from the World Health Organization; others related to more economic organizations, such as the Organization for Economic Cooperation and Development or the European Community) or from international scientific organizations (for example outputs of specialized committees of the International Council for Science-ICSU).

Yet, these processes are far removed from the COP needs and this has been identified as problematic in the application of such assessments, as presented by the relative lack of uptake by the CBD COP of the outcome of the 1995 Global Biodiversity Assessment. And while such large-scale assessments, including as well the 2005 Millennium Ecosystem Assessment, have proven useful in providing a valid and sustainable consensus on the state of affairs or what one might call a "snapshot" of the situation, they have not been as successful in providing a common basis for decision-making at the COP level.

The "good leadership" model

Leadership is often cited as a crucial asset to environmental regimes (Andresen et al, 2000; Young and Ramakrishna, 1996), and several records of negotiations, (especially those written in retrospect by key players in those negotiations) have underscored the driving force of the

proceeding's Chair (Tolba, 1998). This may lead some to assume that the solution to the need for science advice lies in finding the most apt leaders to lead their proceedings.

In relation to SABs in particular, Andresen et al, stress the importance of competent leadership for building the IPCC's scientific authority. They explain that the leadership of the IPCC's Working Groups selects the experts who take part in their work (even if the IPCC Plenary may suggest experts), and develops the rules of procedure for their work. Andresen et al also emphasize the Working Group's leadership in acting as a link between the contributing authors and the IPCC Panel. As the link between the authors and the IPCC Plenary (and member government delegates), the Working Group leadership is responsible for communicating the Working Group in a transparent manner that enhances sustainability of the outcome, while also exercising the flexibility granted to them to seek out the best expertise to shore up the outcome's validity.

The skill of the individual elected to chair any SAB meeting can indeed also influence the outcome's validity and sustainability. The extent to which a Chair takes advantage of the flexibility to convene informal deliberations can have implications on a successful outcome yet may deter from the process' transparency. For example, if a Chair is too quick to convene informal consultations on a delicate issue, some SAB participants may feel excluded from proceedings and agreement on the issue at hand may be elusive in the end.

Such a scenario almost played out at the December 2005 meeting of the Convention on Biological Diversity's SBSTTA where the Working Group Chair only tabled to most contentious issue of incentive measures in an informal contact group (in the Plenary conference room, without simultaneous interpretation) late on the penultimate night of meetings. The issue was never discussed in regular sessions of the Working Group and even more restricted consultations

were held prior to presenting the results to the closing Plenary for approval. The outcome agreement was eventually approved, but not without complaints, especially from delegates from smaller developing countries as to this lack of transparency of the negotiations on this issue.

However, other experts have discounted the central role of leadership in securing agreements. One seasoned negotiator of the biosafety regime, representing a developed country and also often called upon to Chair meetings in MEAs, underscored instead the need for interests to overlap sufficiently to be able to identify common ground. Recalling the difficult negotiations leading to the adoption of Cartagena Protocol, he maintains that (as Parties and coalitions interests are ever shifting as relating to living-modified organisms) agreement was only possible at that particular time and place, regardless of other confounding factors[100].

In this thesis, by emphasizing the essential need for representative membership and a flexible and transparent process, I do not mean to discount the benefits, and more often than not, the encumbrances introduced to these SABs through varying abilities of chairing of meetings. Rather, by emphasizing on two institutional criteria of SABs which can increase the output's validity and sustainability I aim to propose a system which can indeed benefit from the increased efficiency and sustainability often arising from able leadership, yet which is, to some extent, "inoculated" against the potential impacts of poor leadership.

IMPLEMENTING CHANGE

In devising a proposal to improve on the provision of science advice it is necessary to distinguish among the different scales of institutional coordination required to implement each recommendation, and therefore this proposal is separated into two stages.

[100] Based on interview conducted at MOP-2 of the Cartagena Protocol on Biosafety.

Stage I: Redesigning an MEA's SAB

The first stage of improving the way in which science advice is provided to MEA's requires the redesign of each MEA's science advisory process. I propose a multi-tier advisory process as the best means of ensuring representative membership and a fixed and transparent process. For each MEA, I suggest there be created a Science Advisory Committee, a Science Advisory Panel, and a Science Advisory Network. This three-tier science advisory process is summarized in Graph V.1.

Stage I – Tier I: the Science Advisory Committee

The top tier of this system would be the MEA's Science Advisory Committee – which would be modeled upon an academic journal's editorial board. The COP would have to first agree on the size of the Science Advisory Committee – which logistically should bring together between ten and fifteen members. The COP will also have to agree on the minimum disciplinary distribution for the Committee, and as the advisory needs of the COP are likely to evolve, there should be a built-in review period for this disciplinary distribution (every five to seven years depending on the MEA's COP meeting schedule). In order to shore up this Committee's vulnerability to attack and criticism, the COP will also negotiate guidelines for national, economic, institutional and regional diversity.

Membership: Membership on the Committee should be instituted so as to ensure rotation on a regular basis, but not at the expense of the organization's institutional memory. Members will be divided into three groups, and one of these groups will be up for renewal or replacement every two to three years (again depending on the Committee's meeting schedule), so that ideally half of the Committee will always be made-up of returning members. Each member should serve for three-year terms (or half of the COP disciplinary review cycle), with be limited to serving two

terms (if consecutive) – serving on the Committee for those two terms should not preclude serving on the Committee at a later date. The leadership structure of the Committee should also be geared towards continuity.

At any given time, the Chair, previous Chair, and future Chair should be identified and coordinating their work. It is indeed foreseeable that the selection of the Committee Chair will be heavily politicized[101], yet since at the outset two (and subsequently three) individuals will have a shared stake in the chairmanship, it should be easier to satisfy varied interests.

At its inception, the membership of the Committee should be established by the Bureau of the COP[102] in consultation with the Secretariat and the chairs from any pre-existing science advisory bodies to that MEA. Once the Committee is established, existing Committee members should also be involved in the selection of future members.

While the COP will have identified the disciplinary priorities, there should be more seats available than those merely prescribed by the disciplinary assignments so as to better fulfill the COP-negotiated guidelines for representative membership (ie national, economic diversity etc). The balance could be used to allow those selecting Committee members to more easily ensure representation of under-represented interests. Committee members will be selected based on nominations by Parties and observers, but also based on selectors' existing networks. In some cases, the COP might also set out requirements for gender or institutional diversity on the Committee.

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[101] A similar politicization of the leadership of the IPCC came into play in selecting Rajendra Pachauri to succeed Robert Watson as Chair of the IPCC.

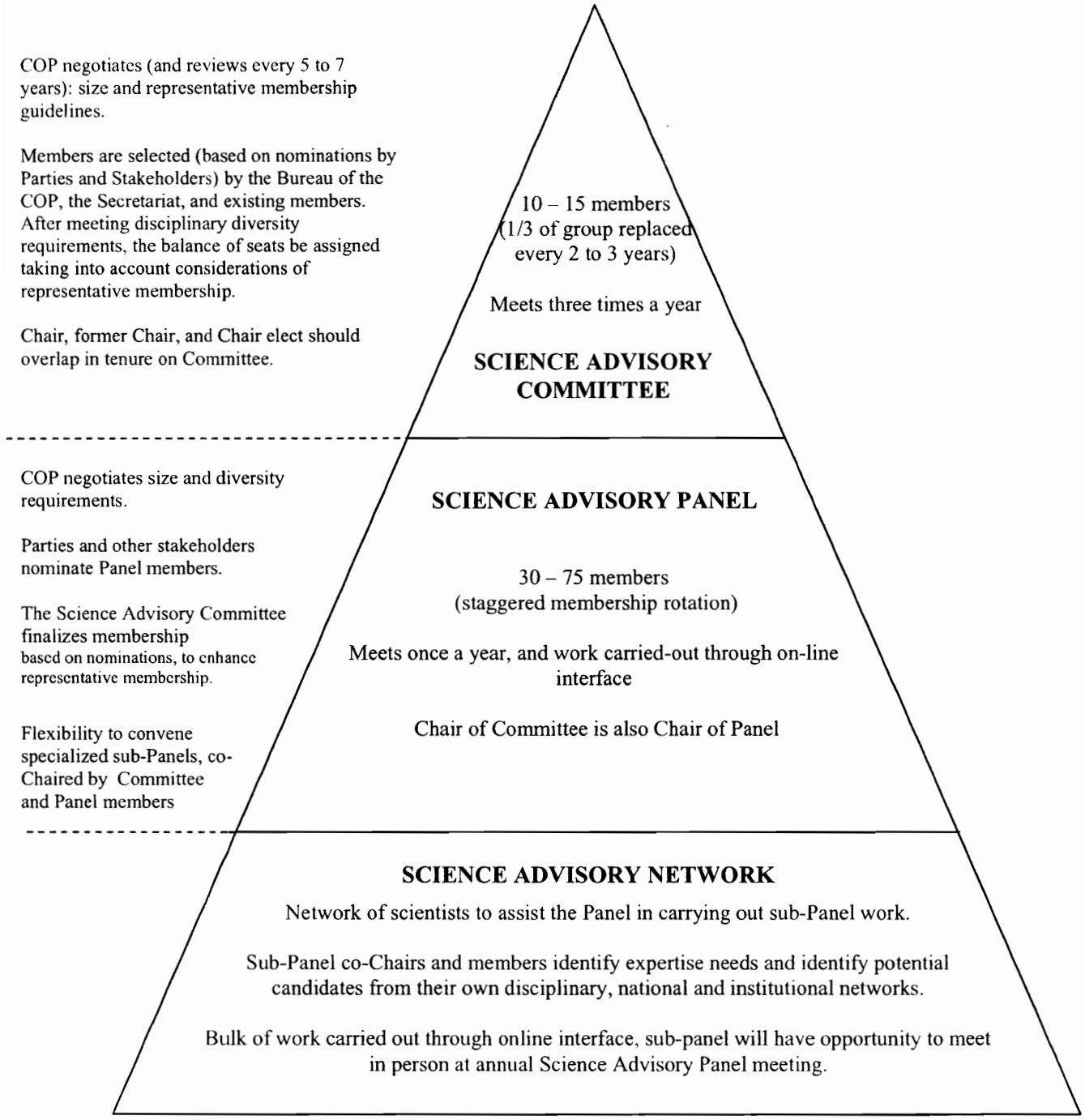
[102] The COP Bureau is the administrative structure of the COP that serves at COP meetings and in between COP meetings – its membership is usually designed to reflect the geographic distribution of Parties. For example, MEAs administered under the UN will usually have one or two Bureau members from each of the UN's five regional groups. The Bureau will also often include the COP President, most usually a representative from the COP meeting's host country.

For example, in the context of the Stockholm POPs Convention, the COP might agree that the Committee should have 15 members, consisting of, at a minimum, two experts in chemical management, one expert in chemical development, one expert in pest management, one expert in plant physiology, one expert in bioaccumulation, one expert in entomology, one expert in health risk assessment, one expert in epidemiology, and one expert in liability. Those selecting the Committee members can seek out the most qualified, and available, experts for each of these slots, and the five-seat balance will be available to them to ease their task of ensuring a more representative membership. Based on the recent negotiations under the POPs regime, it is likely that the COP would have also set guidelines for gender diversity and representation of vulnerable population interests.

Transparency: Once the Science Advisory Committee has been selected, each Committee member will be required to make available a list of qualifications in addition to filling out a detailed declaration of interests. This information should be made widely available, for example through its inclusion in official MEA documents and also on the MEA's website. The declaration of interests should be more detailed than the form currently in use under the PIC and POPs Conventions, which requires experts only to certify their lack of conflict of interest. Instead, each MEA should devise a tailored questionnaire regarding for example institutional affiliations and commercial interests. Transparency will also be enhanced by making available (through the MEA's website) minutes of the Committee's meetings and Committee documents.

Mandate: The Science Advisory Committee will be charged with selecting the membership of the larger Science Advisory Panel (this aspect of their mandate is discussed in greater detail under Stage I – Tier II), and will also coordinate the work of the Panel.

Graph V.1: The Three-tier Science Advisory Process



In particular, the Committee will act as an intermediary between the COP and the Panel, and will be in charge of framing the Panel's work. The Science Advisory Committee will also be available for more immediate consultations with the Secretariat or the COP Bureau, and take a lead role in interacting with science advisory processes to other MEAs.

Process: The Science Advisory Committee will have to meet several times a year to be able to fulfill its mandate, yet the financial implications of such frequent meetings can be addressed by providing for one of these meetings to occur in parallel with (or immediately prior to) a meeting of the COP and the other to take place in parallel with (or immediately prior to or following) a meeting of the Science Advisory Panel. Therefore, only one free-standing meeting of the Science Advisory Committee might be necessary, and again costs could be kept to a minimum by arranging for that meeting to coincide with a meeting of the most relevant academic association, which several of the Committee members may already be attending.

In contrast to the current MEA norm of covering the expenses only of participants from developing countries and from countries with economies in transition, I propose instead that travel and accommodation expenses be provided for all Committee members. As a result, considerations of geographic representation on the Committee will not have any explicit budgetary implications. Meetings of the Committee need not extend more than two or three days, but should be designed as intensive exercises, where Committee members are encouraged to interact over meal times as well. It is important that this stage of the Science Advisory Process encourage innovation, and therefore the work of the Committee will be carried out only in English so as to facilitate informal interaction. The Committee can also take advantage of ever-

improving technologies for continuing their work off-line, although this will take on a greater role (and will be discussed at greater lengths) under Tiers II and III.

Stage I – Tier II: the Science Advisory Panel

The Second Tier of this system will be most clearly the equivalent of the existing science advisory process.

Membership: It will fall unto the COP to negotiate the size and diversity requirements for this panel. So for example, one would envision that under the Stockholm POPs Convention, the COP would again agree upon a 31-member Panel and on an arrangement for regional distribution. Whereas one would expect that under the climate regime, one might expect the COP to opt for a larger Panel. Nominations for Panel Members would be submitted to the Committee by Parties, but also by observer governments and organizations. These nominations would have to detail nominees credentials and a short declaration of interests.

With the help of the Secretariat, the Committee would review the nominations and identify those experts meeting the necessary qualifications; it will then be the Committee's responsibility to finalize the Panel's membership in a way that optimizes representative membership (as discussed in Chapter III, it is impracticable to expect governments nominating one expert to take diversity into account). Again, a staggered membership rotation would be most appropriate.

Process: It is most likely that the Panel will only meet once a year, and as these Panels are likely to be rather large, at least part of their work will have to take place in Plenary setting, and in order to enhance transparency, simultaneous translation should be available in the MEA's official language. For MEAs with fewer resources available for translation services, it may be helpful to investigate means of facilitating active participation by experts who may not be fully

comfortable in the English language, for example by ensuring translation of relevant, or even exploring the usability of "passive" interpretation[103].

The Chair of the Committee will serve as the Chair of the Panel. The Panel will likely be mandated with different types of work, and will need the organizational flexibility to best organize its work. Therefore, the Panel will require organizational flexibility to establish more targeted sub-panels, and these should be co-Chaired by a member of the Panel and a member of the Committee. It is in establishing these sub-panels that the Science Advisory Network will be called into play (see Stage I- Tier III).

As to the financial support for participation from experts, experts whose employers or governments are not able to bear the cost of attending Panel meetings will have the opportunity to apply for financial support for their travel and accommodation expenses. Since Panel members will be entrusted with acting in their personal capacity this will allow participation by experts whose views may not be in line with that of their home country, for example experts affiliated with environmental non-governmental organizations or industry.

Again, in between meetings a great deal of work (and coordination with the Science Advisory Network) can be carried out in between Panel meetings by taking advantage of online interfaces, this of course is limited by access to the internet and computer facilities and thus closely tied to Stage II – Institutional Strengthening.

Output and Transparency: The Panel's output will have to be tailored according to each MEA's science advisory needs, yet it is essential that the output be promptly available to

[103] So-called "passive" interpretation has been used in meetings of the European Union. Under this system, which assumes that participants are more likely able to understand English rather than be able to express their views in English, and therefore translation is provided into English, but not back to other languages (based on intervention of Colin Church -representative of the UK speaking on behalf of the EU- at the POPs COP-1, Punta del Este, Uruguay, May 2005).

interested Parties by posting on the website, translation into the MEA's official languages, and distribution to the MEA's existing networks.

One key output likely to be sought from each MEA is coherent methods for assigning uncertainties and assessing risks associated with specific outcomes and recommendations. Such systematic guidelines would aid the work of the sub-panels and in providing an output more usable by decision-makers.

A key step towards transparency relates to the proceedings' openness to observers, and it is important that at this stage observers are able to follow the progress of the Panel's work, yet, since the representativeness of the Panel's membership is a key focus of expert selection, limits will have to be put in place to control these observers' inputs into proceedings. In addition, since observer participation is often skewed towards industrial interests, a funding system (with applications, to be reviewed by the Secretariat and Committee) will be put in place to support observation by underrepresented groups.

Stage I – Tier III: the Science Advisory Network

The Science Advisory Network will be a broader-based network of scientists called upon to assist the Panel in carrying out its sub-panel work. This aspect of the science advisory process will be emulating for example the wide reach of the IPCC and the knowledge-brokering role of the Expert Group on Best Available Techniques and Best Environmental Practices under the Stockholm POPs Convention.

Membership: Participation in this Tier of Stage I will be broad-based and tailored to an MEA's specific advisory needs. When sub-panels are established under the Science Advisory Panel, its co-Chairs and those Panel members interested in taking part will determine its expertise needs. If they are not met by Panel and Committee members, then sub-panel members will be called upon

to identify potential contributors from their own networks, be they academic, institutional, national or regional networks. Experts that are invited to serve on the sub-panel will also be required to submit credentials and a short conflict of interest report.

Process: Since the Panel itself will carry out a large component of the framing of a sub-panel's inquiry, much of the sub-panel work will be limited to the drafting and review of reports and as such will be quite conducive to being prepared through a dynamic online interface.

A key component of the participation in the sub-panel's work of this Science Advisory Network relates to the way in which the process will be incorporating minority views. Indeed, the process of academic peer-review has often been criticized for excluding non-mainstream views, and in presenting a consensus on science advice the challenge arises from striving to present dissenting views, without overemphasizing them (as the press is often blamed with doing in systematically presenting "both sides" of climate change). This is where drawing on the Panel's agreed-upon risk and uncertainty can facilitate the most effective input by the Science Advisory Network.

Stage II: Institutional Strengthening

The second stage of this solution to the MEA science advisory process relates to addressing needs that are often implicitly fulfilled through the provision of science advice: most broadly categorized as capacity building.

Participants in several MEAs have emphasized the importance of the science advisory process for capacity building, especially for developing-country scientists. For example, when discussing options for improving the provision of science advice under the Ramsar Wetlands Convention, long-time participants of the Scientific and Technical Review Panel noted that although participants from developing countries might not have always participated fully in the

generation of science, they often characterized their participation as a very fruitful learning experience.

While according to my proposed solution the emphasis should be on the provision of science advice rather than on capacity building, a mechanism for capacity building is necessary in the longer term, especially as a means of alleviating concerns of trade-offs between geographic representation and scientific credibility.

In the day-to-day implementation of MEAs, discussions for capacity building in reality often boil down to a debate over technology transfer,[104] which is often framed as a one-way transfer of proprietary technology from industry in the "North" to governments in the "South." Yet, for the purpose of improving long-term science advice, the strengthening of capacity building should focus on the institutional strengthening of expert communities not only in developing countries but also within organizations representing vulnerable populations in these MEAs.

Many activities geared at the institutional strengthening of science communities in developing countries are currently being carried out within the science community itself, as illustrated by the International Council for Science-ICSU's strategy for capacity building for sustainable development (ICSU, 2002) which emphasizes both North to South collaboration and South to South collaboration. The recommendations outlined in this 2002 report were recently solidified at the end of October 2005 at ICSU's General Assembly, where delegates approved ICSU's Strategic Plan for 2006-2011, which provides for, *inter alia*, the establishment of ICSU regional centers in developing countries.

Many MEAs, and by extension their science advisory processes, have the potential to also contribute to capacity building through increased regional emphasis. For example, under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their

[104] This is especially apparent in the negotiations over the phase-out of DDT under the Stockholm POPs Convention.

Disposal, Basel Regional Centers for technical assistance have served as models for similar ventures under the PIC and POPs Conventions. It is foreseeable that, when MEAs have access to such regional centers, the Science Advisory Committee could not only take advantage of these facilities but also ensure that the output of its work is integrated in these regional centers' work and that Science Advisory participants (from the Committee, Panel and Network) take part in these regional efforts.

In the longer term, as expert communities in all countries are strengthened, then it is likely that upon the regular revisiting of the three-tier process membership guidelines, other criteria of diversity may have to more clearly prescribed, as it will be easier to meet disciplinary and expertise needs while maintaining geographic diversity.

IMPROVING SCIENCE ADVICE IN THE BIODIVERSITY REGIME

As described above and in previous chapters the Biodiversity Regime is suffering from confusion when dealing with its own science advisory process. While the SBSTTA is widely acknowledged as the CBD's central science mechanism, its proceedings are often accused of veering too far into the political realm, and as SBSTTA-11 came to a close in December 2005, Mexico and other participants called for the re-examination of SBSTTA's role and operation at COP-8 in March 2006.

In addition to this large body teetering between science and policy roles, the Biodiversity Regime has also established a wide range of *ad hoc* (time limited) Working Groups tasked with more or less technical mandates for furthering the work of the Convention and Protocol, including for example the Working Group on Liability and Redress, which brings together legal experts in exploring the potential for a liability regime, and also the Working Group on Protected Areas, which seeks to provide guidance on the establishment and management of protected

areas. However, these Working Groups have had varying degrees of success in facilitating the work of the COP, and some observers noted that little resolution as a rule came out of these Groups, with the most contentious issues often being shuffled from Group to Group.

The biodiversity science advisory process has also more recently been influenced by the Millennium Ecosystem Assessment, a global scale assessment of the health of ecosystems and biodiversity. While this Assessment was independent from the Biodiversity Regime, it was overseen by several of the same international institutions that collaborate closely with the CBD, and also consulted often with the SBSTTA throughout its scoping, research and drafting.

In January 2005, France hosted a conference on "Biodiversity: Science and Governance," an informal high-level dialogue between scientists and policymakers. At this event, participants decided to establish a consultative process on the potential establishment of an International Mechanism of Scientific Expertise on Biodiversity (IMoSEB). An Executive Secretairat has been established to oversee this consultative process, which will likely be co-Chaired by Michel Loreau (France) and Jose Sarukhan (Mexico)[105]. As of yet, there is little information available on this consultative process despite the holding of an informative event on the issue at SBSTTA-11, and the process for taking part in the consultations lacks transparency. A meeting of the Steering Committee has been announced for February 2006, but as of December 2005 there is no information available on this Committee' s membership or on means of participating in this effort.

This initiative has also met with strong opposition, especially from Parties in Latin America and the Caribbean, who cite their concern that an emphasis on another science mechanism would weaken the SBSTTA and reduce already scarce resources. However, as delegates at SBSTTA-11 took part in a joint meeting with the UNFCCC SBSTA to discuss in particular the findings of the

[105] Information note on IMoSEB distributed at SBSTTA-11.

Millennium Ecosystem Assessment, several observers in interviews highlighted the need for a more "scientific" science body under the biodiversity regime, noting that SBSTTA, despite calling itself a scientific entity, was too political to generate science advice which would assist Parties in implementing the Convention.

Further, at the September 2005 Working Group on the Review of the Implementation of the Biodiversity Convention, several Parties stressed the need for better engagement with the scientific community, and also emphasized the need to examine, and improve, the selection of SBSTTA delegates. Several Parties suggested means of enhancing SBSTTA's work as a provider of science advice, and in particular improving the technical content of recommendations of SBSTTA to the COP. The possible revision of SBSTTA's *modus operandi* was also discussed, again with some delegates calling for example for SBSTTA to engage with the wider scientific community. At this same meeting, delegates discussed setting clearer guidelines for the establishment of *ad hoc* Working Groups and Expert Groups, with, not surprisingly, developing countries calling for equitable geographic representation in determining their membership.

The issue of science advice under the Biodiversity Regime is certain to be an issue of debate at COP-8 in March 2006. In addition, in early January, a new Executive Secretary of the Biodiversity Convention will be taking office. The combination of so-many science-related concerns coming to the fore (discussions at SBSTTA and in the Working Group on the Review of Implementation, the release of the Millennium Ecosystem Assessment and the launching of the consultative process for an IMoSEB), in combination with the upcoming meeting of the COP and the change of leadership within the Secretariat indicate that the Biodiversity Regime may be in a situation to soon begin significantly modifying its science advisory process. Therefore, I will briefly discuss how my proposed three-tier science advisory process could be applied in practice

to the biodiversity case. Of course, in the context of this exercise, it is not possible to replicate COP negotiations of administrative details and I will identify the options likely to optimize the output's validity and sustainability. This three-tier science advisory process as it applies to the Biodiversity Regime is summarized in Graph V.2.

Tier I: the Science Advisory Committee

I propose that the Biodiversity Science Advisory Committee should have 15 members. This larger size is necessary as the Committee will have to combine expertise on both matters of biodiversity and biosafety. In terms of setting disciplinary guidelines for the Committee, one can expect that the COP would want to ensure participation by at least 2 experts each in: ecosystem assessments and management, taxonomy, risk assessment, invasive species, and genetic engineering. These disciplinary guidelines should be reviewed every 4 years (by every second COP meeting). The COP would also negotiate guidelines for national, economic, regional, institutional and personal diversity.

Membership: The members will be at first selected by the Bureau and Secretariat based on nominations by stakeholders. These nominations should include detailed CVs, but also detailed declarations of interests. These Committee members will be serving in their personal capacity, but those selecting the Committee should of course take into account efforts to achieve a geographically and economically representative Committee. In the context of the Biodiversity Regime, it is also important to include an expert with ties to the indigenous communities, and also experts who reflect the interests of some of the broad coalitions, for example the Miami Group in matters of biosafety (this latter aspect is where the COP-negotiated guidelines for regional diversity will come into play).

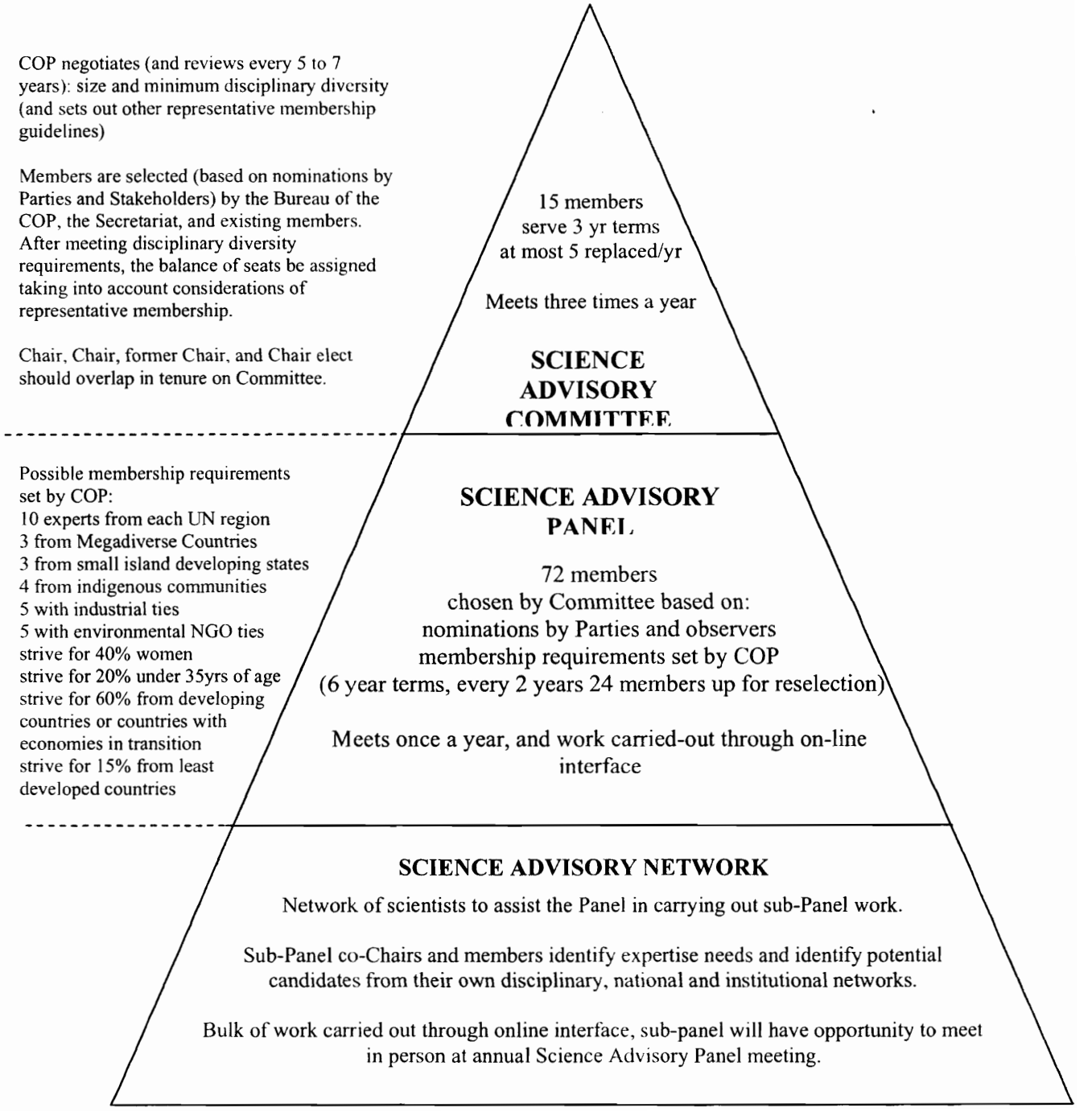
The 15 Committee members will elect one of their own to serve as Chair for the first 2 years, and, at their first meeting will also elect the Chair-elect who will assume functions 2 years later. Eventually, at any given time the Committee will include a former Chair, the current Chair and the Chair-elect to help ensure institutional consistency. In general terms, members will be nominated for 3-year terms, and shouldn't be allowed to serve more than 2 terms consecutively (therefore, anyone who will Chair the Committee will be serving at least a full 6 year term, but may have to serve a 7 year term).

So as to ensure that no more than a third of the Committee is replaced at any given time, the initial nominations will be staggered, so that every year 5 Members' terms will be up for renewal or replacement, and no more than 5 new Members will join the Committee. If any expert were to resign prior to the end of her term, then the Committee would seek a replacement in consultation with the Bureau and Secretariat, again keeping an eye to striving for representative membership when possible.

Transparency: Once the Science Advisory Committee has been selected, each Committee member will be required to make available a list of qualifications in addition to filling out a detailed declaration of interests, which will be made available to Parties and observers. Also, in discussing each agenda items, Committee Members should at first highlight any potential conflicts of interest relating to that item. Preparatory documents from the Committee, as well as minutes of Committee meetings, will also be made available on the CBD website. However, Committee meetings will not be open to observers.

Mandate: The Science Advisory Committee will be charged with selecting the members of the second Tier and will coordinate the work of the Panel. In particular, the Committee will act as an intermediary between the COP and the Panel, and will be in charge of framing the Panel's work.

Graph V.II – The three-tier approach to biodiversity science advice



Each COP meeting will have the opportunity to review the Committee's research agenda, so as to ensure the broad base of end-decision makers is aware of the framing in generating the science advice. At the very least, the Chair of the Committee will attend COP meetings to address any Party concerns.The Committee may also identify among its members those that have the greatest potential for enhancing synergy with the science advisory process of other MEAs. For example, one of the experts in biodiversity management may already play an active role in the Ramsar Wetlands Convention, and as such could be charged with reporting on science developments under that MEA.

Process: The Science Advisory Committee will meet at a minimum three times a year. One meeting can be arranged to coincide with the annual meeting of the Parties to the Cartagena Protocol on Biosafety, and the other with the annual meeting of the Science Advisory Panel. A third meeting could take place independently of other meetings, but may also be scheduled to coincide with an academic gathering which a majority of Committee members may already be planning to attend. Each meeting will last 1 and a half to 3 days (depending on the agenda), and will be held in English. They will also have the opportunity to closely collaborate in their work in between physical meetings through the use of a web portal hosted by the Secretariat (this interface will be private).

Incremental costs of attending Committee meetings will be covered through the Secretariat, which will designate at least one full-time staff person to coordinate the science process in general and the work of the Committee in particular.

Tier II: the Science Advisory Panel

The Second Tier of this system will supplant the existing SBSTTA and other Technical Expert Groups and Working Groups.

Membership: It will fall unto the COP to negotiate the size and diversity requirements for this panel. One could envision that in terms of representative membership, the COP might call for a 72 member Panel with: 10 experts at least from each of the 5 UN regions, with the inclusion as well of 3 experts from Megadiverse Countries, 3 from small island developing states, 4 from indigenous communities, 5 with industrial ties and 5 with environmental NGO ties. The COP might also decide that the Committee should make efforts to strive for other diversity thresholds, with for example a minimum of 40% women experts, 20% of "young" participants (under 35yrs of age), 60% from developing countries or countries with economies in transition, and 15% from least developed countries.

The COP would also have to set some disciplinary guidelines (probably quite similar to those developed for the Standing Committee), but it would be the Committee's role to develop this disciplinary balance, in light of the other membership constraints set out by the COP. The Committee will review nominations by Parties and organizations and first rank them for relevant expertise. The Secretariat will then work with a small sub-committee of Committee members to flag the membership attributes of each nomination (highlighting which category each nominee fulfills), and this information will then be used by the Committee in finalizing the Panel membership.

Process: The Chair of the Committee will serve as the Chair of the Panel, and will discuss with the committee the potential of establishing more targeted sub-Panels, whose membership will be mostly drawn from Panel members. Panel members will have the opportunity to select the sub-Panels in which they wish to take part. These sub-Panels will be the closest equivalent to the *ad hoc* technical expert and working groups currently operating under the CBD.

The Panel members, will, with the Committee, specify the mandate and scope of each of these sub-Panels, whose membership will be supplemented under Tier III – the Science Advisory Network. These sub-Panels will be co-Chaired by a member of the Panel and a member of the Committee. The Panel will meet annually for 5 days to address overarching issues not suitable to the establishment of sub-Panels, and will also review the work of these sub-Panels.

While the Committee does serve as liaison with the COP and Bureau, it is only the Panel which will be tasked with reviewing and forwarding recommendations to the COP for use in decision-making.

During this annual meeting, 2 to 3 days will be devoted to parallel meetings of the sub-Panels. While some sub-Panels may only meet annually and carry out their work in between Panel meetings through a private online interface, other sub-Panels may generate interest by some Parties who may chose to fund more frequent meetings of that small group of experts.

Output and Transparency: The Panel's output will have to be responsive to the needs of the COP, and as such Committee members will have to work closely with the COP Bureau in framing the Panel's agenda. While the Panel is aiming to present a consensus to the COP for its decision-making, it should also investigate ways in which it may elucidate consensus on options for steps forward, rather than recommending one specific policy option.

In particular relating to biosafety, the Panel will have to develop a clear framework for assigning uncertainties and assessing risks associated with specific outcomes, and provide regular updates, for example, in technological developments for the detection of LMOs.

The annual Panel meeting should be open to observers, yet their participation in deliberations should be controlled so as not to upset the membership balance prescribed by the COP. Similarly, the Panel will interact in between meetings through a private online interface, yet

minutes of any meetings, and summaries of progress on preparing documents will be posted online so as to be available for monitoring by observers not directly involved in the Panel's work (therefore, an observer will be able to monitor the evolution of a discussion without being able to contribute directly to textual changes for example).

Tier III: the Science Advisory Network

The Science Advisory Network will be a broader-based network of scientists called upon to assist the Panel in carrying out its sub-panel work. The Biodiversity Regime is fortunate in that it can easily tap into existing networks of scientists, such as that convened for example in carrying out the Millennium Ecosystem Approach, but also experts involved in the provision of science advice to other biodiversity-related MEAs. This Tier of the solution would be an alternative to the establishment of a separate IMoSEB, though the science advisory process might yet benefit from another "snapshot" assessment of biodiversity in another decade (perhaps a 2015 Assessment). This Network does not refer to a static institutional body, but rather to a pool of available applicants which can be drawn in to take a more formal role in the biodiversity science advisory process.

Membership: Participation in this Tier will not be subject to the membership considerations applied in Tiers I and II, rather gaps in expertise in the Panel or Committee will be identified and posted on the biodiversity website. In addition to nominations by Parties and observers, particular weight will be given to experts located through networks (disciplinary, institutional or national) of Panel and Committee members. These gaps in expertise are most likely to occur in fulfilling the mandates of sub-Panels, and as such recommendations for experts from those that are already sub-Panel members will be examined first by the Committee and sub-Panel co-Chairs, and the sub-Panel co-Chairs will have the final say in selecting their members from the

Science Advisory Network. Experts that are invited to serve on the sub-panel will also be required to submit credentials and a short conflict of interest report.

Process: Since the Panel itself will carry out a large component of the framing of a sub-panel's inquiry, much of the sub-panel work will be limited to the drafting and review of reports and as such will be quite conducive to being prepared through a dynamic online interface.

The Science Advisory Network can also be called upon in validating the work of the Panel. Some of the work arising from the Biodiversity Science Advisory Panel, for example relating to risk assessment of LMO releases, may benefit from an extensive peer review process which could include a broader range of experts from this Network. Input from this Network could, for example, be expected to identify options for synergies, or threats of unintended consequences of Panel recommendations. Network members who would want to take part in such a review process, would have to submit their nomination to the Secretariat, who would approve their relevant expertise, in consultation with the Committee and Bureau as necessary.

Overcoming obstacles to implementing a new biodiversity science advice process

It can be expected that several Parties will resist such a shift to a science advisory system so much smaller than the current SBSTTA, especially in light of the increased limitations on participation. Nevertheless, the increased oversight provided by the Science Advisory Committee may help to increase the legitimacy arising from this process, and a greater emphasis on expertise and qualification is sure to bolster the science advice's validity.

Others might question the availability of experts to take part in such an intensive venture, and it is likely that the system will have to first establish its reputation to attain the level of academic and professional recognition arising, for example, from participation in the IPCC. However, the growing dissatisfaction with the current model for biodiversity advice might help galvanize the

science community to take an active role in developing, but also in staffing and strengthening this novel approach to science advice. And indeed, one key component to the success of such a venture is ensuring that the science community is included in discussions to establish such a process, through input from the International Council for Science, but also from different biodiversity-related academic associations. Parties, and national-level decision-makes will also have to be involved in these negotiations, and become more educated consumers of knowledge. By that I mean that they should gain a greater understanding of the dynamics of knowledge production and the limits of science advice so as to best tailor their requests for science advice.

NEXT STEPS

Science advisory bodies have been acknowledged as necessary components of multilateral environmental agreements, yet there is a need for a broader recognition that their central role relates to brokering consensus on matters of science. For this consensus to successfully feed in to decision-making – and ultimately contribute to an effective MEA, provisions for representative membership and a transparent and flexible process are key elements of an SAB's institutional design. The three-tier science advisory process described above would provide an institutional framework that optimally incorporates these considerations, yet an essential finding arising from the careful study of science advice across these six cases is that, while membership and process are crucial to the SAB's success, the exact distribution of the types of diversity, transparency and flexibility will have to be tailored to the needs and even to the organizational culture of any given MEA.

The role of SABs within MEAs warrants much further study, and in particular it would be helpful to examine the role these SABs in stakeholders' broader MEA negotiation strategies. For example, it is foreseeable that some Parties might favor the discussion of an agenda item under

an SAB's purview, not out of a need for a science consensus, but rather as a means of effectively taking some options "off the table" in the COP negotiations, thus reducing the universe of possible solutions. Similarly, it would be helpful to investigate the SABs role not as a producer of consensus, but rather as a staging ground for "parking" contentious negotiations until they are ripe for consensus in the policy arena. This might be one interpretation of the current role of the SBSTTA and the many *ad hoc* groups under the Biodiversity regime. While many observers and stakeholders have complained that some issues, such as access-benefit sharing have been shuffled from body to body with no resolution in sight, it would be interesting to examine whether such cases, rather than exemplifying SAB failure, may in fact serve strategic means and act as a "lifesaver" of sorts by ensuring that discussions continue outside of the policy arena until it is "ripe" for agreement by the COP.

In expanding the study of SABs to MEAs and broadening the case array, the examination of the benefits arising from the institutional aspects of membership and process emphasized in this thesis would contribute to a deeper examination of their impact on the SAB's ability to broker a valid and sustainable consensus. Further insights could be drawn form the study of the impact of both a representative membership and a transparent and flexible process on the outcomes of SABs that include provisions for majority, rather than consensus, decision-making (as is the case, for example, under the Convention on International Trade in Endangered Species of Wild Fauna and Flora). Further, it would be interesting to investigate how paradigm shifts in the science relevant to an MEA may affect an SABs function, and whether these or other institutional features of an SAB can provide the robustness and adaptability most likely required of SABs in such situations.

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- CRC terms of reference: www.pic.int/incs/crc1/c3)/English/CRC%201-3.pdf
- Decision Guidance Documents: www.pic.int/en/ViewPage.asp?id=239
- COP reports: www.pic.int/en/ViewPage.asp?id=353
- ENB reports: Vol. 15, No. 1-129 (PIC, POPs and SAICM) available at www.iisd.ca/vol15/

Stockholm Convention on Persistent Organic Pollutants (POPs)
- Convention text, available at: www.pops.int/documents/convtext/convtext_en.pdf
- About the POPs Convention: www.pops.int/documents/background/
- POPRC reports: www.pops.int/documents/meetings/poprc/default.htm
- POPRC terms of reference: Decision SC1/7, available at: www.pops.int/documents/meetings/poprc/Text%20of%20SC1-7.doc
-BAT/BEP terms of reference: www.pops.int/documents/meetings/bat_bep/1st_session/EGB1_INF7_mandate.doc
- COP reports: http://www.pops.int/documents/meetings/cop_1/meetingdocs/en/default.htm
- ENB reports: Vol. 15, No. 1-129 (PIC, POPs and SAICM) available at www.iisd.ca/vol15/

MEETINGS ATTENDED

Vienna Convention for the Protection of the Ozone Layer and Montreal Protocol on Substances that Deplete the Ozone Layer

- 14th Meeting of the Parties to the Montreal Protocol (MOP-14) and 6th Meeting of the Conference of the Parties (COP-6) to the Vienna Convention, 25 – 29 November 2002, Rome, Italy.
- First Extraordinary Meeting of the Parties to the Montreal Protocol (ExMOP), 24 – 26 March 2004, Montreal, Canada.

Convention on Biological Diversity and Cartagena Protocol on Biosafety

- Fourth Meeting of the Subsidiary Body for Scientific, Technical and Technological Advice (SBSTTA-4) to the Convention on Biological Diversity, 21- 15 June 1999, Montreal, Canada.
- Second *Ad-Hoc* Open Ended Working Group on Access and Benefit-Sharing, 1 – 5 December 2003, Montreal, Canada.
- Third Meeting of the *Ad hoc* Open-ended Intersessional Working Group on Article 8(j) and Related Provisions of the CBD, 8 – 12 December 2003, Montreal, Canada.
- First Meeting of the Conference of the Parties Serving as the Meeting of the Parties to the Cartagena Protocol On Biosafety (COP-MOP1), 23 – 27 February 2004, Kuala Lumpur, Malaysia.
- First Meeting of the *Ad Hoc* Open-Ended Working Group on Liability and Redress under the Biosafety Protocol, 25-27 May 2005, Montreal, Canada.
- Second Meeting of the Parties to the Cartagena Protocol on Biosafety (MOP-2), 30 May – June 3 2005, Montreal, Canada.
- Eleventh Meeting of the Subsidiary Body for Scientific, Technical and Technological Advice (SBSTTA-11) to the Convention on Biological Diversity, 28 November – 2 December 2005, Montreal, Canada.

Stockholm Convention on Persistent Organic Pollutants (POPs)

- Sixth Meeting of the Intergovernmental Negotiating Committee on Persistent Organic Pollutants (POPS INC-6), 17 – 21 June 2002, Geneva, Switzerland.
- Seventh Meeting of the Intergovernmental Negotiating Committee on Persistent Organic Pollutants (POPS INC-7), 14 – 18 July 2003, Geneva, Switzerland.
- First Meeting of the Conference of the Parties to the Stockholm Convention on POPs (POPS COP-1), 2 –6 May 2005, Punta del Este, Uruguay.

Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade

- Eleventh Session of the Intergovernmental Negotiating Committee for an International Legally Binding Instrument for the Application of the PIC Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (INC-11), 18 September 2004, Geneva, Switzerland.
- First meeting of the Conference of the Parties (COP-1) to the Rotterdam Convention on a PIC Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, 20 – 24 September 2004, Geneva, Switzerland.

Other Processes

- Third Session of the UN Forum on Forests (UNFF-3), 26 May – 2 June 2003, Geneva, Switzerland.
- 22nd Session of the Intergovernmental Panel on Climate Change (IPCC), 9 – 11 November 2004, New Delhi, India.
- UN World Conference on Disaster Reduction (WCDR), 18 – 22 January 2005, Kobe-Hyogo, Japan.