STRUCTURAL AND PROCESS HISTORY OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

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Abstract. In the nine years since its establishment in 1988, the Intergovernmental Panel on Climate Change (IPCC) has attempted to walk the tightrope of being scientifically sound *and* politically acceptable. This paper investigates how the IPCC has evolved over two assessment cycles. It provides an in-depth examination of important characteristics of the IPCC process including the peer review mechanism, participation of developing countries, and its interactions with the intergovernmental negotiation process on climate change.

Acronym List

CoP	Conference of Parties (to the Climate Convention)
FCCC	(United Nations) Framework Convention on Climate Change
INC	Intergovernmental Negotiating Committee (for the Climate Convention)
IPCC	Intergovernmental Panel on Climate Change
JWP	Joint Working Party (of the IPCC and INC)
JWG	Joint Working Group (of the IPCC and Climate Convention Bodies)
OECD	Organization for Economic Cooperation and Development
SBSTA	Subsidiary Body for Scientific and Technical Advice
UN	United Nations
UNEP	United Nations Environment Programme
US	United States
USSR	(former) Union of Soviet Socialist Republics
WG I	Working Group I
WG II	Working Group II
WG III	Working Group III
WMO	World Meteorological Organization

1. Introduction

Past analyses of the IPCC can be broadly categorized as *output oriented:* both at the level of overall assessment reviews (Schneider, 1991; Jefferson, 1996; Singer, 1996), and at the level of questioning specific underlying scientific assumptions (Lindzen, 1992; Linden, 1993; Meyer and Cooper, 1995); *process oriented* (Fitz-

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gerald, 1990; Boehmer-Christiansen, 1994a; Boehmer-Christiansen, 1994b); and *use oriented* (Boehmer-Christiansen and Skea, 1994c). In the latter two categories research has largely been restricted to the First Assessment cycle of the IPCC which ended in 1990, or at most, until 1992, when an update for the Earth Summit negotiations was published. There has also been a tendency to focus almost exclusively on the 'Science' Working Group of the IPCC – Working Group 1.

The second in a two-part series, this paper has a three-fold mission: descriptive, explanatory and evaluative. The unit of analysis is the IPCC assessment process itself, not specific reports or Working Groups. The goal of this paper is not to delve into micro issues at the level of, for example, the choice of particular forcing parameters to drive General Circulation Models. Yet, the research goes much beyond providing a simple historical narrative of the configuration of the IPCC. An attempt is made to highlight significant but hitherto neglected aspects of the process, such as, the involvement of developing countries, the logic underlying the scope and mandate of the IPCC Working Groups, who the intended users of IPCC assessments are, and whether and how the assessment process has been responsive to their needs over time.

2. Evolution of the IPCC: 1988–1997

By the time the IPCC was established in November 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) many key features of its assessment structure were already in place. It had an *intergovernmental* status, a mandate to do *comprehensive assessments* of the science, impacts and responses of climate change, *three Working Groups working in parallel* to examine each of these components, and *a small Bureau* to oversee the work of the Panel. The rationale for, and evolution of each of these components have already been discussed in the first part of this analysis (Agrawala, 1998). These design features have largely survived till the present day, except for a change in the mandates of Working Groups II and III in 1992.

It is also important to recognize what was missing in the IPCC structure and design in 1988 but evolved subsequently as the institution responded to fast ratcheting demands for enhanced representation, transparency, credibility and decision-making relevance. During the pre-establishment phase from 1986–1988 the IPCC structure was shaped essentially by a small group of individuals at WMO, UNEP and the U.S. agencies. However, once the IPCC was out of the womb and buffeted by political pressures a somewhat different cast of characters was responsible for its subsequent evolution. First, the authorizing agencies: WMO and UNEP played increasingly marginal roles in the IPCC design. The U.S., though, still continued to wield considerable influence through its scientists and bureaucrats who were members of the Panel. Second, a new cast of influential individuals emerged led by the Chairman of the IPCC, Bert Bolin. Third, IPCC was shaped considerably

by exogenous pressures which included demands from the bodies of the Framework Convention on Climate Change (FCCC) and increased scrutiny of the IPCC process by many oil exporting countries and special interest groups such as the U.S. fossil-fuel lobby.

BOX 1
Overview of the IPCC Assessment Process

The work of the IPCC is conducted at three distinct levels (Moss, 1994). First, the IPCC hosts a plenary session at the beginning of an assessment cycle. This also marks the end of the previous assessment. During this plenary session government representatives review and approve the completed reports from the previous cycle. They also set the agenda for the Panel's next round of activity. Environment and industry groups have observer status during these sessions. After the plenary each Working Group prepares detailed workplans and report outlines to implement its agenda. Export nominations are then invited from governments, international and non governmental organizations, and writing teams are finalized by the chairs of individual Working Groups assisted by their respective Technical Support Units. In the third and final tier of the process, each of the writing teams work in coordination with their respective Working Group Chair, Bureau and Technical Support Units to draft their relevant section of the IPCC report. This process is iterative and typically takes between one and a half to two years. It includes comprehensive expert and government reviews and several 'lead-author' meetings to review comments and resolve inconsistencies across different sections of the report. The final outputs from each Working Group are then presented for government approval at their respective plenary session. The entire IPCC assessment is then approved at a full IPCC plenary session.

This section explores the evolution of three critical design features: the peer review process, the participation of developing country scientists and IPCC's attempts to abstain from policymaking and yet be policy relevant.

3. Peer Review

While many have acknowledged the existence of a peer review mechanism for IPCC reports, the extent and degree of sophistication of the process have largely been left unexplored. To most, peer review is a binary variable: either it exists, or it does not. Most recognized journals have peer reviews, as do many research reports. Thus, at first sight, while having a peer review mechanism within the IPCC design is important, it is by no means unique. However, the IPCC peer review is more

comprehensive, *by many orders of magnitude*, than that in an average journal. For example, draft chapters of the 1995 Working Group II Second Assessment report went through two full scale reviews: the first involving anywhere from twenty to sixty expert reviewers per chapter (a total of 700 experts from 58 countries were involved), and the second involving all IPCC member governments and the experts who had sent their reviews in the first round. The action taken by writing teams on review comments was monitored by the Working Group Bureau and the Technical Support Unit.

It is important to note that there are two different outputs from the IPCC process: policymaker summaries which are extensively reviewed and then approved line by line by governments, and the underlying reports which have extensive expert and government review, but are not subject to line by line approval. The latter has been much less political than the policymaker summaries as it does not require line by line approval by government representatives.

The organization of peer review had not been discussed either in the negotiations prior to the establishment of the IPCC, or during its first plenary session in 1988. The first discussion on this subject was held during the first session of the IPCC Bureau in February 1989. During this meeting Working Group 1 (WG 1) indicated that a review of its draft chapters by both contributing and external experts was included in its work plans while the Working Group II (WG II) only indicated a review by its contributing authors (IPCC, 1989). Somewhat more detailed discussions on the subject were held during the second meeting of the IPCC Bureau in February 1990 when the draft chapters for the First Assessment were nearing completion. The IPCC Bureau decided that 'the draft reports of WG I and WG II will undergo peer reviews. These two Working Groups are free to choose the form of the peer review as long as the latter is conducted in such a manner as to assure quality products' (IPCC, 1990b). Thus, during the preparation of the First Assessment, the IPCC had no formal rules on who should participate in peer reviews, or formal follow up mechanisms to ensure proper action is taken. Peer review was ad-hoc, based on a tradition of scientific conduct and trust than on any political norms. Severe budgetary constraints also limited the ability to impose more formal mechanisms.

The three Working Groups, however, catered to very different communities with vastly differing levels of disciplinary cohesion, clearly defined 'experts', or a shared set of peer review standards. The natural science community in WG 1 was relatively mature and well organized, experts on the subject were generally easily identifiable and a review process on the lines of a scientific journal was conducted (though with substantially more reviewers). The impacts community in WG II was, however, not so well developed. There were also some concerns voiced by western scientists regarding the management of the Working Group by the Soviets. This led the IPCC Bureau to impose some external pressure to ensure that a wider community of experts participated in the review of WG II chapters. Working Group III (WG III) meanwhile was dominated by legal experts and nego-

tiators. The Bureau felt that the standards of a scientific journal-type review could not realistically apply to this group and consequently did not impose any review requirements. The 'policymaker' summaries of all three Working Groups, however, went through government review and approval before the First Assessment Report was released.

Between 1990 and 1992 a number of political factors forced the IPCC to ensure that its peer review process was formalized to carry more credibility with government negotiators. First, the release of its First Assessment prepared by, what was billed as 'the best scientists in the world' put the institution under intense media scrutiny. Second, as climate change neared the negotiation phase in the build up to the Rio Summit, the political environment became increasingly polarized. Powerful interest groups with huge stakes in the issue now began to show much more interest in the IPCC . Two notable entrants were lobbying arms of the US fossil-fuel industry: the Global Climate Coalition and the Climate Council. They brought with them the 'if you don't like the message, discredit the messenger' approach which had been perfected to an art form in Washington lobbying circles. Also, climate change was ratcheted one level above WMO and UNEP to the UN General Assembly when the latter established the Intergovernmental Negotiating Committee (INC) in 1990. IPCC meanwhile was charged with preparing a report for release in 1992 to aid the deliberations for a possible climate convention.

Since it was imperative that this interim report be *politically* credible to national negotiators at the time of the Rio Summit, the IPCC Bureau in its fourth session in August 1991 mandated that 'the Working Groups should ensure as wide a peer review as possible in order that the Supplement (Report) may find acceptance by governments' (IPCC, 1991). The real hardening of IPCC rules of procedure (including peer review), however took place during its eighth plenary session in Harare in November 1992 after the Rio Summit and release of the 1992 Report. This is when the Task Force on IPCC Structure presented its report to the plenary session. Among other things this report emphasized that: the same review procedures should apply across all Working Groups, the process of selecting contributors and reviewers should be made more open, since developing country expert names might not show up in the 'open' literature, special efforts must be made to get their names from their governments, the IPCC should establish the best possible relations with relevant global research and observation programs (to get access to the best experts), a master list of experts from all countries should be available to all those involved in the IPCC, clear guidelines should be set regarding the time for reviews, and peer review requirements for policymaker summaries be carefully specified (IPCC, 1992).

Based on these recommendations, a formal set of rules governing peer review were adopted during the ninth plenary session of the IPCC in June 1993. Specifically, a two tier system of external reviews was formalized: the first by experts, and the second by all IPCC member governments and all experts and contributors from the first round. It was mandated that the expert review should include the

following categories: specialists with significant publications in particular areas, experts named in IPCC 'master lists' based on information supplied by various governments and organizations, and specialist reviewers nominated by international organizations including those in the UN system, The World Bank, Third World Academy of Sciences, OECD and so on. Perhaps most significantly in terms of its political implications, it was formally stated that all IPCC reports will have policymaker summaries which will be subject *to line by line approval* at a plenary session of the relevant Working Group (IPCC, 1993).

Despite the hardening of IPCC rules over the years, the peer review of the underlying assessment is not without its loopholes. First, the same review can often be submitted via multiple pathways, a fact that was exploited considerably by many US industry lobbying groups during the Second Assessment of the IPCC. They submitted identical reviews on behalf of individual experts, certain non governmental organizations and as part of the official US government review. This can lead to an unnecessary amplification of essentially minority opinions. This problem is probably easy to fix if the IPCC rules clearly stipulate that one review can only be submitted through a single channel. A second problem is, what one IPCC author calls the problem of the 'silent majority' (Nakicenovic, 1997). Even if a majority of reviewers support certain conclusions they are unlikely to mention that as part of their review comments while the few reviewers who want the conclusions changed explicitly voice their dissatisfaction in their reviews. This may result in changes in the document in response to just a few critical comments. There are no easy ways of solving this problem other than encouraging reviewers to include conclusions they support, not just the ones they disagree with, a point which the IPCC review guidelines already emphasize.

Finally, a third, and potentially the most significant flaw is that even though extensive peer review is conducted, the action on specific comments is largely left to the discretion of the writing teams. Technical Support Units do play a watchdog role but they can only persuade authors to follow up on review comments which writing teams may have inadequately dealt with. If these writing teams are dominated by opinionated experts holding one particular viewpoint, then, conceivably, they could get away with ignoring some or a majority of all critical review comments. This may have been the case in Chapter 6 of the Working Group III Second Assessment Report which used controversial assumptions to calculate the 'social costs' of climate change (Pearce et al., 1995). For example, a cash value of $1.5 million was assigned to a human life in the OECD against a mere $150,000 in the developing countries (Meyer and Cooper, 1995). The Working Group III report consequently failed to get plenary approval in July 1995, a dubious first for the IPCC. The situation could have been avoided had there been greater external supervision regarding action by the authors on review comments. There is currently an active discussion within the IPCC to set up 'editorial boards' on the lines of a scientific journal to fix this flaw in the review process (Watson, 1997). Whether this

innovation is actually adopted and if it actually improves the review mechanism remains to be seen.

The *line by line consensus* approval of policymaker summaries, meanwhile, is an intensely political process. It is straightforward to see why countries such as small island states which feel threatened by sea level rise would push for much tougher language on climate change risks and the need for urgent action. Equally evident is why oil producing countries which might suffer economically from any shift away from fossil fuels would try to steer the IPCC message towards emphasizing scientific uncertainties and greenhouse gases *other* than carbon-dioxide. Then, of course, while developing countries want to emphasize that a bulk of *past* greenhouse gas emissions have come from the industrialized world, the developed world would rather have the IPCC emphasize that a bulk of *future* emissions will come from developing countries. All these are obviously different shades of 'the truth', none more scientifically defensible than the other. This makes the IPCC process particularly susceptible to political pressure in terms of which aspects its summaries should emphasize more.

Functioning in this highly polarized environment, the IPCC plenary approval process of policymaker summaries often resembles a fox-trot performed by a drunken couple: one lurch forward, followed by a sideways stagger, then a stumble backwards. In the words of a British diplomat who attended the fourth IPCC plenary in Sundsvall in 1990 when the First Assessment Report was released: 'having started in a very organized fashion with songs about the future from children's choirs ... the meeting came close to a breakdown. It finished at four o'clock in the morning, one day late, with most of the delegates having abandoned their chairs in the conference hall to gather on the front podium and shout at each other' (Brenton, 1994). The final negotiated statements from such sessions are often based on least common denominator conclusions written in carefully hedged language. It is indeed true that many IPCC conclusions are generally more vague and have many more caveats than the more direct, policy-proactive statements that emanated from conferences such as Villach 1985, Villach and Bellagio 1987 and Toronto 1988. However, the IPCC conclusions, in their modesty, are much more scientifically defensible than the distinctly activist stance taken by some of its predecessors, such as the 1987 call by Bellagio experts to set 'tolerable' rates of temperature and sea level rise (Jäger, 1988).

It is important to recognize that assessments make frequent trade-offs between maintaining scientific credibility and enhancing the policy specificity of their conclusions. Line by line consensus approval of IPCC policymaker summaries is clearly an attempt to buy global credibility *amongst governments* while the Villach/Bellagio workshops were more an attempt to effect prompt policy outcomes. Neither approach is implicitly superior. However, the fact that key conclusions from both rounds of IPCC Assessments *did* manage to catalyze the policymaking process indicates that with adequate skill, and persistence, policy impact *need not* come at the cost of credibility.

An important question is whether the political credibility of the IPCC can be preserved in ways other than requiring line by line consensus approval of summaries. After all, with the establishment of the INC in 1990, the IPCC is no longer the forum to debate policy. And governments do not need to consensually approve science, particularly after their scientists have both participated in writing and reviewing the assessment. Furthermore, with the FCCC now having its own functional Subsidiary Body for Scientific and Technical Advice (SBSTA) to interface between the IPCC assessments and policymakers, it might be sensible to remove the line by line governmental scrutiny of IPCC summaries. In practical terms, however, it might not be politically feasible to take back what governments have already become used to. Moreover, plenary sessions often serve as the only forum for many governments, particularly developing countries, to openly hold the IPCC accountable for whether or not it adequately considered the views sent in by their experts during peer review. This is indeed a very important function which IPCC plenaries serve and should not be done away with. Therefore, a compromise solution might be to retain plenary acceptance of underlying documents. As far as policymaker summaries are concerned, even if line by line approval is retained, approval rules can be changed so that acceptance is by a *significant majority* instead of *complete consensus*. This would most likely retain political credibility with a majority of governments and yet prevent one or two governments (which is usually the case) from unnecessarily holding the process hostage by stalling plenary approval or substantially diluting the IPCC conclusions.

4. Developing Country Participation

In his letter to member governments announcing the proposal to establish the IPCC on 25 March 1988, WMO Secretary General Obasi noted that the membership of the Panel should include major greenhouse gas emitting countries, ensure equitable geographic representation and allow for participation by countries with considerable scientific expertise on the subject. At the same time Obasi cautioned 'it is obvious, however, that the Panel should be small enough so that it can function effectively' (Obasi, 1988). This turned out to be an inconsistent set of goals and the idea of a small core membership for each IPCC Working Group which was adopted during the first IPCC plenary session (IPCC, 1988) was subsequently abandoned (IPCC, 1989) in order to allow for widespread participation, particularly by developing countries. As Bert Bolin commented to a climatologist colleague soon after he was asked to chair the IPCC 'right now, many countries, especially developing countries, simply do not trust assessments in which their scientists and policymakers have not participated. Don't you think global credibility demands global representation?' (Schneider, 1991).

Operationalizing effective developing country participation, however, has been, and continues to be, a major challenge for the IPCC. In fact developing country

participation is the only issue (other than the IPCC budget) to be discussed in almost every session of the IPCC Bureau from 1989 to 1996. In its very first session in February 1989 the IPCC Bureau established an 'Ad-hoc Sub-group on Ways to Increase Participation of the Developing Countries in IPCC Activities' chaired by A. Al-Gain of Saudi Arabia, who was also the Vice-Chair of the IPCC. Other members of this group consisted of representatives from Brazil, Senegal and Zimbabwe. Their findings were presented to the second plenary session of the IPCC in June 1989. A number of action items were proposed by this group both for the short term and the medium to long term.

Four short term (18–24 months) items were identified: expanding financial support for developing country experts to attend sessions of the IPCC and its Working Groups; identification of developing experts and their area of expertise and to eventually develop 'master resource lists' of these experts at the national level; formation of national committees which can use IPCC findings to garner resources to set up national action programs; and to have IPCC sponsored conferences and seminars to help increase awareness. For the longer term (2–10 years) the following four priorities were identified: the IPCC work should provide a useful input to existing technical cooperation plans, for example, to shape the research priorities of the African Center of Meteorological Applications for Development; using existing WMO and UNEP programs such as the Global Environmental Monitoring System and World Climate Programme to disseminate relevant information, technology and expertise; to encourage developing countries to include climate change considerations in their development plans; and to develop intellectual and scientific resources in developing countries.

Based on these findings, participants at the Second IPCC plenary in 1989 decided to establish a 'Special Committee on the Participation of Developing Countries' under the chairmanship of Jean Ripert of France (who later became the first chairman of the INC) and with representatives from four other developed, and five developing countries. This committee met three times between September 1989 and June 1990 and its findings were presented to the fourth IPCC plenary session in Sundsvall (Sweden) in August 1990 when the First Assessment Report of the IPCC was also approved. The committee noted five factors which limit the full participation by developing countries: insufficient information about the problem, ineffective channels to disseminate this information, limited number of trained scientists, institutional difficulties such as lack of coordination between various ministries which might have a stake in the climate issue, and limited financial resources. Its recommendations largely echoed those made by its predecessor, the Ad-hoc group on developing country participation, discussed earlier.

In terms of concrete action, IPCC efforts to encourage developing country participation over the years can be described as a partial success. By the time of the second plenary session of the IPCC in 1989 most OECD countries (and the USSR) were already represented on the Panel. Non-OECD participation took much longer to increase. As shown in Table I it has grown steadily from a mere 14 at the first

TABLE I
Participation in IPCC plenary sessions

Year	Non-OECD countries[a]	Total countries
1988 (IPCC I)	14	30
1989 (IPCC II)	25	44
1990 (IPCC IV)	48	70
1991 (IPCC VI)	57	79
1992 (IPCC VIII)	77	96
1993 (IPCC IX)	94	115
1995 (IPCC XI)	98	117

[a] This number also excludes the Former Soviet Union/Russia.

plenary in 1988 to 48 in 1990 when the First Assessment Report was released, to 98 in 1995 during the eleventh plenary session of the IPCC when the Second Assessment was released. Recall, one of the primary goals of having an 'intergovernmental' mechanism in the first place was to get governments involved in the climate change issue. In this respect the IPCC has certainly been an unqualified success. A majority of developing countries from Bhutan to Benin which might not have been interested in climate change nine years ago are now willing to send their delegates to IPCC sessions.

Over the years the IPCC has undertaken several specific measures to encourage participation by developing country scientists both as authors and reviewers. Almost half of the annual budget outlays from its Trust Fund are used to pay for trips made by these experts to attend the meetings of the Panel and its Working Groups. For example, as early as 1989 (barely a year after the IPCC was set up) about US $254,000 were spent to pay for 85 trips by 80 developing country experts to attend IPCC meetings (IPCC, 1990a). This number has grown substantially in recent years. In fact, financial support for *at least* one developing country expert to attend *each* writing team meeting of every IPCC chapter was made mandatory during its Second Assessment cycle. Many developed countries have also stipulated part of their contributions to the IPCC Trust Fund to support the research and/or travel of developing country experts. In addition, another significant component of the IPCC budget is used to translate its documents in all UN languages for broader outreach. Furthermore, when the rules of procedure of the IPCC were amended in 1993 it was explicitly stipulated that for *each* chapter in the Second Assessment there should be *at least* one developing country *lead-author*. Finally, the new rules stipulated that the chairmanship of each Working Group was to be shared by one developed and one developing country scientist.

Although these measures have improved the situation, they have clearly not been sufficient. A major shortcoming of all IPCC efforts including its Second Assessment has been that information on climate change impacts and the feasibility

of adaptation and mitigation options is still sorely lacking for developing countries. Global generalizations are often drawn from a relatively over-sampled set of data from a few developed countries. This situation cannot be corrected unless assessments have a more regional focus, a fact which is currently under serious consideration by the IPCC for the design of its Third Assessment (Watson, 1997).

Perhaps even more importantly, the *assessment* efforts of the IPCC need to work in tandem with *research and data gathering*, particularly in developing countries to plug the gaps in existing knowledge. However, with the notable exception of the IPCC-OECD Methodologies for Greenhouse Gas Emissions Inventories which are being widely applied to construct national greenhouse gas inventories, there has been very little application of other IPCC methodologies to conduct standardized impact and mitigation assessments in developing countries, or to use the research gaps identified in IPCC reports to shape future research. One reason is that with a total professional staff of less than eight (to manage the Secretariat and all three Working Groups) and a shoe-string budget, the IPCC was never designed to duplicate research efforts of well established programs such as the World Climate Research Program and the International Geosphere Biosphere Programme. Further, while the IPCC has several design features (such as governmental participation and policymaker summaries) to build *the bridge forward towards policy*, it does not have effective mechanisms *to build the bridge back towards research*. Perhaps, at the end of the assessment process, there should be an institutionalized mechanism within the IPCC to engage its authors in a discussion with the managers of collaborative research programs, non-governmental organizations and multilateral development agencies. These meetings could be used both to market any methodologies the IPCC might have developed and to help such organizations plan future research so as to reduce existing research/data gaps which the IPCC assessment may have identified. However, IPCC Chairman Bert Bolin notes that the Panel has consciously stayed away from directly shaping research priorities. This is to avoid unnecessary politicization which he believes would undoubtedly result if IPCC experts had the power to influence where future research dollars went (Bolin, 1997).

The long term solution to improved developing country involvement in climate change assessments hinges critically on the building of indigenous capacity and awareness in these countries. The IPCC has only made some limited advances in this direction. According to Roberto Acosta-Moreno of Cuba, one of only a handful of developing country Convening Lead Authors in the IPCC Second Assessment, the Panel has helped raise awareness about the problem in Cuba. It also helped train more than 50 Cuban scientists through their participation in IPCC writing teams and workshops. However, he notes that the extent of benefits a developing country can draw from participation in the IPCC is a strong function of the prevailing levels of education and intellectual expertise. Cuba, in this respect, might have been an exception because it has reasonably trained experts which the IPCC could draw on (Acosta-Moreno, 1997). This might not be true for a majority of

other developing countries and therefore merely encouraging participation might not contribute significantly to capacity building in these countries.

Low pre-existing levels of developing country research capacity which might inhibit their effective participation should realistically be recognized as an *externally imposed constraint* on the effectiveness of the IPCC. The IPCC does not have the mandate, funds or the expertise to conduct the job of national governments or multilateral development agencies in terms of capacity building. Neither can it micromanage dissemination and outreach of its assessments within these countries lest it be misconstrued as 'propaganda' by the host government. Similarly, it is well known that most IPCC communications are dealt with by one specialized agency (such as the Department of Meteorology) within many developing countries. These agencies often do a poor job at transmitting IPCC communications and reports to other agencies (such as the Ministries of Environment, Energy, Transportation and so on) which might also have a stake in the climate problem. This constrains the effectiveness of several aspects of the IPCC process including author and reviewer nominations as well as dissemination of results. Yet, there is little the IPCC can do to improve these internal communication networks as it might be tantamount to interference in the domestic affairs of the concerned country.

In conclusion, while the IPCC has made concerted efforts to engage developing country scientists, these efforts have only met with limited success. There are also considerable gaps in data and research with regard to climate change impacts and mitigation information in developing countries. This, at least partially, stems from the lack of any formal coordination between IPCC assessments and the research priorities of multilateral programs in this field. The long term solution to more effective developing country participation is enhanced awareness and the building of indigenous research capacity. The IPCC however might not be the right forum to effectively address these endemic issues. They should, instead, be addressed by developing countries themselves in conjunction with multilateral development aid agencies.

5. Links to Decisionmaking

There are two intertwined aspects of the IPCC: assessment *outputs* and the assessment *process* itself. Similarly, policymaking has two aspects: the final *outcomes* in terms of conventions signed and decisions taken, and the *process* of arriving at these decisions. Policy influence of the IPCC therefore has four components: how the IPCC *process* and *outputs* have each shaped the policy *process* and *outcomes*. In the context of climate change few policy outcomes were observed until the Kyoto Summit in December 1997. Yet, it is premature to conclude that the IPCC has been ineffective. Instead, the policy influence of the IPCC should be judged by how its outputs and process have shaped the policymaking process over time.

5.1. LINKS BETWEEN IPCC ASSESSMENT OUTPUTS AND THE POLICY PROCESS

In its first session in February 1989, the IPCC Bureau adopted a proposal by Working Group I to incorporate a 20-page 'policy document' in its assessment, which would summarize the scientific results and place them into perspective. The Bureau then requested the other two Working Groups to produce similar 'policy documents' (IPCC, 1989). These became the well known policymaker summaries of IPCC Assessments. The summary produced by Working Group I for its First Assessment is widely regarded as being very authoritative. One of its statements that (under a business as usual scenario) the world is likely to see 'a rate of increase of global mean temperature during the next century ... that is greater than that seen over the past 10,000 years' was, by most accounts, very influential in catalyzing the decisionmaking process which eventually led to the signing of the FCCC in 1992. The summaries for the other two Working Groups were much less successful due to a lack of consensus, significantly higher uncertainties, and the implicit value laden nature of many conclusions on climate change impacts and responses. This trend has largely continued on to the Second Assessment. Once again, it was a line in the Working Group 1 Summary: 'the balance of evidence suggests a discernible human influence on climate change' which, in many ways, defined the entire Second Assessment and provided a rallying cry for environmentalists and governments (including the chief U.S. negotiator Under Secretary Tim Wirth) that it was time to 'put the science behind us' and commit to a legally binding climate treaty (Wirth, 1997).

That an assessment whose policymaker summaries require word by word consensual approval by government representatives with very obvious political stakes could still come up with a few key conclusions that provide significant triggers for subsequent policy action should not be dismissed lightly. On the other hand, the policy usefulness of IPCC impact and response assessments has been constrained by significantly higher uncertainties. They have also not done an adequate job of effectively communicating the nature of prevailing uncertainties (whether uncertainty stems from a lack of consensus or a lack of data, what the extent of disagreement is, where precisely uncertainties are in the causal chain, and so on) in these areas. Thus overall, the influence of IPCC outputs on the policy process has been occasional, but significant. The nature of the influence, on the other hand, has been largely symbolic in terms of triggering and sustaining policy concern and considerably less in shaping subsequent action.

5.2. LINKS BETWEEN THE IPCC ASSESSMENT PROCESS AND THE POLICY PROCESS

The interactions between the IPCC process and the climate change policymaking have had an interesting evolution and, in fact, go back to the time when the IPCC was established in November 1988. Two months later, in January 1989, the UN General Assembly adopted a resolution, proposed by Malta on 'Protection

of global climate for present and future generations of mankind'. In addition to requiring the IPCC to conduct assessments of science, impacts and responses, this resolution formally charged the heads of WMO and UNEP working through the IPCC to provide a comprehensive review and recommendations on 'the identification and possible strengthening of relevant existing international legal instruments having a bearing on climate; (and) elements for inclusion in a possible future international convention on climate' (UNGA, 1989). Thus, in its initial years the IPCC fulfilled the dual role of assessing knowledge to advise policy, and at the same time directly helping shape policy itself.

In response to the General Assembly resolution, the heads of WMO and UNEP established a small 'WMO/UNEP Task Force on a Convention on Climate Change' which met for the first time in October 1989. This advisory body consisted of two representatives each from WMO and UNEP, Howard Ferguson who was the coordinator of the upcoming Second World Climate Conference in 1990, and three experts from the IPCC Legal Measures Sub-group of Working Group III. The goal was to draw on the ongoing work in IPCC Working Group III, which was debating possible elements for inclusion in a climate convention and use them to arrive at specific 'action oriented measures' which national governments could agree to as part of a possible climate convention. A less obvious, if politically more important, goal of this task force was to keep the deliberations for the climate convention low key and to prevent them from becoming enmeshed in the much more political UN General Assembly. This was Tolba's attempt, assisted by WMO and IPCC, to duplicate the informal 'ad-hoc group on legal and technical experts' which had led to the signing of the Vienna Convention on Ozone. The IPCC had direct input into this task force, but the latter was soon replaced by the Intergovernmental Negotiating Committee (INC) under the auspices of the UN General Assembly in 1990.

The IPCC process contributed to the setting of the INC in two ways. First, the high profile nature of the then ongoing IPCC First Assessment convinced many governments of the need to seriously negotiate a climate convention. Second, until then the IPCC had achieved limited success in its efforts to engage developing countries for its First Assessment cycle. This made some large developing countries, in particular Brazil and Mexico very suspicious of the IPCC (though it is important to note that many other developing countries, particularly from Africa were very supportive of the IPCC), and consequently of the small Task Force on a Climate Convention. Furthermore, they believed that climate change was closely linked to development, and hence not purely a technical issue (Bodansky, 1994). These countries therefore pressured a political body, the UN General Assembly, to take charge, a move which was eventually supported by the US, their close ally. These opinions came to the fore during the meeting of an open-ended ad-hoc group of government representatives convened by WMO and UNEP in September 1990. This led to the creation of the INC under the auspices of the UN General Assembly.

Climate science and policy were thus formally split and housed in two separate intergovernmental mechanisms under different sponsorships.

The INC held its first session in February 1991 and met four more times until the signing of the Framework Convention on Climate Change (FCCC) in June 1992. According to Jean Ripert who chaired the INC since its inception until 1993, the IPCC process played important substantive and symbolic roles during the protracted negotiations for the climate convention. Ripert, a senior French diplomat, had been closely involved in the IPCC process prior to his election as INC chair. He had chaired the IPCC Committee on Participation of Developing Countries and had also attended the meetings of IPCC Working Group III where elements of a possible convention were being deliberated. Ripert believes that by providing a 'first-cut' at elements of a possible convention, Working Group III of the IPCC made an important substantive contribution to the subsequent negotiations as it made the work of the INC more efficient than it would have been had they started from scratch (Borione and Ripert, 1994; Ripert, 1997). On the more symbolic side, the fact that the IPCC Chair Bert Bolin addressed each session of the INC and kept negotiators abreast with ongoing IPCC assessment activities helped keep 'the pot hot'. More significantly, the scientific consensus reached by a credible, international group of experts in IPCC Working Group I during its First Assessment as well as its reaffirmation of earlier findings in the 1992 Report just prior to the Rio Summit played a critical role in pushing the negotiations towards a convention. Ripert concludes that the negotiation and signing of the climate convention would 'definitely not' have been possible without the IPCC (Ripert, 1997).

Shortly after the FCCC was signed in 1992 the INC elected a new chairman, Ambassador Raul Estrada-Oyela of Argentina. Meanwhile IPCC underwent a major restructure, guided in part by the twin goals of ensuring greater developing country representation and making its assessments more responsive to the changing needs of the policy makers. The challenge now was to operationalize the various goals of the FCCC. For example, Article 4.1 of the Convention called on all parties to the Convention 'to develop, periodically update, publish and make available inventories of anthropogenic emissions... using compatible methodologies agreed upon by the Conference of Parties'. IPCC offered to build on an effort it already had underway in collaboration with the OECD to develop these methodologies, a proposal which was readily accepted by the INC. These methodologies are being widely tested and applied in many countries and form the internationally accepted basis for the reporting of greenhouse gas emissions by developed countries under the FCCC. This is a seminal example of a dynamic assessment process directly feeding into a dynamic decisionmaking process. The INC also expressed interest in receiving IPCC input in three other areas: 'assessment of the relative forcing of different greenhouse gases, ... the state of knowledge for assessing impacts of climate change, ... and an evaluation of current scenarios of greenhouse gas emissions' (Estrada-Oyela, 1993). More importantly this information was desired before the First Meeting of the Conference of the Parties (CoP) in March 1995. The IPCC

was able to respond to all three requests by producing a three-part 1994 Special Report, in time for the March 1995 meeting although its Second Assessment was released a year later.

Overall, however, the interaction between the IPCC and the FCCC process has had a rocky history. Over the years there have been concerns voiced within the INC as to whether IPCC would be able to deliver what the negotiators need and when they need it (Box 2). This problem has been an endemic feature of many institutionalized assessment processes. Lawmakers in the U.S., for example, had similar complaints about both the National Acid Precipitation Assessment Program and the Office of Technology Assessment. In the case of the IPCC, however, the trade-off between the time required for 'proper' assessment practice and decisionmaking relevance was even more exacerbated. This is because of many aspects in its design including intergovernmental status, multiple rounds of peer review and a mandate to have adequate representation of developing country experts.

BOX 2
The Frankenstein Syndrome

In his remarks to the Royal Geographical Society in London on 31 May 1994, INC Chairman Raul Estrada-Oyela said that for the time being the Convention process was 'waiting for (scientific) inputs from the IPCC but I wonder if they will come in time. Almost one year ago, explaining the needs of the Convention to the IPCC Bureau, I had the feeling that the IPCC was suffering (some) kind of 'Dr. Frankenstein Syndrome'. After all, the idea of a Convention was nourished by the IPCC, but now the Convention starts to walk and begins to demand additional food, the IPCC answered that it had its own program of work and could not deliver products by client's requests. . . . We hoped, for instance that the Convention would profit from an IPCC workshop on the objectives of the Climate Convention in Fortaleza, Brazil, in April (1994). However, the workshop was postponed for October (1994), most probably for very scientifically sound motives. The point is that the INC shall meet next August and we are not going to have that input then' (Estrada-Oyela, 1994). London based New Scientist took these comments to make a news story entitled 'Frankenstein Syndrom Hits Climate Treaty' marking the first public criticism of the IPCC by an INC official (New Scientist, 1994).

In recent years, the IPCC has initiated two institutional sets of responses to make its outputs more in tune with the needs of its primary users and to deliver them in a time frame which suits their decisionmaking cycles. In March 1993, a few months after the signing of the Climate Convention, IPCC Chairman Bert Bolin wrote to his counterpart at the INC to start an ongoing dialog between the two

institutions. This resulted in the creation of the IPCC-INC Joint Working Party (JWP) consisting of senior officials from both organizations. The JWP met for the first time in November 1993 and has continued to meet regularly since then. The only cosmetic modification was that the INC was replaced by the Secretariat of the FCCC after the first meeting of the Conference of Parties (CoP) in March 1995. The (old) JWP now goes under the name of the Joint Working Group (JWG) of the officers of the IPCC and the Bodies to the Framework Convention. Issues discussed in these meetings over the years include the development and testing of IPCC-OECD methodologies for greenhouse gas emissions inventories, the contributions of different gases to climate change, decisions regarding allocation of emissions from bunker fuels, IPCC inputs to the INC review of adequacy of commitments made by certain parties to the FCCC, specific informational inputs the IPCC could provide at the various sessions of the INC/CoP, and so on.

The second institutional response instituted by the IPCC to make its outputs more timely and digestible without compromising their scientific credibility is its diversification of assessment outputs to include Special Reports and Technical Papers. Special Reports constitute a more targeted (as opposed to a comprehensive) assessment of specific issues of decisionmaking relevance on which information is needed on a one-two year time frame. The IPCC has published two Special Reports, one in 1992 before the signing of the FCCC and the second in 1994, before the first meeting of the CoP, both in response to specific demands from international negotiators. Technical Papers are an even more recent innovation and may owe their creation to the 'Frankenstein Controversy' (Box 2). The IPCC realized that its continued relevance depended critically on its ability to provide concise, 'rapid response' reports on key issues relevant to the Convention. The four Technical Papers which the IPCC released in 1997 do just that. They were prepared on a schedule of about six months and essentially distilled information from the IPCC Second Assessment relevant to a few key issues that the FCCC bodies (the secretariat, SBSTA and Subsidiary Body for Implementation) were grappling with. Since these papers were essentially drawing on the Second Assessment which had already been approved by governments, the problem of line by line approval by government representatives was also skillfully avoided.

More important than the details of these institutional innovations is the fact that there is an ongoing dialog between the producers and users of assessments. This interaction between the assessment and decisionmaking processes has not been perfect, and indeed cannot be. Scientists cannot always deliver information in the form and time frame that political negotiators might find useful. Nevertheless, this ongoing interaction has not only provided useful inputs to the negotiation process but has also helped shape IPCC outputs in response to user needs. As shown by the examples of the Joint Working Group, the IPCC Special Reports and Technical papers, despite its cumbersome size, political and institutional constraints, the assessment process has indeed shown a capacity for iterative improvements and

institutional learning. Thus, the richest interaction between the IPCC and climate change decisionmakers has been at the process level.

6. Conclusions

Assessments are often viewed as black boxes whose only measurable metric is the reports they produce. This paper underscores the importance of viewing them as dynamic social processes. The following paragraphs evaluate the IPCC along two critical dimensions: institutional innovation, and policy relevance.

Institutional Innovation and Learning

Although the external contours of the IPCC have by and large been preserved over the two assessment cycles, it has exhibited a certain amount of dynamism in response to changing circumstances. Some examples of institutional innovation discussed in this paper include: the decision to produce policymaker summaries (1989), establishment of a Special Committee for Participation of Developing Countries (1989–1990), preparing a special report to aid Earth Summit negotiations (1992), restructuring of IPCC Working Groups to learn from the First Assessment experience (1992–1993), starting a process of interactive dialog with officials from the FCCC bodies (1993–), the ongoing IPCC-OECD effort to standardize reporting on greenhouse gas inventories (1991–), and the introduction of 'rapid response' Technical Papers for FCCC bodies (1996–). Few international organizations, let alone large scale assessment bodies have shown such institutional agility and learning.

These adaptations have clearly enhanced the IPCC's survivability in an environment where its predecessor, the Advisory Group on Greenhouse Gases failed to make a mark. A more interesting question, however, is not *whether* but *how* the IPCC has been able to display such institutional learning. First, there are inbuilt features within it such as plenary sessions and regular interaction with FCCC bodies which provide a forum for stakeholders to discuss and shape subsequent assessment activities. This dynamic interaction probably makes the assessment process more responsive to changing user needs. Another important feature of the IPCC is that participants do not get paid or hold 'permanent' positions. Compared to more hardened bureaucracies this reduces incentives for maintaining 'status-quo' within the IPCC. Finally, idiosyncratic factors such as leadership, both in stature and substance cannot be overlooked.

It must, however, be pointed out the IPCC has exhibited this dynamism within a rather limited domain. It studiously stays clear from policy recommendations. It even avoids shaping the priorities of global change research programs to avoid unnecessary politicization of its assessment process. Many argue that this sanitized approach and IPCC's reluctance to 'get its hands dirty' may have made it less

useful than it could have been. Others, most notably IPCC managers contend that this was the only way the body could preserve its scientific credibility.

Relevance and Policy Impact

Comparisons are often drawn between the ozone and climate change experiences. The ozone assessments through the 1980s did not have significant governmental involvement or nearly as many procedural rules. Nor did they have as large and diverse a participant pool as the IPCC. One question therefore is, *could the ozone experience have been duplicated in climate change?* This research argues that it would not have been possible. Climate change bears a close relationship with the energy and land-use sectors which are much more central to economic development than Chloro-fluorocarbon (CFC) use. Consequently, climate change is *intrinsically* more political than ozone. Second, climate change may have suffered from *ozone recoil*. For example, there was reluctance in some quarters to let Mostafa Tolba steer policy on climate change with the same control that he had wielded in case of ozone. This may have influenced many aspects of IPCC design. Furthermore, agreement on a protocol after a framework convention was faster in ozone because the US and most other OECD countries were strongly behind it while major industry groups, Japan and Russia were no longer opposed to it. Even a weak climate protocol has taken much longer to negotiate because some powerful governments, particularly the U.S. are still not entirely supportive of it. This in turn is because the extremely influential U.S. fossil fuel lobby is strongly opposed to any binding agreement. Thus, the extent to which global environmental issues may or may not get resolved may depend more on where political actors stand and the economic power of the lobbies opposing policy agreement than on whether or not assessments of those problems were inherently more or less superior.

Given such a political context what, then, are some benchmarks to assess the performance of the IPCC ? As noted earlier, according to Jean Ripert, the founder chairman of the INC, the FCCC would ‘certainly not’ have been possible without the IPCC. It is equally important to note that Ripert is not a scientist with a stake in the IPCC but a diplomat from France, a country which has limited political interest in climate change. The biggest contribution of the IPCC, however, has not been at the level of aiding spectacular decisions but rather at the level of low-key *process* interactions with its users. It has provided inputs which may not have caused decisions to be made but may have made decisionmaking more efficient. An indirect measure of the relevance of the IPCC to policymaking comes from the fact that many industry lobbying groups invest a lot of resources in reading the fine print of IPCC reports, attend its sessions and even conduct expensive media campaigns which cast aspersions on IPCC findings and authors. They would not have invested so much time and money had the IPCC not been critical to decision-making. On the other hand, environmental advocacy groups which were so active on the assessment arena in the 1980s have stopped doing their own assessments. In November 1988 only one environmental advocacy group attended the first plenary

session of the IPCC. Many others had elected to attend a conference in Hamburg to follow their own climate agenda. Now, many draw legitimacy from the IPCC. They attend IPCC sessions in large numbers, cite its conclusions and their contributions to IPCC activity in public statements and even annual reports. The IPCC has not *demanded* hegemonic status but, instead, may have *commanded* it.

Finally, in the aftermath of big international conferences issue salience fades rapidly. This happened after the Stockholm Conference in 1972. It has also happened after the 1992 Earth Summit for two of the three issues for which conventions were signed: desertification and biodiversity. Yet, climate change has remained highly salient both in the media and on the policy agenda. There were no major assessments other than the IPCC during this time, no international environmental agreements (so no case for Montreal Protocol type spillovers), and no dramatically 'hot summers' to capture media attention as they did in the 1980s. In other words, most other causal factors were pointing in the direction of *decreased* policy salience of climate change after 1992. The fact that serious discussions for a binding climate treaty persisted for five years after Rio is at least partly due to the IPCC Second Assessment activity and its findings.

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