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Mobilization, diffusion and use of scientific expertise

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Mobilization, Diffusion and Use of Scientific Expertise

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The series of reports will deal with the following themes:

- Issues raised by the international environmental governance system
- Mobilisation, diffusion and use of scientific expertise
- Observation system and alert
- Mechanisms to monitor member states' commitments
- Articulation between the various levels of government
- Role of the stake-holders
- Implication of a UNEO for the global architecture of the international environmental governance system
- Financing for environment and development

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Executive Summary and Recommendations

1. Global environmental issues need a concerted global effort combining research, assessment and policy development. For the science-policy interface to be effective, decision-makers and scientists need to be involved in all aspects of the science-policy interface. The research agenda should be informed by the types of information needed by decision-makers, and for assessments to be successful, decision-makers and scientists should interact closely in the assessment process.

Key Conclusions on State of International Research Programs

2. In order to inform decision-makers and influence the institutional, technological and behavioural responses to environmental and development issues, scientific research should become increasingly policy-relevant; participatory; address a variety of geographic scales and integrate various disciplines and knowledge systems.. This does not mean that basic and curiosity driven research should not be funded – in fact this type of research forms the long-term information that is needed for sustainable development.

3. The International Council of Science (ICSU) in combination with its partners, is playing a critical role in strengthening international science for the benefit of society. They have recently expanded the focus of their environmental programs, embracing sustainable development issues and emphasising the integration of the environmental, social and economic pillars of sustainable development. The four global environmental change programs (International Geosphere Biosphere Program - IGBP, World Climate Research Program - WCRP, International Human Dimensions Program - IHDP and Diversitas) have, to differing degrees, made excellent progress and are supporting research that is policy relevant. The development of the Earth System Science Partnership among the four programs is an important new development and is expected to provide important results of relevance to the science and policy formulation for sustainable development. Most of the international research programs coordinated and co-sponsored by ICSU and its partners are efficient, legitimate, multi-disciplinary and largely equitable.

4. International research programs, global observing systems and capacity building efforts are important and interconnected components of the international research programs.

- Research is supported by long-term observations and thus global observations are extremely important for international research. However, the current Global Observing Systems and the International Global Observing Strategy Partnership are not adequately addressing the needs of the scientific, and hence decision-making, communities.
- Capacity building, both individual and institutional, is a central component in any effort to address the environment and its relationship to sustainable development. The scientific and technical infrastructure in many developing countries, especially in Africa, needs to be strengthened.

5. International research programs are only as strong as the national research programs that they depend on. Hence, for international research programs to remain vibrant, national research programs need continued stable funding. In some cases increased funding is required for research and capacity building, especially in developing countries and for the social sciences. While single disciplinary science is essential to understanding the Earth System, an increased emphasis is needed on inter- and multi-disciplinary science. A close and two way connection between the national and international research programs is critically important.

Key Conclusions on International Assessments

6. International assessments are most useful when developed to address complex or contentious issues and where international agreements are needed, e.g., climate change. International assessments are viewed as a social process, through which expert knowledge related to a policy problem is organized, critically and objectively evaluated, integrated and the findings presented to inform or guide policy choices or other decision-making. A communication strategy, which is an essential component of an assessment process, allows for a continuous interaction between the decision-makers and the scientists conducting the technical assessments. To be successful, experience shows that it is critical that decision-makers are involved in assessment processes from the outset, and are not just presented with a report at the end of the process.

7. Based on experiences to date, for a scientific assessment to be most useful, it has to have certain characteristics:

- Be demand driven, and involve experts and all relevant stakeholder groups in the scoping, preparation, peer-review, and outreach/communication;
- The process must be open, transparent, representative, and legitimate, with well defined principles and procedures;
- The process, when appropriate, should incorporate formal scientific as well as local and indigenous knowledge, which is often informal,;
- The findings and analyses need to be technically accurate and evidence-based, not value- laden;
- Be policy-relevant but not policy-prescriptive, i.e. provide options rather than recommendations;
- Cover risk assessment and risk management; and
- Present different points of view that often exist, and whenever possible quantify the uncertainties involved.

8. Scientific assessments have, to varying degrees, influenced national and international decision-making. The influence appears to be related to the issue (s) being addressed and the authorising mandate. For example, the international stratospheric ozone depletion assessments and the assessments conducted by the Intergovernmental Panel on Climate Change have been very influential and addressed the needs of decision-makers, and they were conducted with an appropriate authorizing mandate. The Global Biodiversity Assessment, on the other hand, while being an excellent scientific assessment, had limited impact on international policy formulation as it lacked a clear authorizing mandate.

9. There are different authorising environments used in international assessments, primarily intergovernmental or non-governmental. An intergovernmental process is appropriate if the main stakeholders are governments, given that it is imperative that they fully own the process. However, given the importance of ownership by other stakeholders, especially the private sector and NGOs, an intergovernmental process with a multi-stakeholder Bureau, as in the recently endorsed International Assessment of Agricultural Science and Technology for Development (IAASTD) may be more appropriate. If an assessment addresses multiple thematic issues, co-sponsorship by appropriate international bodies is recommended, as is the case in Millennium Ecosystem Assessment (MA) and IAASTD.

10. For many environmental and sustainable development issues a global assessment needs to be complemented by sub-global assessments at an appropriate geographic scale, e.g. as in the MA and the IAASTD.

Key Conclusions on Science-Policy Interface

11. At the international level, the subsidiary bodies of the Conventions provide an important forum for communication of the assessment findings and a step towards policy development based on the findings. The scientific input to the UNFCCC appears to be working well, but there appears to be a need to strengthen the scientific inputs into the CBD, UNCCD and Ramsar Wetlands Convention. In late 1990s, these three conventions recognised this need and hence became stakeholders in the Millennium Ecosystem Assessment (MA). However, the MA is a non-governmental assessment and it is not clear to what degree the findings will be translated into policies through the scientific subsidiary bodies of the conventions. .

12. With the exception of the Stratospheric Ozone assessment, there has been a lack of development and implementation of policies based on the findings of the assessments. Once policies are developed, there is a need to implement them at the appropriate level – local, national, regional or global. This remains a challenge in the research-assessment-policy nexus

13. Given the environmental issues of climate change, loss of biodiversity and land degradation are inter-linked scientifically and given there are both synergies and trade-offs among the policies and practices that are employed to address these issues individually, the recent advent of a joint liaison group amongst the

UNFCCC, CBD and UNCCD Secretariats and the chairs of the subsidiary bodies is encouraging. However, there is no trilateral joint work program at present. Likewise the joint working group, recently established among the biodiversity-related international agreements (CBD, Ramsar, World Heritage Convention, Convention on Migratory Species, CITES) should improve implementation activities on the ground.

Recommendations

14. Given that many of the environmental issues are linked through the underlying causes and they have synergies and trade-offs in terms of policies, there needs to be close cooperation and collaboration between research, assessment, capacity building and policy development.

15. The information needed for decision-makers requires continued research and thus financial support, and needs to encompass research, global observation systems, capacity building (for research, assessment and policy development) and regular assessments.

16. There is a need to integrate the natural, social and human health sciences so that the relationships among driving forces (demographic, economic, socio-political, technological and cultural), the resulting changes in the environment, and poverty alleviation and human well-being can be better understood. Given the progress to date, this will be a scientific and institutional challenge and would require resources through national funding mechanisms, especially to encourage the participation of social scientists.

17. There has to be a concerted effort to develop policies from the existing findings of the numerous assessments and then implement them at the appropriate level.

18. Given the large number of assessments currently being conducted under a wide range of authorizing environments, there is a need for improved coordination to limit redundancies and ensure a consistent message, and to synthesize the major findings in order to gain a more holistic view of the state of the planet and the responses needed to make progress towards sustainable development.

19. Future assessments should be based on specific questions, e.g. those raised by joint working groups of the conventions and thus truly have a mechanism for meeting the user needs for scientific inputs to these bodies. There would still continue to be a need for regular assessments such as those of the IPCC every 5-10 years, however there is no doubt that given the quantity of information published by the scientific community, it would be daunting to conduct an effective multi-driver based assessment on a more frequent basis and challenging to have the findings translated into policies, let alone have them implemented.

20. Some areas that would benefit from an internationally coordinated research-assessment-observation-capacity building effort include: (i) Environment and human health; (ii) Vulnerability of ecological systems and socio-economic sectors to natural disasters and human-induced extreme events; (iii) Transgenic crops and their implications for human health and the environment; and (iv) Environment and human security.

21. There is a need for stronger collaboration among the Conventions of Parties, the subsidiary bodies of the Conventions and among focal points at national levels, which would include joint activities such as developing tools or policy guidance that is of interest to more than one convention, as well as common requests to assessment bodies.

Introduction

22. One of the major challenges today is to manage our rapidly changing planet sustainably. The challenge exists because of rapid changes in key drivers, i.e., demographic changes, economic growth, technological innovations, and changing socio-political conditions and behavioral patterns. To meet the challenge, there has to be a realisation by politicians and civil society that many of the environmental issues are issues of the global commons or issues of global concern. Coordinated global action is required to successfully address issues of the global commons, such as stratospheric ozone depletion, climate change, loss or changes in biodiversity, persistent organic pollutants, endocrine disruptors and open ocean pollution. While stratospheric ozone depletion is fundamentally a solved problem with both developed and developing countries agreeing to eliminate the production and use of ozone-depleting substances, the other global common issues are far from being addressed in a meaningful manner and require political will and the involvement of a wide range of stakeholders, including governments (national and local), the private sector, non-governmental organizations, foundations, and the scientific community. Issues of regional to global concern include regional air pollution, land degradation, water scarcity and degradation of water quality, and loss or changes in biodiversity. While these are also issues of the global commons at one level, most actions to address them will have to be taken at the local to regional level and would be less dependent on coordinated global action. Therefore, different social and political institutions and institutional structures are needed to deal with issues of global commons compared to issues of global concern.

23. Growing concern about global environmental issues or global change and its implications for human well-being pose multiple challenges for science. Issues of sustainable development add further complexity. What makes addressing these global environmental issues even more challenging is that they cannot be dealt with in isolation because they are all interconnected . For example, climate change affects issues such as stratospheric ozone depletion, air and water quality, land degradation and biodiversity, but in turn, changes in these issues impacts and will continue to impact climate change. Likewise, biodiversity is affected by climate change, land degradation, persistent organic pollutants, air pollution, and pollution of fresh and marine waters, but changes in biodiversity will, in turn, affect climate change, and land and water degradation. While climate change primarily affects the other environmental issues, changes in biodiversity are primarily the outcome of these issues. Therefore, these issues should not be addressed in isolation.

24. There is an urgent need to understand and analyse all of the interacting drivers and identify policies and practices that can simultaneously address more than one issue at a time. The scientific community will need to develop ever-more sophisticated integrated models to understand these interactions, complemented by comprehensive ground-based studies and long-term satellite and ground-based observations. A vibrant integrated modelling and observational research program, coupled with long-term monitoring is needed to provide the information that is essential for informed policy-formulation.

25. National and international assessment activities provide an essential bridge between the scientific and policy communities. Assessments play a critical role in identifying and assessing the importance of emerging regional and global environmental issues and are central to stimulating new scientific programs and providing an important link between the scientific and policy communities.

26. This paper primarily focuses on the international science-policy interface in the field of the global environment, reflecting on how scientific research is currently organized at the international level, and how the resulting knowledge is assessed and incorporated in national and international policy formulation. It reviews experiences to date, primarily focusing on the experiences gained when addressing global environmental issues such as stratospheric ozone depletion, climate change and biodiversity, and then proposes how the system could be strengthened.

27. The international research and monitoring programs assessed focus on those co-sponsored and coordinated by the International Council of Science (ICSU), in close collaboration with numerous partners, including the World Meteorological Organization (WMO), the United Nations Environment Program (UNEP) and the United Nations Education Scientific and Cultural Organization (UNESCO) and the Food and Agricultural Organization (FAO). The research programs include the International Geosphere Biosphere Program (IGBP), the World Climate Research Program (WRCP), the International Human Dimensions Program (IHDP), Diversitas, and the recently established Earth System Science

Projects (ESSPs). The monitoring programs include the Global Climate Observing System (GCOS) the Global Terrestrial Observing System (GTOS) and the Global Ocean Observing system (GOOS). The international scientific assessment processes reviewed include the International Ozone Assessments, the Global Biodiversity Assessment (GBA), the Millennium Ecosystem Assessment (MA), the Intergovernmental Panel on Climate Change (IPCC), and the newly endorsed International Assessment of Agricultural Science and Technology for Development (IAASTD). In each case the characteristics of the assessments are discussed and to what degree they influenced national and international policy formulation.

28. Lastly, the paper briefly discusses the mechanisms developed to access scientific knowledge for use in international policy formulation.

State of International Research Programs and Global Observation Systems

29. For the past two decades, global change research has been coordinated at the international level by ICSU in conjunction with the multiple partners mentioned above. In 2003, the ICSU Committee on Scientific Planning and Review (CSPR) established an ad-hoc committee, chaired by Robert Watson (a co-author of this paper) to review ICSUs activities in the area of Environment and its Relationship to Sustainable Development (ICSU 2003). The conclusions of this section of the paper are largely taken from the report of the CSPR Assessment Panel.

International Research Programs

30. ICSU, in combination with its partners, is playing a critical role in strengthening international science for the benefit of society. ICSU and its partners provide an invaluable coordination mechanism, not a funding mechanism, for global change research. Therefore, the strength of the international global change programs are only as strong as the underlying national programs. Unfortunately, most national global change research programs are somewhat unbalanced, in-so-far-as they focus more on understanding and monitoring the state of the environment and how it may be influenced by natural processes and human activities, rather than on understanding the consequences of global change on ecological systems, socio-economic sectors and human health. In particular, the social sciences are significantly under-funded in comparison to the natural sciences (biological, physical, chemical and geological). ICSU's four research programmes (IGBP, WCRP, IHDP and Diversitas) have, in differing degrees, made excellent progress and are producing knowledge that is policy relevant. In addition, the coordination and collaboration among the global environmental change programmes has successfully evolved over time (Box 1).

31. ICSU and its partners have recently expanded the focus of their environmental programs, embracing sustainable development issues and emphasising the integration of the environmental, social and economic pillars of sustainable development. ICSU's key objectives with respect to environment and its relationship to sustainable development include:

- Identify emerging issues where scientific knowledge and research can make a difference;
- Catalyse and co-ordinate environmental scientific research that expands our understanding of the interactions between natural processes and their social causes (drivers of change) and impacts;
- Contribute to the development of monitoring activities that are essential for documenting the state of the global systems and their components;
- Ensure that the social sciences are fully integrated into environmental programmes as appropriate;
- Stimulate collaboration with partners in developing research agendas; and
- Communicate results from research and thus contribute to environmental assessments.

32. Over the past few decades the scientific community has made remarkable progress in advancing scientific understanding of global change through national programs and international collaboration, primarily through environmental scientific activities launched and sponsored by ICSU. The results of

these research programmes, complemented by a number of international assessments, have been essential for the development of multi-national regional and global environmental agreements, e.g., stratospheric ozone depletion, acid deposition and climate change.

33. However, in spite of the excellent progress to date, the information needed for decision-makers requires continued research and an evolution in scientific understanding. In order to inform decision-makers and influence the institutional, technological and behavioural responses to environmental-development issues, scientific research has to become increasingly policy-relevant; participatory; address a variety of geographic scales; integrate various disciplines and knowledge systems. This requires integrating the natural, social and human health science domains so that the relationships among driving forces (demographic, economic, socio-political, technological and cultural), the resulting changes in the environment, and poverty alleviation and human well-being can be better understood.

34. The social sciences, including economics and the humanities, are essential components in addressing environmental problems in an integrated way. However, the interaction between ICSU and the International Social Science Council (ISSC), the main international body for social science research, is particularly weak, potentially undermining the appropriate integration of the social sciences into international research programs.

Box 1: Global Environmental Change Programmes

IGBP, which was established to understand the interactive physical, chemical and biological processes that regulate the Earth system and how they are influenced by human actions, has successfully improved the understanding of Earth system processes, and especially how human activities are affecting the Earth at regional and global scales. The recently planned holistic programme structure and planned core projects on ocean, land, atmosphere interactions are appropriate to the needs of the scientific and policy communities. A primary challenge for the IGBP is to improve the understanding of biogeochemical processes in order to develop transient ecological models of sufficient complexity to capture the dominant processes of core elemental cycles that can be coupled to transient global change models.

WCRP, which was established to understand and provide the basis for prediction of the Earths physical climate system, has made significant progress in establishing the physical basis for understanding and predicting El Niño events, and the improved understanding and predictability of natural climate variability and human-induced climate change at the regional and global scale. One of the major challenges for the WCRP is to develop improved transient fully coupled atmosphere-ocean-land general circulation models that incorporate biogeochemical feedbacks.

IHDP, which was established as an interdisciplinary research programme to address the coupled human-natural system in the context of global environmental change, has successfully integrated natural and human sciences in the Land Use and Land Cover Change project.

DIVERSITAS, has recently been established to: (i) promote integrative biodiversity science, linking biological, ecological and social disciplines in an effort to produce new, socially-relevant knowledge; and (ii) to provide a scientific basis for the conservation and sustainable use of biodiversity.

35. The development of the Earth System Science Partnership (ESSP) among the IGBP, WCRP, IHDP and Diversitas programs is an important new development, with the joint projects under ESSP expected to provide important results of relevance to the science and policy formulation for sustainable development. By adopting the projects proposed for ESSP, the global change programmes of ICSU raise high expectations, both in the scientific and policy communities. The prospects for success with the type of synthesis (natural and social sciences) and integration required among hitherto largely separate research programmes (i.e., programs within IGBP, WCRP, IHDP and Diversitas) is largely untested. The four initial projects (global carbon cycle, global environmental change and food systems, global environmental change and water systems, and global environmental change and human health), are either being developed or in the early stages of implementation.

36. To further promote international and interdisciplinary research more resources are required through national funding mechanisms, especially for the full participation of social and health scientists. The estimated annual research budget associated with the global environmental change research programmes is about US$2billion (excluding funding for satellite programs).

37. In summary, most of the international research programs coordinated and cosponsored by ICSU are efficient, multi-disciplinary and largely equitable:

- *Efficiency:* The programs met most of their scientific objectives and successfully contributed to policy formulation.
- *Legitimacy:* The legitimacy of these programs has been accomplished by being designed and implemented in an open and transparent manner. The quality of the peer-reviewed results have ensured sustained funding, albeit lower than desirable, and have provided the scientific basis for significant elements of the international assessments.
- *Equity:* Developing country experts are certainly involved, albeit to a lesser degree than desirable, in the formulation of the objectives, the control of research and the validation of results. The lack of full participation is not the fault of the international programs, rather it reflects the lack of funding at the national level.
- *Multidisciplinary approach:* These programs are inherently multi-disciplinary, integrating a wide range of disciplines. The most significant exception, as stated above, is an adequate involvement of social scientists.

Global Observation Systems

38. Global observations are critically important in support of policy-relevant science, but the current Global Observing Systems and the International Global Observing Strategy Partnership are not adequately addressing the needs of the scientific, and hence policy, communities. There has been a general decrease in capacity and coverage of the climate observing capabilities worldwide over the past decade. GCOS recently prepared two “adequacy reports” for the United Nations Framework Convention on Climate Change (UNFCCC), which identified a number of key limitations that need to be addressed.

39. There is a need to improve the storage of, and ensure the full, open and equitable access to, scientific data and information. The World Data Center needs to prepare a vision statement, a strategy document and an implementation plan, which should aim to ensure that environmental data are freely available in a timely manner to the global science community.

Capacity Building Initiatives

40. The capacity building efforts of the scientific unions and the ICSU interdisciplinary bodies needs continued emphasis. START, the global change SysTem for Analysis, Research and Training, is an excellent example of an initiative that acts to enhance the scientific capacity of developing countries in global change research. It places emphasis on establishing and fostering regional networks of collaborating scientists and institutions in developing countries. These networks conduct research on regional aspects of global change, assess impacts and vulnerabilities to such changes, and provide information to policy-makers. START also mobilizes resources to support infrastructure and research programs on environmental change within developing regions (www.start.org). Most of the START programs are designed and conducted by nationals within developing countries.

41. The scientific and technical infrastructure in many developing countries, especially in Africa, needs to be strengthened. This recognizes that understanding global environmental issues requires an understanding at the local and regional level. It also recognizes that locally-based environmental research needs to be linked to local development priorities. This will require strengthening educational systems and mobilizing funds for research. Assessments of Impacts and Adaptations to Climate Change (AIACC) project has been developed with these concerns in mind (see Box 2).

Box 2: A summary of Assessments of Impacts and Adaptations to Climate Change (AIACC) project

AIACC is a global initiative developed in collaboration with the UNEP/WMO Intergovernmental Panel on Climate Change (IPCC) and funded primarily by the Global Environment Facility to advance scientific understanding of climate change vulnerabilities and adaptation options in developing countries. AIACC aims to enhance the scientific capacity of developing countries to assess climate change vulnerabilities and adaptations – a gap identified in the Third Assessment Report of the IPCC. Activities in AIACC address a range of questions about vulnerabilities to climate change and other environmental changes through funding, training, and mentoring developing country scientists to undertake multi-sectoral and multi-disciplinary research of importance to the regional or national development issues. AIACC is thus a research driven approach to capacity building.

Source: www.aiaccproject.org

42. Capacity building, both individual and institutional, is a central component in any effort to address the environment and its relationship to sustainable development. This can be achieved through formal education, improved communication between the scientific community and decision-makers, and improved use of scientific information in policy formulation. It is clear that:

- Science and technology should be a routine component of primary and secondary education;
- The current university structures are generally a hindrance for the development of inter- and multi-disciplinary curricula;
- Scientists in both developed and developing countries need disciplinary expertise, but also need opportunities for research training across disciplines and scales; and
- Bridging the communication gap between scientists and policy makers is a joint-and "learning-by-doing" experience

Recommendations for international research programs, global observation systems and capacity building initiatives

43. National research programs need continued stable funding. In some cases increased funding is required, especially in developing countries and for the social sciences. While disciplinary science is essential to understanding the Earth System, an increased emphasis is needed on inter- and multi-disciplinary science.

44. The evolving ICSU programs, global observation systems and capacity building initiatives need continued support, including an increase in funding for the Secretariats of the various programs.

45. There needs to be better integration and collaboration among the global observing systems, and their priorities should be based on the global requirements of the science community as well as the policy community.

46. There are four areas of research that require an internationally coordinated effort:

- *Environment and human health*: Understanding the links between environmental conditions and human health is critical, given that human health is a key determinant of human well-being, with the environment being responsible for about 20% of the global burden of disease, comparable to that of nutritional insecurity.
- *Vulnerability of ecological systems and socio-economic sectors to natural disasters and human-induced extreme events:* An improved understanding of the vulnerability of ecological systems and socio-economic sectors to human-induced extreme events and natural disasters, e.g., volcanic eruptions and earthquakes, is required in order to improve coping strategies.
- *Transgenic crops and their implications for human health and the environment*: An improved understanding of the implications of transgenic crops for human health and the environment requires focussed research in order to contribute to sound policy.

- *Environment and human security:* An improved understanding of the inter-relationships between demographic changes, environmental degradation and national and regional conflict is a priority in order to manage our Earth sustainably and in peace and security.

International Assessment Processes

47. International assessments are most useful when dealing with complex or contentious issues, and where international agreements are needed, e.g., climate change and stratospheric ozone depletion. Assessments should be viewed as a social process, by which expert knowledge related to a policy problem is organized, critically and objectively evaluated, integrated and presented, normally in documents, to inform or guide policy choices or other decision-making. Assessment processes should be viewed to be as important as the final outputs. To be successful it is critical that decision-makers are involved in assessments process from the outset, and are not just presented with a report at the end of the assessment process.

48. Scientific assessments that have, to varying degrees, influenced national and international decision-making have addressed issues including stratospheric ozone depletion (International Ozone Assessments), climate change (the Intergovernmental Panel on Climate Change - IPCC), and loss of biodiversity (Global Biodiversity Assessment - GBA). In addition to the large-scale international assessment processes, which involve hundreds of experts in the preparation and peer-review process, there are other assessment processes, which typically involve fewer experts in the preparation process. These assessments are peer-reviewed, but they are often less inclusive and transparent compared to the IPCC and MA, which are sent for peer-review to all governments and hundreds of experts, with the review comments and author responses posted on an open web site. Examples include:

- The Inter-Academy Council Study on Science and Technology Strategies for Improved Agricultural Productivity and Food Security in Africa (2004). The assessment panel, comprised of about 20 experts with an interest, expertise and experience, developed a strategic plan on how best to harness technology and science to improve food security in Africa.
- The World Commission on Dams, which comprised of 12 members from a range of stakeholder groups (who served in their individual capacity), supported by a 39 member-forum “sounding board”, assessed the environmental and sustainability aspects of large dams. The report, which was based on case studies and thematic reviews, underwent limited peer-review and the impact to date is unclear.
- The Global Environmental Outlook (GEO) is UNEP's cross-sectoral assessment that results in global, regional, sub-regional, national and city level assessments. Inputs are solicited from all over the world especially through a network of UNEP’s regional Collaborating Centres, United Nations organizations and independent experts, and coordinated by the GEO Team in Nairobi. Chapters appear to be written anonymously. Drafts are peer reviewed by a number of scientists and governments as part of feedback process in the regions. There is no formal approval process. Emphasis is placed on capacity building activities, especially in developing countries through training and "learning-by-doing".

Key characteristics of scientific international assessments

49. Based on experiences to date, for a scientific assessment to be useful, it has to have certain characteristics:

- Be demand driven, and involve experts from all relevant stakeholder groups in the scoping, preparation, peer-review, and outreach/communication - have full involvement in the assessment process by the full range of decision-makers who would implement the potential responses.
- The process must be open, transparent, representative, and legitimate, with well defined principles and procedures;

- The process should incorporate institutional as well as local and indigenous knowledge whenever appropriate;
- The results and analyses need to be technically accurate;
- Policy-relevant but not policy-prescriptive;
- The conclusions must be evidence-based and not value-laden, i.e. they must be devoid of ideological concepts and value-systems, recognizing that the assessment conclusions will be used within in a range of different value-systems;
- Cover risk assessment and management; and
- Present different points of view, and whenever possible, quantify the uncertainties involved.

50. In order for scientific assessments to impact the national government policy-making process, they need to involve and reach out to all key decision-makers within government. These include the finance, energy, transportation, agriculture, and forestry ministries, not just the environment ministries. It is equally important to involve the private sector, especially those that have a direct impact on the environment, e.g., mining, oil and gas pipelines, roads, agriculture and forestry sectors. Involvement of NGOs, multilateral and international organizations, foundations and the international scientific community is also absolutely critical. It is also important to involve consumers because their choices will determine the future demand for goods and services.

Examples of major scientific assessments

51. As stated above, a number of scientific assessments have influenced policies to different extent on global environmental change. Most have focussed on an environmental issues, for example, stratospheric ozone depletion in the Ozone assessment, climate change in the IPCC assessment reports and loss of biodiversity in the Global Biodiversity assessment. In recent years, there has been an attempt to look at multiple issues, for example the almost completed Millennium Ecosystem Assessment (MA), and the recently approved International Assessment of the Role of Agricultural Science and Technology in development (IAASTD), This section discusses the strengths and weaknesses of many of these assessments and the impact they have had on policy development.

Stratospheric Ozone Depletion

52. The International Ozone Assessments, which began in 1981 on a non-governmental basis, were later conducted as part of an intergovernmental process under the auspices of UNEP and WMO, were expert peer-reviewed, and provided the scientific and technical basis for the Vienna Convention to Protect the Ozone Layer and the Montreal Protocol (and its subsequent amendments and adjustments) on Substances that Deplete the Ozone layer to eliminate the production and use of ozone-depleting chlorine- and bromine-containing chemicals. While the initial assessments focussed on the scientific aspects of the ozone layer, subsequent assessments included a comprehensive assessment of the implications of ozone depletion on human health and ecological systems, and the technical and economic options to replace the ozone-depleting substances. These assessments had a profound impact on national and international decision-making and the results were used by both governments and the private sector. A key question that could be asked is why were governments willing to take a series of “hard” decisions to eliminate the consumption and production of ozone-depleting substances? The bottom line is that there was solid credible scientific evidence, produced and assessed by the worlds best scientists from academia, governments, the private sector and environmental organizations, linking human activities to ozone depletion, which in turn resulted in increased levels of ultraviolet radiation at ground level leading to an increase in the incidence of melanoma and non-melanoma skin cancer in light-skinned people. Skin cancer is an issue that the general public care about, and they demanded that action be taken to protect them.

Climate Change - Intergovernmental Panel on Climate Change (IPCC)

53. The International Panel on Climate Change (IPCC), which began in 1988 is an intergovernmental process, has strong expert and government peer-review, and has been highly influential on the policy process. The first assessment report formed the scientific and technical basis for the UNFCCC, the second assessment report formed the scientific and technical basis for the formulation of the Kyoto Protocol, and

the third assessment report formed the scientific and technical basis for ratification of the Kyoto Protocol. As of October 2004, all industrialized countries, except for the US, Australia and the Russian Federation have ratified the Kyoto Protocol. While the US and Australia have stated that the Kyoto is flawed and that they will not ratify it, the Russian Federation have stated that they will ratify it. The IPCC reports have also been very influential on a large number of multi-national companies who have committed to become more climate-friendly.

Loss of Biodiversity – Global Biodiversity Assessment (GBA)

54. The GBA did not have the same effect on international policy formulation as have the stratospheric ozone and climate change assessments. The Global Biodiversity Assessment (1995) was designed, prepared and peer-reviewed by experts, and while an excellent academic document, it had almost no impact on policy formulation because its was conducted as a non-governmental exercise with inadequate government ownership. It lacked an appropriate authorizing mandate because a group of the world's best scientists decided on the scope of the assessment without asking potential users (e.g., the CBD, governments, private sector or NGOs) what information was needed. This error was compounded by an inadequate outreach and communication strategy during preparation of the report and after completion of the report.

State of the Worlds Ecosystems and Implications for Human Well-being - Millennium Ecosystem Assessment (MA)

55. Prior to starting the Millennium Ecosystem Assessment (MA), it was recognized that the scope of the assessment must be based on user needs, not simply based on what the scientific community believed were the important issues. In addition, priority was placed on outreach and communication throughout the assessment process. The MA began in 2001 and most of its reports are to be published in 2005. The MA is a non-governmental process, but is closely tied to several intergovernmental processes such as the Convention on Biological Diversity (CBD), Convention to Combat Desertification (CCD), Convention on Migratory Species (CMS) and the Ramsar Convention on Wetlands. The MA, which is comprised of a global assessment and a series of sub-global assessments (continental to community level), is subject to both expert and government peer-review. The MA has a multi-stakeholder Board of Directors, which includes representatives from the scientific community, private sector, NGOs, international organizations and governments, and is responsible for approving the scope of the assessment, finalizing the selection of the authors and peer-reviewers, and approving the summary for decision-makers. A key question that will need to be answered after the MA report has been published is whether a non-governmental process, albeit linked to Conventions and where governments are involved in the peer-review process, is as an effective mechanism as an intergovernmental process such as the IPCC.

Coordination Among International Assessments

56. Given the large number of existing or planned international assessments it is important to ensure that decision-makers who are making decisions about new or existing assessments have all the relevant information needed to make informed decisions. Unfortunately, they do not always understand the implications of their decisions, either because there is no mechanism to help them understand or the experts are too shy to be candid. For example, sometimes a particular government proposes and drives a particular assessment for its own reason, but it should be standard practice to do a "feasibility study" to determine if there is a real need, or whether existing assessments or processes could fulfill this need in a more cost-effective and efficient way.

57. There is a need for coordination between assessment processes (this does not mean control by a single entity over all assessments, but real coordination and collaboration) so that:

a. Each assessment could build on the work and achievements of others and incorporate the lessons learnt in the design and implementation, e.g., new assessments could learn from existing assessment processes of how to do sub-global assessments and incorporate capacity building. This would limit "reinventing the wheel". Unfortunately, new assessments sometimes appear to ignore the work of previous ones, or refuse to acknowledge it, and start from scratch, learning the same bitter lessons of how hard it is to do everything all at once in a short time.

b. Assessments should be based in a real institutional "home". Setting-up Secretariats in various countries just because offers have been made to host them often leads to

fragmentation because it limits the Secretariat's ability to interact with other parts of the organization(s) it is supposed to be linked to. It also often means that there is no institutional back-up support if and when problems arise.

Box 3: Key Characteristics of International Assessments

International Ozone Assessments (1981 – present)

- originally non-governmental, now inter-governmental, although no formal bureau – governments suggest the topics to be addressed;
- detail design and preparation by experts from all stakeholder groups worldwide;
- assesses the natural processes and human activities that affect stratospheric ozone, the impact of ozone depletion on human health and ecological systems, and potential technological solutions and their costs;
- peer-reviewed by experts from all stakeholder groups; and
- finalized by experts.

Highly influential on consumers, private sector, research programs, and national and international policy formulation

Intergovernmental Panel on Climate Change (1988 – present)

- inter-governmental – governments approve the scope of each working group and the synthesis report – input from scientists, NGOs and the private sector;
- bureau of government representatives;
- prepared by experts from all relevant scientific disciplines and stakeholder groups worldwide;
- assesses the natural processes and past, present and plausible future anthropogenic activities that affect the climate system, the resulting impacts on human health, ecological systems and socio-economic sectors, and options to adapt to climate change and mitigate greenhouse gas emissions, including their costs; and
- expert and government peer-review – government approval of the Summaries for Policymakers;

Influential on public opinion, private sector, research programs and national and international policy process

Global Biodiversity Assessment (1995)

- non-governmental; and
- scope, detailed design, preparation, peer-review and finalization by experts1.

Limited impact on international policy formulation - lack of an appropriate authorizing mandate

Millennium Ecosystem Assessment (2001-present)

- non-governmental, but closely tied to intergovernmental conventions (CBD, CCD , CMS, Ramsar);
- multi-stakeholder board of directors and executive committee;
- scope developed by experts based on a set of multi-users needs documents from the Conventions (CBD, CCD and Ramsar) and the private sector;
- global and sub-global assessments (regional, national and local);
- prepared by experts from all stakeholder groups worldwide;
- assesses past, current and plausible future changes in ecological systems, their goods and services, and the resulting impacts on human well-being, and response options;
- peer-reviewed by experts and governments;
- final reports approved by board of directors;

Impact yet to be determined

International Assessment of Agricultural Science and Technology for Development (2004-present)

- intergovernmental; but with a multi-stakeholder bureau;
- scope developed through an extensive international consultative process and approved by a plenary of all stakeholders;
- global and sub-global assessments;
- detailed design by ;
- prepared by experts from all stakeholder groups worldwide;
- will assess the historical and potential future contributions of agricultural knowledge, science and technology to poverty and hunger alleviation, in an environmentally and socially sustainable manner, and the effectiveness of policies and institutions
- peer-reviewed by experts and governments;
- final reports approved in plenary

Impact yet to be determined

58. One of UNEP's main functions since its inception in 1972 is to keep under review the world environmental situation. In 2002 its Governing Council concluded that "the increasing complexity of environmental degradation requires an enhanced capacity for scientific assessment, monitoring and early warning, *inter alia*, through the establishment of an intergovernmental panel on global environmental change" (UNEP 2003). A proposal for the establishment of such a panel was developed by UNEP. However, the proposal got mixed reactions from governments. The question is, whether such a panel is needed, and if so, what would be the remit and how would it operate in relationship to the other ongoing assessment processes. It is clear, however, that there is a need to synthesize the major findings from the wide range of thematic assessments in order to gain a more holistic view of the state of the planet.

Funding for international assessments

59. A key issue is funding for international scientific assessments. Although they are not cheap to prepare and peer-review, their role in informing policy and research priorities, is so important that it is critical to ensure that adequate funds are available. Too often they are done with a sub-optimum budget, and all depend on the experts providing their time free of charge. The IPCC is primarily funded by governments, where-as the MA was primarily funded from non-government sources, except for the sub-global assessments. The Global Environment Facility has played a vital role in providing critical funding for several of these assessments, e.g., the GBA, IPCC, MA, GIWA (global international water assessment) and the IAASTD.

Recommendations and key characteristics to be considered when designing an assessment

60. Drawing upon the major assessments, there appear to be a number of key characteristics that should be seriously considered when designing an assessment and are discussed below. They can be divided into three major components: designing the assessment as a whole, conducting the technical work and communicating the findings (see figure 1). These are iterative stages with users being intricately involved at all times.

61. An international assessment should be conducted using an open, transparent, representative and legitimate process involving a representative set of experts, acting in their individual capacity, from all relevant stakeholder groups. It should be intellectually rigorous, peer reviewed, accessible and comprehensible to non-specialists, be policy relevant, but not policy prescriptive, and encompass risk and benefit analysis. To be effective it should develop a consensus on what is known and unknown, explain different points of view and identify, and where possible quantify, the uncertainties. It should also incorporate capacity-building activities and incorporate a continuous and effective outreach and communications strategy. It is important to recognize that the process is as important as the product.

62. Key characteristics include:

- **Assess the need for an assessment**. The first step is to assess whether there is a need for an assessment and if so develop a well-defined scope that meets the needs of

the user communities, i.e., assessments should be demand-driven not supply-driven. User needs should be developed through a consultative process engaging the full range of appropriate stakeholders.

- **Establish a governance structure**. Given that an assessment is a social process, and should be conducted in an open, transparent, representative and legitimate manner, it is critical to establish an appropriate authorizing environment and a set of Principles and Procedures. As stated above, assessments should be demand-driven and be open to all relevant stakeholders (it is critical that all voices be heard), it should be conducted in a transparent manner (the process must be understood), the participants must be representative of the relevant stakeholders, and the process must be legitimate to all stakeholders from the grass roots to the global level (governments and multi-national corporations). Therefore, an assessment should be conducted with a governance structure owned and supported by all relevant stakeholders: A key decision is whether an assessment should be conducted as a non-governmental process or an intergovernmental process. An intergovernmental process is recommended if the main stakeholders/actors are governments, given that it is imperative that they fully own the process, e.g., IPCC. However, given the importance of ownership by all actors a new paradigm is recommended, i.e., an intergovernmental process with a multi-stakeholder Bureau, e.g., the IAASTD. Decisions would be taken by governments in plenary meetings, open to all stakeholders, taking into account the recommendations of the Bureau. The proposed intergovernmental process should ensure ownership by governments, while an integrated Bureau would allow the full range of stakeholders to meet as a single body creating opportunities for constructive exchanges and building consensus.

- **Develop an agreed set of Principles and Procedures**. A set of principles and procedures should be developed prior to initiating an assessment, which outline how the assessment will be conducted to ensure openness, transparency, inclusiveness and legitimacy. The principles and procedures should describe the overall organizational structure; the eligibility and selection procedures for Panel and Bureau membership (assuming there is a Panel and Bureau, ala, IPCC), including their desired technical qualifications; tasks and responsibilities for Bureau members; procedures for nominating and selecting the assessment chair/co-chairs, authors and editors; tasks and responsibilities of chair/co-chairs, authors and editors; tasks for the secretariat; and procedures for the preparation, peer-review, acceptance, adoption, approval and publication of the assessment Report(s) and associated Summaries for Decision Makers and Synthesis Reports, if applicable.

- **Assess the temporal and spatial scales of the assessment**. Given the broad range of spatial scales associated with most environmental issues, most assessments should be multi-scale, addressing global and sub-global (community to regional) issues, e.g., the MA and IAASTD. Global assessments would address issues that are not place-based, e.g., an assessment of the reliability of climate, biodiversity or other types of theoretical models, but would be interlinked with the sub-global (community to regional) assessments. Sub-global assessments, which would vary in scale from the continental to community level, should use consistent methodologies. Selection criteria for selecting sub-global assessments should be developed at the earliest possible stage in the development of the assessment.

- **Assess which knowledge systems are appropriate.** Depending on the scope and spatial scales of the assessment it is important to determine the appropriate use of institutional and local/indigenous knowledge, and should take use a multi-disciplinary approach to address the full range of relevant issues. As appropriate, the assessment should assess the economic, environmental, health and social (including gender) dimensions of the issue being assessed.

- **Develop a Conceptual Framework** that could be used across a range of temporal and spatial scales, e.g., a framework that links the direct and relevant indirect human-induced drivers of change (e.g., demographic, economic, socio-political, technological,

behavioural, land-use) and natural drivers of change (e.g., solar energy and volcanic eruptions) to changes in the environment (e.g., climate change, air pollution, and ecosystems and their services) to human well-being and poverty reduction (e.g., health and environmental, cultural and economic security).

- **Involve a representative set of experts from all relevant stakeholder groups** in the preparation of the assessment using local and institutional knowledge, as appropriate. It is critical to attract the best experts in the world to conduct these assessments. Typically 5-20 experts per chapter are needed to prepare each chapter of the assessment in order to ensure geographic, disciplinary and gender balance from all relevant stakeholder groups. Experts are individuals, acting in their personal capacity, possessing information relevant to the questions being asked. Hence, experts with local knowledge can play a critical role in place-based local studies.
- **Be intellectually rigorous (peer and stakeholder reviewed) but accessible and comprehensible to non-specialists**. A representative set of experts from all relevant stakeholder groups should be involved in the peer-review process – both modern and traditional knowledge should be reviewed, as appropriate, by peers for accuracy and reproducibility. Assessment reports, especially the summaries for decision-makers and the synthesis reports, should be robust and accurate, but accessible and comprehensible to those who are not specialists in the material.
- **Policy relevant, not policy prescriptive.** Assessments should analyze information of importance to the range of relevant stakeholders/decision-makers. Depending on the subject, assessments should, as appropriate, assess the effectiveness of research agendas, institutional systems and the economic, environmental, social and gender implications of different technologies, policies and practices, but not recommend actions. In other words, assessments should assess options for action, but not recommend specific actions. They should assess the implications of different policy/technology decisions using the "if x," "then y" approach.
- **The conclusions must be evidence-based and not value-laden**. The conclusions must be devoid of ideological concepts and value-systems, while recognizing that the assessment conclusions will be used within in a range of different value-systems.
- **Encompass risk and benefit analysis**. Assessments should use a risk-benefit framework for reviewing the application of technologies, policies and practices to a particular environmental/development issue, how to manage the risks and capture the benefits, and to communicate the risks and benefits in an understandable and useful form to the range of relevant stakeholders.
- **Develop a consensus on what is known and unknown, explain different points of view and identify, and where possible, quantify, the uncertainties**. Assessments should analyze all relevant knowledge and identify where there is consensus on what is well known (well established - robust) as well as what is uncertain. Assessments should discuss minority points of view that cannot be discounted, and identify and, where possible, quantify uncertainties. In addition, assessments should attempt to discuss the implications of the robust findings, uncertainties and gaps in knowledge for policy formulation without being policy prescriptive.
- **Incorporate capacity-building activities**. Assessments should integrate capacity-building activities to ensure the effective engagement and participation of local expertise, in both the preparation and use of the conclusions.
- **Incorporate a continuous and effective outreach and communications strategy.** In order to ensure broad stakeholder engagement and interaction as well as effective public awareness, an assessment process should include an effective communications, information and media relations strategy involving all stakeholders throughout the process, i.e., from inception to completion and beyond. It should be

designed to overcome potential barriers that arise, e.g. language barriers, distrust between assessment users, disconnect between the user expectations and the outcomes, scientific and technical jargon. To be effective it should use innovative and scale appropriate methods, e.g., ranging from published reports for national/regional users to drama and plays for local-level users, and pamphlets for the wider audiences.

63. A successful assessment should be able to develop shared views, gain a common understanding and shared vision for the future, provide robust information for decision-makers, and potentially develop new partnerships. Without a shared view of the future it will be difficult to form the appropriate partnerships required to integrate environmental concerns into national economic planning. Hence, it is critical to ensure an appropriate balance of expertise and sectoral representation.

64. If the assessment addresses multiple thematic issues, co-sponsorship by appropriate international bodies is recommended, ala, IAASTD (World Bank, FAO, WHO UNEP, UNDP, and UNESCO).

65. Given the large number of assessments currently being conducted under a wide range of authorizing environments there is a need for improved coordination to limit redundancies and ensure a consistent message, and to synthesize the major findings in order to gain a more holistic view of the state of the planet

66. Thousands of experts and decision-makers get heavily engaged in designing and conducting an assessment. Most of this work is conducted voluntarily (e.g in IPCC, MA) although the travel costs to author meetings are covered by individual governments (developed countries), trust funds or other mechanisms. Given this demand , future assessments would be most useful and possible if they are based on specific questions, e.g. like those in the Synthesis Reports, Special Reports and Technical reports of the IPCC during the Third Assessment (IPCC 2001, 2001, 2003). There would still continue to be a need for regular assessments such as those of the IPCC every 5-10 years, however there is no doubt that given the quantity of information published by the scientific community, it would be daunting to conduct an effective multi-driver based assessment on a more frequent basis.

Science – Policy Interface

67. For the science-policy interface be effective decision-makers should be involved in all aspects of the science-policy interface. The scientific agenda should be informed by the types of information needed by decision-makers, and for assessments to be successful, decision-makers should be fully involved in the assessment process as discussed above. However, despite the assessment findings being communicated to the users, there has been a lack of development and implementation of policies. Once policies are developed, there is a need to implement them at the appropriate level – local, national, regional or global. This remains a challenge in the research-assessment-policy nexus (see figure 2).

68. In the international arena, the conventions are the main bodies receiving the inputs from the assessments. Each of the major environmental conventions has a different approach with regards to scientific input into their decision-making. Box 4 summarises the approaches used in UNFCCC, CBD, UNCCD and Ramsar. There are some similarities between the CBD and UNCCD, i.e., they both have *ad hoc* technical groups for particular issues to provide input to the technical bodies. The CBD, UNCCD and Ramsar are major users of the Millennium Ecosystem Assessment and will receive individually tailored synthesis reports in response to the user needs they each expressed at the start of the MA in 2001.

Box 4

United Nations Framework Convention on Climate Change - UNFCCC

The IPCC, which has a mandate independent of the UNFCCC, provides most of the scientific, technical and economic information that is used as the basis for their policy discussions. The Secretariat of the UNFCCC and IPCC established an informal joint working group to ensure that the needs of the UNFCCC were understood by the IPCC, and in turn, the UNFCCC could understand the ability of IPCC to deliver on their requests for information. The IPCC not only produces comprehensive assessment reports every 5-6 years, but also produces more narrowly focused reports at the request of the UNFCCC Subsidiary Body for Scientific and Technological Advice, e.g., an assessment on issues related to land-use, land-use change and forestry. The key

conclusions of IPCC reports are presented at meetings of the UNFCCC Subsidiary Body for Scientific and Technological Advice, where the implications of the findings for policy are discussed and debated. The major findings of IPCC reports are also presented at plenary sessions of the Conference of Parties. These mechanisms have proven very effective in ensuring that the latest scientific knowledge is available to all participants (governments, private sector and NGOs) attending UNFCCC meetings.

Convention on Biological Diversity - CBD

As with the UNFCCC scientific inputs are channeled into the policy-making process via the Conventions Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA). Among the tasks of SBSTTA is the provision of scientific assessments. In practice scientific inputs are made through a number of mechanisms, separately, or, more often, in combination:

a- preparation of assessments or scientific advice through Ad Hoc Technical Expert Groups set up for a specific purpose.

b- preparation of summary documents by the Secretariat, drawing upon the published literature and recent meetings and workshops, sometimes with the assistance of consultants;

c- preparation of reports by other organizations including UN specialized agencies and international non-governmental organizations.

d- large-scale assessments undertaken by other bodies, notably by the MA.

These various approaches are largely complementary: while the MA, for example, provides an assessment of ecosystem services and their relationship with biodiversity, AHTEGs and commissioned studies can respond to more specific and urgent needs of the decision-making process.

The SBSTTA is conscious of the need to improve the science-policy interface under the Convention. It has considered this matter in a comprehensive way and is currently reviewing its experience with scientific assessments. SBSTTA has noted that assessment processes should be initiated as the result of an intergovernmental recommendation and conducted within a set of agreed procedures, rules, and frameworks. Experience to date has underscored the value of rigorous peer review and the need to maintain separate the preparation of an assessment from the development of policy guidance drawn from that assessment.

United Nations Convention on Combating Desertification - UNCCD

The Committee on Science and Technology (CST) was established as a subsidiary body of the COP to provide it with information and advice on scientific and technological matters relating to combating desertification and mitigating the effects of drought. The CST is composed of government representatives with expertise relevant to combat desertification and mitigating the effects of drought. It is multi-disciplinary and open to the participation of all Parties. In addition there is also a Group of Experts to carry out work based on the recommendations from the COP. The Conference of the Parties can appoint *ad hoc* panels to provide it, through the CST, with information and advice on specific issues regarding the state of the art in fields of science and technology relevant to combat desertification and mitigating the effects of drought. Each ad hoc panels appointed by the COP is composed of experts whose names are taken from the roster of independent experts, taking into account the needs for a multi-disciplinary approval, an appropriate gender balance, and broad and equitable geographic representation.

The Ramsar Convention on Wetlands

The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty, which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The Scientific and Technical Review Panel (STRP) is the subsidiary body of the Convention that provides scientific and technical guidance. Its individual members are elected and serve in their own capacities as experts in the scientific areas required by the STRP's triennium Work Plan. In addition to the 15 individual STRP members, delegates from the four International Organization Partners (BirdLife International, IUCN-The World Conservation Union, Wetlands International, and the World Wide Fund for Nature International) -- represent their organizations as full members of the Panel. 18 subsidiary bodies of other Multilateral Environment Agreements and non-governmental organizations and associations participate as permanent observers during each triennium, and representatives of other organizations are invited to participate in the work of the STRP as required by the nature of the tasks.

69. Despite the similarities and differences, there is little doubt that there needs to be strengthening, of assessment inputs into the CBD, UNCCD and Ramsar Conventions, beyond the inputs from the MA, perhaps a mechanism comparable to that of the IPCC for the UNFCCC. Indeed a key question is whether

the MA will meet the needs of the three Conventions, as well as the needs of other users, e.g., the private sector. If successful, should the MA remain a non-governmental assessment, or should it be transformed into an intergovernmental process, with a multi-stakeholder Bureau, which would tie it more closely to governments. Another question is whether a future MA could also be commissioned to address more narrow Convention-specific questions in the manner similar to how the IPCC is responsive to the UNFCCC.

70. Given the environmental issues of climate change, loss of biodiversity and land degradation are inter-linked scientifically and given there are both synergies and trade-offs among the policies and practices that are employed to address these issues individually, the recent advent of a joint liaison group amongst the UNFCCC, CBD and UNCCD Secretariats and the chairs of the subsidiary bodies is encouraging. However, there is no trilateral joint work program at present. Likewise the joint working group, recently established among the biodiversity-related international agreements (CBD, Ramsar, World Heritage Convention, Convention on Migratory Species, CITES) should improve implementation activities on the ground. However, there will remain a need for stronger collaboration among the Conventions of Parties, the subsidiary bodies of the Conventions and among focal points at national levels, which would include joint activities such as developing tools or policy guidance that is of interest to more than one Convention, as well as common requests to assessment bodies. .

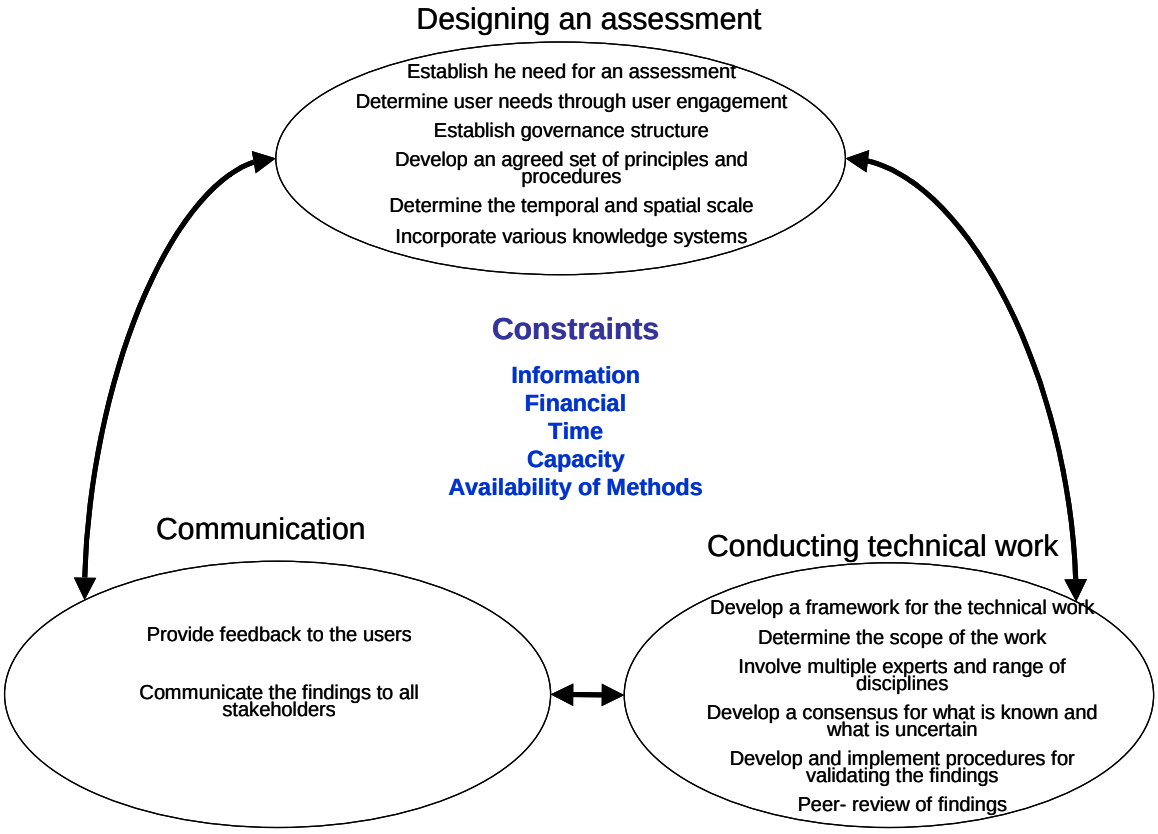

Figure 1: Important components in the assessment process. These components are iterative as well as interconnected (modified from Gitay et al – in press)

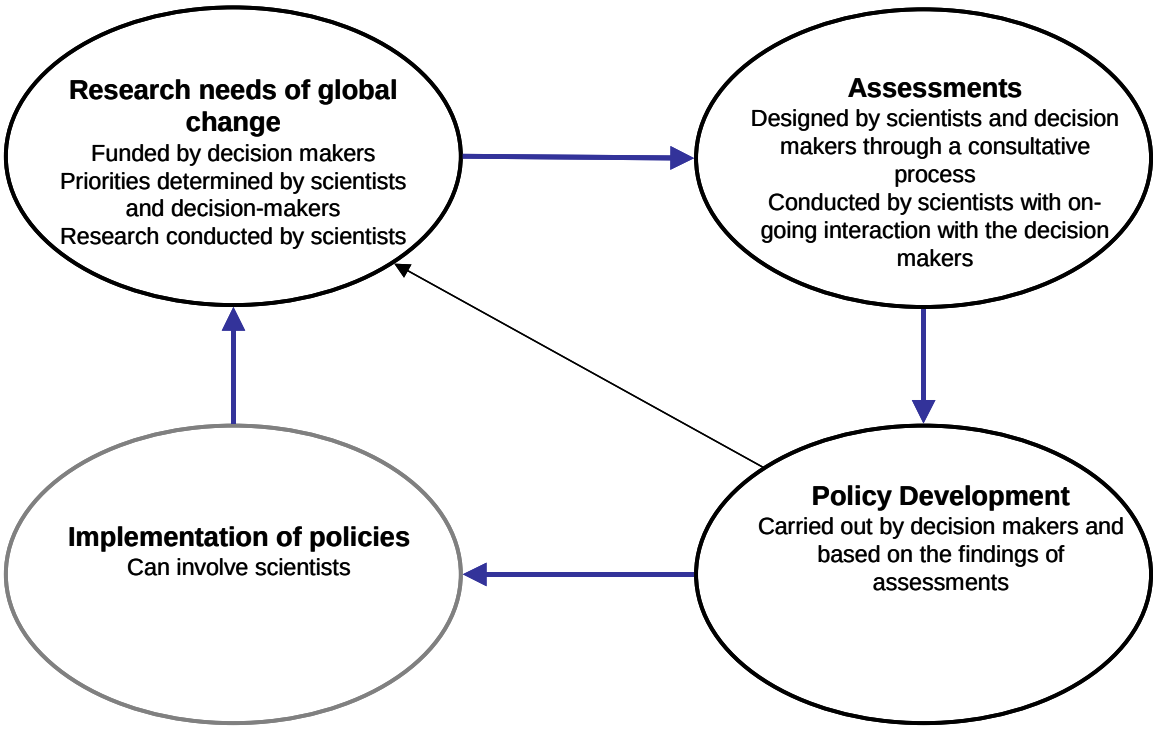

Figure 2: connections between research, assessments, policy development and implementation to address global change. **This is an ideal representation. In many countries, the connectivity between the research, assessment and policies does not exist. At international, regional and national level, in many instances policies to address global change are developed, but rarely implemented**

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