

International Group of
Funding Agencies for
Global Change Research

IGFA

Meeting Report No. 9

Biosphere 2 Center
Tucson, Arizona
October 14 - 17, 1997

The International Group of Funding Agencies for Global Change Research (IGFA) is an informal group of representatives of agencies and ministries of 21 countries and the EU, responsible for the funding of global change research.

The purpose of the Group is to facilitate international global change research in the natural, social and economic sciences by bringing the perspective of these national funding agencies to strategic planning and implementation of such research.

IGFA's goals are:

- (i) internal communication about funding issues;
- (ii) communication with the international organizations dealing with global research issues;
- (iii) addressing specific issues related to global change research and its funding.

Once a year IGFA has a plenary meeting

Additional copies of this report may be obtained upon request from:

The IGFA secretariat,
c/o Netherlands Organization for Scientific Research (NWO)
P.O. Box 93138
NL-2509 AC The Hague
The Netherlands
Tel: +31 70 3440752
Fax: +31 70 3819874
E-mail: igfa@nwo.nl

International Group of

Funding Agencies for
Global Change Research

IGFA

Meeting Report No. 9

Biosphere 2 Center
Tucson, Arizona
October 14 - 17, 1997

Table of Contents

I. Meeting Report	7
1. National Presentation.....	9
2. Presentation of activities and work plans of the IGFA Working Groups.....	10
2.1 Working Group on the resource assessment.....	10
2.2 Working Group on the interface between science, policy and the private sector.....	11
2.3 Working Group on the relationship between research funding and development aid agencies.....	12
2.4 Working Group on human dimensions.....	13
2.5 Working Group on observations and data.....	14
3. Presentations on the international research programmes and regional frameworks.....	16
3.1 IGBP.....	16
3.2 IHDP.....	17
3.3 APN, IAI, ENRICH, START.....	18
4. Funding Issues.....	19
5. Future role of IGFA.....	20
II. Agenda	23
III. Resources for international scientific integration of global change research - “Glue Money”.....	31
1. What is “Glue Money?”.....	31
2. Scientific integration activities.....	31
3. The added value of “Glue Money”.....	32
4. Practical implementation of the concept of “Glue Money”.....	33
IV. List of participants.....	35

I Meeting Report

9th Plenary Meeting 14 - 17 October 1997, Tucson, AZ, USA

Executive Summary

The main conclusions and achievements of the 9th meeting are:

On resource issues the following recommendations were adopted:

- IGFA members are encouraged to provide marginal additional funding for international global change research programmes to improve coordination in a wide range of ongoing and future research in order to foster the additional value of such research. IGFA members may provide this "glue" through one or more of the mechanisms suggested below:
 - include in their project funding small amounts of money for coordination. (IGFA members are encouraged to make their willingness to provide such funding known to both their research and reviewer communities);
 - identify specific resources to support international scientific coordination of global change research; targeted activities should include:
 - . international planning meetings for research intercomparison, analysis and synthesis of results;
 - . travel grants for scientists for participation in international meetings;
 - . funding of scientists to enable them to conduct coordination tasks in support of international research programmes.
- IGFA members and the international programmes should consider a closer working relation towards achieving a joint resource assessment activity.

On the interaction between science and policy:

it was decided to bring the results of the discussions in IGFA to the OECD Megascience Forum. After the OECD Workshop, an ad hoc group will develop a proposal for action for the next IGFA meeting.

The Working Group on the relationship between research funding and aid agencies will:

- complete the "scoping" meetings with development aid agencies seeking to identify:
 - Aid Agency goals, strategies and plans with regard to research and education related to broad issues in global environmental change;

- important areas of aid investments in such themes as: water, food resources and availability, environmental security, natural ecosystems, desertification, etc.; and
- capacity building and related topics.
- investigate, through contacts with several of the Aid Agencies with whom substantive discussions have taken place, our *mutual* interests in research, education, and related issues in the context of the environmental conventions, agreements, and/or protocols (e.g. on desertification and others where the research and related topics are not so well developed as in the climate field).

IGFA members are invited to join the implementation of the Working Group Agenda, either by joining the core group and/or developing links with their own Aid Agency(s).

With regard to human dimension issues:

on IHDP:

- Prepare a consolidated IGFA response on the funding potential of members.
 - Task: All IGFA institutional members should take a position on their potential to participate in concerted IHDP funding
 - Time frame: Members' positions should be clear by January 31, 1998
 - To be communicated to IHDP etc. by the end of March
 - Then meeting with IHDP/SC end of March
- Internal IGFA assessment of the situation of IHDP
 - Task: Prepare an internal assessment document.
 - To be ready by October 1998 for the IGFA plenary
 - Time frame: Criteria and process clear on IGFA's side by January 31
 - Discussion with IHDP/SC at the end of March
 - Internal IGFA consultation ready by July 1
 - Report ready by September 1

on the broader Human Dimensions issues:

- IGFA document on new human dimensions' tendencies as seen by IGFA members
 - Task: to prepare a short document on IGFA impressions about changes in the repertoire of human dimensions topics (e.g. hidden in other issues as trade, impact studies, integrated assessment, health, urban) and changes in (new) actors
 - Form: Mini-task force
 - Time frame: Preparations until July 1, 1998
 - Document ready September 1
- IGFA position on the 1999 world conference on Human Dimension issues in Japan and on contributions to the funding of the conference
 - Task: to consolidate IGFA member support
 - Time frame: IGFA members' position clear by June 1, 1998
 - Consultations until October

On data and observations the IGFA Working Group will pursue a two track approach:

- a more passive watching brief with regard to data management and data policy issues;
- a pro-active role in:
 - working jointly with CEOS and the sponsors of G3OS on the development of an IGOS;
 - bringing to the attention of governments the importance of global observations for research and policy; and
 - assisting in the transfer of observational capacity from research to the operational domain.

1. National Presentations

All member countries have tabled national documents with information with regard to global change policy, funding and research. Links with international programmes, budget trends, funding of the international programme infrastructure, as well as strategies for communication of results to policy makers were addressed in these documents. Oral national presentations were given, highlighting specific issues. The national documents will be published separately.

There are signals of shifts in the focus of research from global to increased emphasis on regional relevance, a shift from understanding towards prediction and response options, and an increased interest in integrated assessment. Research priorities shift towards increased multidisciplinarity, and from single stress to multiple stress issues. International collaboration in research and links of national projects and programmes with WCRP, IGBP and IHDP are becoming more explicit. IGFA also notes a tendency to link research with the relevant global conventions. The transfer of results to other stakeholders like other ministries and agencies, as well as the private sector, is getting more attention at the national level.

The funding situation of global change research is more stable than IGFA assumed two years ago (Kyoto 1995). Regular funding mechanisms dominate. New institutional arrangements are being developed for international cooperation, such as bilateral and multilateral cooperation in setting up institutes, for example the institute for prediction of interannual variability. This enhances the embedding of global change research in the regular science system.

IGFA should address the following issues of common interest to all members:

- further development of private-public partnerships;
- communication policies aimed at the policy and private sector;
- stronger emphasis on monitoring and observation;
- communication between global change research and the domain of education;
- how to deal with biodiversity in the work of IGFA; and

- increase explicit links of national research with the three international programmes.

2. Presentation of activities and work plans of the IGFA Working Groups

2.1 Working Group on the resource assessment

Dr. Gerhard Hahn and dr. Helmut Kühr presented the preliminary results of the Resource Assessment. The results were considered a major achievement.

The leading role of Germany in this effort was highly appreciated. The preliminary results (in which the figures are not yet complete) show that the total funding level of relevant research is adequate when compared to the requirements for most programme elements of the international programmes. However, a considerable part of this funding concerns research which is not coordinated by the international programmes and hence lacks the added value offered by international embedding. These advantages lie in the harmonization of methodologies, the sharing of internationally coordinated databases and interpretation and modeling in a wider context, including upscaling. The international programmes provide a forum for researchers to discuss research priorities in a catalytic process laying out the research agenda. In addition the programmes bring together the networks of researchers which are able to carry out the agenda.

Of course there will and should always be research which is done for other reasons, and which does not gain value from international embedding. For projects where value can be gained this situation can be improved by two mechanisms:

- relatively small increases of the budgets for international coordination should enable the projects to expand their coordination to a wider range of research;
- as was proposed in the 1996 meeting of IGFA in Oslo, the funding agencies might include in the evaluation of proposals as an additional criterion or advantage whether the research fits in internationally coordinated Core Research.

Germany offered to complete the Resource Assessment by early 1998. In a limited additional effort the following actions will be taken:

- recently provided data will be incorporated;
- further harmonization will be attempted; and
- clear misunderstandings with regard to resource requirements should be clarified.

A single report will be produced, with an executive summary for wide distribution.

On the basis of the preliminary results and the experiences during the collection of the data the following recommendations were adopted:

- IGFA members are encouraged to provide marginal additional funding for international global change research programmes to improve coordination in a wide range of ongoing and future research in order to foster the additional value of such research. IGFA members may provide this "glue" (see part III) through one or more of the mechanisms suggested below:
 - include in their project funding small amounts of money for coordination. (IGFA members are encouraged to make their willingness to provide such funding known to both their research and reviewer communities);
 - identify specific resources to support international scientific coordination of global change research; targeted activities should include:
 - . international planning meetings for research intercomparison, analysis and synthesis of results;
 - . travel grants for scientists for participation in international meetings; and
 - . funding of scientists to enable them to conduct coordination tasks in support of international research programmes.
- IGFA members and the international programmes should consider a closer working relation towards achieving a joint Resource Assessment activity.

2.2 Working Group on the interface between science, policy and the private sector

Dr. Uno Svedin and dr. John Marks introduced the subject. IGFA members informed the plenary meeting about national strategies and activities aimed at bringing results of science and their implications for policy to the attention of the policy sector and the public at large.

IGFA was informed about the plan of the OECD to organize at the initiative of Japan a workshop on 4-6 March 1998 - on the invitation of Sweden - in Stockholm on the "Interface between science and policy in global scale issues". IGFA noted that several of its members were closely involved in the organization, and decided to offer to cooperate in the preparation.

The tour de table demonstrated that a wide variety of mechanisms for interfacing exists:

- . briefings (including at high level);
- . advisory councils with broad membership, often at high level;
- . to produce concise focused information;
- . to develop research partnerships with other sectors such as the private sector;
- . to create expert networks for immediate consultation by media, policy;
- . to stimulate public presentations by scientists;

- . to develop links with the media;
- . to use opportunistic interactions; and
- . to establish Global Environmental Change offices.

The scientific basis for providing the information needed by policy makers is developed in the international global change research programmes. In addition more focused research for policy is needed, in which integrated assessments are a valuable tool. In participating in interactions with policy makers and the public it is important that scientists explain limitations and uncertainties. Examples of problems in the interface were mentioned: the unsound initial scientific basis of the Biodiversity Convention; lacking coordination between ministries; and the time lag between science policy steering and the production of policy relevant results.

It was decided to bring the results of the discussions in IGFA to the OECD Megascience forum. After the OECD Workshop, an ad hoc group will develop a proposal for action for the next IGFA meeting.

2.3 Working Group on the relationship between research funding and development aid agencies.

The Working Group chair, dr. Robert Corell presented the report. Over the last year, several meetings were held with Aid Agencies. The most important observation was that results of global change research do not easily reach decision makers dealing with aid programmes. Aid agencies did express an interest in receiving information on what science is funded by IGFA agencies. Priorities in development aid programmes are determined on the basis of political and economic considerations, often initiated by developing countries. They are difficult to influence. Priority themes are environment, agriculture, fresh water, atmospheric chemistry. Capacity building is considered to be of general interest by aid agencies. Developing joint funding between science funding agencies and aid agencies is feasible, and indeed examples exist, but takes time to develop.

IGFA agrees on the Working Group's recommendation to maintain a focus on aid agencies and related development agencies and to continue to explore interests and potentials for joint endeavors. Actions should be concrete and instrumental in building partnerships, in particular in addressing the requirements of the conventions. In this context the following work plan was adopted:

- To complete the "scoping" meetings with development aid agencies seeking to identify:
 - aid agency goals, strategies and plans with regard to research and education related to broad issues in global environmental change;

- important areas of aid investments in such themes as: water, food resources and availability, environmental security, natural ecosystems, desertification, etc.; and
 - capacity building and related topics.

Key visits over the next several months will include Canada, USA and possibly others;

 - To investigate, through contacts with several of the aid agencies with whom substantive discussions have taken place, our *mutual* interests in research, education, and related issues in the context of the environmental conventions, agreements, and/or protocols (e.g. on desertification and others where the research and related topics are not so well developed as in the climate field); and
 - IGFA members are invited to join the implementation of the Working Group Agenda, either by joining the core group and/or developing links their own aid agency(s).

2.4 Working Group on human dimensions

The Working Group chair, dr. Uno Svedin introduced the issues. He noted that the interest for human dimensions of global environmental change is still growing. The IIASA conference in June 1997 showed that research groups and networks are established. Methods are maturing and there appears to be a convergence in the development of issues. Non-academic parties like the private sector are getting involved. The budgets are difficult to quantify, but seem to be expanding.

In the 1995 meeting IGFA decided to assess the situation of the IHDP in 1997. Given the early stage of development of the IHDP this will be postponed until 1998. Meanwhile it can be noted that IHDP is developing in a positive way: a new concentrated programme structure, the funding of the Bonn office and the hiring of an Executive Director, the establishment of links with national committees, and strong relations with WCRP and IGBP. It is important to strengthen the linkages to the social science community at large. Funding issues of IHDP are not yet settled.

The IGFA decisions in 1995 on the concerted funding process have not yet resulted in a sufficient response from IGFA members.

The Working Group presented the following workplan for 1998:

With regard to IHDP:

- Prepare a consolidated IGFA response on the funding potential of members.
Task: All IGFA institutional members should take a position on their potential to participate in concerted IHDP funding
Time frame: Members' positions should be clear by January 31, 1998
Communicated to IHDP etc. by the end of March

Then meeting with IHDP/SC end of March

- Internal IGFA assessment of the situation of IHDP:
 - Task: Prepare an internal assessment document
To be ready by October 1998 for the IGFA plenary
 - Time frame: Criteria and process clear on IGFA's side by January 31
Discussion with IHDP/SC at the end of March
Internal IGFA consultation ready by July 1
Report ready by September 1

With regard to the broader Human Dimensions issues:

- IGFA document on new human dimensions' tendencies as seen by IGFA members.
 - Task: To prepare a short document on IGFA impressions about changes in the repertoire of human dimensions topics (e.g. hidden in other issues as trade, impact studies, integrated assessment, health, urban) and changes in (new) actors
 - Form: Mini-task force
 - Time frame: preparations until July 1, 1998
Document ready September 1
- IGFA position on the 1999 world conference on Human Dimension issues in Japan and on contributions to the funding of the conference.
 - Task: To consolidate IGFA member support
 - Time frame: IGFA members' position clear by June 1, 1998
Consultations until October

In the discussion it was noted that in addressing the broader human dimensions tendencies, IGFA should not put itself in the seat of the SC-IHDP.

2.5 Working Group on data and observations

Dr. Gordon McBean, Environment Canada, has accepted the chair of the IGFA Working Group on data and observations. The Working Group will be reconstituted, and IGFA members are invited to nominate participants.

Main interests of IGFA in this area are:

- data availability and accessibility;
- the interaction with CEOS and the G3OS sponsors in the development of an Integrated Global Observing Strategy (IGOS).

With regard to the data, IGFA will:

- maintain national data activities to:
 - . optimize access to and utilization of existing data; and
 - . provide the basis for international data exchange;
- encourage cooperation with government agencies and private sector to
 - . identify and make available data sets collected for other purposes; and
 - . improve observations, e.g. in data sparse regions.

IGFA is concerned about the deterioration of the existing observation networks and data sets.

With regard to IGOS IGFA:

- recognizes the need for a strategic framework for global observing systems for decisions and resource allocation;
- encourages the development of mechanisms for the transition of capacity from research to operational; and
- underlines the importance of in situ observations in their own right.

The initiative taken by CEOS to develop an IGOS is considered extremely important. IGFA is committed to work together with CEOS and the G3OS sponsors on IGOS. This IGOS should:

- provide improved understanding for governments by providing an overarching view;
- form a framework for decisions on continuity in observation of key variables;
- help to reduce unnecessary duplication;
- assist in improved resource allocation; and
- assist the transition from research to the operational domain.

In order to achieve the objectives of an IGOS, actions are necessary at three levels:

- create a strategic partnership of senior representatives of G3OS sponsors, CEOS, IGFA and others;
- develop IGOS and pilot projects; and
- bring together at the national level agencies and ministries with (partial) responsibility for observations.

The G3OS should be built upon the results from the programme elements of the international global change research programmes: e.g. CLIVAR, JGOFS, WOCE. The pilot projects should primarily bring together existing elements in the G3OS. The present set of pilot projects comprises:

- global ocean data assimilation experiment;
- upper air measurements;

- long-term continuity of ozone measurements;
- global observation of forest cover;
- long-term ocean biology measurements; and
- disaster management.

The pilot projects are a mechanism to develop and illustrate the coherence of what is already existing and to demonstrate the usefulness of data, rather than a way to obtain money for new developments.

This should lead to awareness of governments, in particular of those parts with responsibility for the Conventions, of the importance of global observations for Global Change research and policy; it will facilitate the planning of funding agency support for integrated space and in situ observations.

The Working Group will pursue a two track approach:

- a more passive watching brief with regard to data management and data policy issues;
- a pro-active role in:
 - working jointly with CEOS and the sponsors of G3OS on the development of an IGOS;
 - bringing to the attention of governments the importance of global observations for research and policy; and
 - assisting in the transfer of observational capacity from research to the operational domain.

3. Presentations on the international research programmes and regional frameworks

3.1 IGBP

The executive director of IGBP gave a very informative presentation which demonstrated that the IGBP has a clear plan of action and is obtaining important new results. The role of IGBP has evolved:

- identify and prioritize key scientific challenges;
- facilitate new scientific initiatives requiring interdisciplinary teams;
- add value by coordination;
- develop implementation plans;
- oversee, guide and assess implementation of plans;
- integrate and synthesize, which in particular is a new role of GAIM; and
- foster earth system approach and view.

IGBP science is educating a new generation of scientists, who have learned to look across disciplinary borders. The programme has led to the global mobilization of the scientific community.

Recent progress in the IGBP:

- science results, networks of scientists, inter-programme element links;
- GCTE synthesis books;
- mid course corrections in several programme elements;
- new inter-projects;
- a pilot initiative to transfer results to the policy community;
- joint WCRP/IHDP/IGBP projects;
- reduction of centralized staff costs; and
- near completion of extremely useful IGFA resource assessment.

Some examples of recent results:

- JGOFS led so far to 1400 refereed publications, and has produced ocean CO₂ flux maps;
- GCTE research demonstrates that the present rate of absorption of carbon by the ecosystems cannot be sustained; and
- PAGES brought together the many proxy records that have been collected and is making them intercomparable.

IGBP is preparing a new 5 year workplan. The synthesis results will be published in a book series by a commercial publisher. For public relations purposes a brochure and a replacement for the booklet "Reducing Uncertainties" are in preparation.

3.2 IHDP

The presentation by the new executive director of IHDP made clear that IHDP has come forward. The plan of action which contains a limited set of priorities is in full development.

- LUCC is actively trying to involve the social science community;
- GECHS (human security) focuses on water; environmental migration; modeling and vulnerability; and environmental security in the context of socio-political change;
- Institutions addresses the formation and evolution of institutions governing the interactions with large biospheric systems and the operation and consequences of institutions affecting the interactions between humans and the environment; and
- Industrial Transformation takes a system analytical perspective, looking at industrial ecology: life cycle analysis, energy; and addresses consumers and consumer choice.

It is recognized as an essential requirement for IHDP to engage the national communities and national programmes. Capacity building should also apply to social science. In the Industrial Transformation active involvement of Eastern European scientists is sought.

The second track which now will be pursued is to develop the implementation of the IHDP programme.

The perception of IHDP by social scientists is a matter of concern. On the one hand the impression exists that IHDP follows the natural science model of research; on the other hand IHDP is viewed as the programme for integrated assessment and policy options. It is considered a challenge to develop IHDP in neither of these directions, but as a research programme for social science on global change issues.

Priority actions in the coming year will be:

- further engage the social science community;
- involve young developing country scholars through a summer school; and
- develop an information strategy: newsletter, state of the art reports, 3rd Open Science Meeting.

A matter of concern is the small size of the Secretariat in view of the tasks ahead. Also the financial situation is precarious. The International Programme Offices for the Programme Elements require support. IHDP is developing a system of national contributions.

3.3 APN, IAI, ENRICH, START

The presentations by the regional networks the Inter American Institute (IAI), the Asian Pacific Network (APN) and the EU's ENRICH were of great interest. Each network has a different perspective, membership and history. It was noted that EU's ENRICH opens the door for collaboration of European scientists in all directions, not just Africa. All networks are in operation now and support to science projects has been started. Some innovating partnership mechanisms have been developed.

APN is supporting IHDP activities; has set up a Web site; has developed a procedure for reviewing proposals. Its next intergovernmental meeting will be held in China.

Twenty countries joined IAI so far. IAI is still weak in the Caribbean and in central America. Science priorities are in :

- El Niño related research;
- composition of the atmosphere;
- effects of climate change; and
- land use/cover change.

An interesting impact of IAI is that the peer review system is now being applied in a wider community. Joint funding agreements between IAI and the research councils in Latin America are being developed.

The 2nd call for proposals for ENRICH closes in December 1997. Types of projects that are supported include the European participation in LBA; in the human dimensions area projects on energy demand and efficiency analysis and industrial transformation. ENRICH can only support projects with European involvement. There is also room for funding European contributions to IAI and APN.

START is developing a multidonor proposal for support of capacity building by a consortium of development aid agencies. Another line of activity is the development of a capacity building project in Integrated Assessment.

4. Funding Issues

The preliminary results of the Resource Assessment and the estimates of the requirements for 'core research' give a valuable insight in the funding levels of the international research programmes. On the basis of the preliminary data an extensive discussion was held about funding issues. The funding levels of internationally coordinated core research (category 1) and regional/national contributing research (category 2) together were sufficient to cover the requirements. The volume of category 1 research does not match the requirements of some of the international projects; some projects identified in category 2 appeared to have strong potential to be shifted to category 1. Such a shift could be promoted and encouraged as follows:

- (i) to use the linkage of research projects to the international programmes as a selection criterion for the funding; and/or
- (ii) broad agreement exists on the need and value of "glue" money for the international coordination of research (see appendix for a definition, and description of the mechanism).

IGFA members are encouraged to seek and provide means to reinforce the international coordination of global change research.

It is recommended that the IGFA Working Group and the relevant Programmes/Projects work closely together on a regular basis to improve and expand the database and to resolve disparities in them.

With respect to IHDP it is noted that new programme elements will be established and should be supported by International Project Offices. This will require resources. IHDP invites IGFA members to consider what role their country could play. In Kyoto the IGFA chair sent a letter of IGFA to the president of ICSU, in which among others he announced that the feasibility of a concerted funding exercise would be explored by IGFA.

So far not all IGFA members have responded to the request to make their possibilities and limitations known. IHDP is considering the option of developing a national contribution scheme.

START reported that a multi-donor action with initial funding by aid agencies from Denmark and the Netherlands has been started successfully. It is aimed for to expand the number of participating aid agencies.

5. Future role of IGFA

In a Tour de Table participants expressed their opinion about the results obtained by IGFA and their expectations for the coming year. The value of IGFA was widely recognized, and stressed in particular by those attending for the first time. The main focus of IGFA is and should remain to act as a high level platform for the exchange of information and for addressing funding issues. It is the only place where science programmes and funding agencies meet. The influence of IGFA on decision making is rather subtle, and was characterized as "socializing decision making". The agenda shows that IGFA is "maturing but not ageing". The expansion of the number of issues of common concern requires careful preparation of meetings, taking maximum advantage of written inputs.

The value of intersessional Working Group activities as a means of implementing IGFA's agenda and in preparation of plenary meetings was stressed. *In that context members are once again invited to nominate participants in the Working Groups of IGFA.*

In addition to the core activities of exchanging information and addressing funding issues, IGFA should address:

- multidisciplinary research, in particular between the social sciences and the natural sciences;
- the interface between science and policy;
- involvement of the private sector;
- the risks to the global observing systems; and
- development of the "glue money" concept.

There was a general feeling that the Tucson meeting was too dense, leaving too little time for informal meetings. The Steering Group was asked to reflect on a different way of structuring the meetings.

In this context it was suggested to develop a multi-annual agenda; to divide the agenda into information items mainly through written inputs, and issues for substantive discussion. The use of parallel sessions should further be explored.

With regard to future meetings it was decided to approach the EU, concerning the possibility of having the next meeting in Ispra. The meeting in 1999 will be hosted by China. In 2000 IGFA will meet in Switzerland.

The present chair will continue for another year. The present and the past chair were charged with the task to propose a successor in time for the next meeting. The secretariat will be hosted by the Netherlands for another year.

At the end of the meeting the chair expressed IGFA's thanks to the director of Biosphere-2, dr. William Harris, and his staff for hosting the meeting, and for offering the opportunity to get acquainted with the potential of the Biosphere-2 facility. Thanks was also expressed to the support staff of UCAR for the excellent assistance in organizing the meeting and to the IGFA secretariat.

1998

John Marks, May

II Plenary meeting, Tucson, Arizona, USA, 14-17 October 1997

Highlights: Resource assessment, Interface science/policy, focused discussion with IGBP WCRP and IHDP about funding issues and interactions. Much time is reserved for communication of national highlights.

Draft agenda

13 October	evening: <i>informal gathering (open bar)</i>
14 October 08:00 - 09:30	Steering group meeting
I	Opening session
14 October 10:00 - 10:30	<p>Dr. John Marks, chair of IGFA, will open the Meeting.</p> <p>Dr. Robert W. Corell, U.S. Member of IGFA, will welcome the participants on behalf of the U.S. Global Change Research Program.</p> <p>Dr. William Harris, Director of Biosphere-II, will welcome the participants on behalf of Biosphere-II.</p> <p>Dr. Marks will present the draft agenda for review and adoption.</p> <p>Dr. Hans de Boois, chair of the IGFA Staff group, will present the administrative arrangements for the Meeting.</p>
II 10:30 - 12:30 with	<p>National presentations by members</p> <p>Members are invited to present <u>written summaries</u> reporting highlights of their national programmes, recent changes and trends in areas such as:</p> <ul style="list-style-type: none"> . Policy in your country related to GCR . Organization of GCR funding and programmes and links international programs (WCRP/IGBP/IHDP/START), their international committees and corresponding national committees. . Budget developments including recent trends on the funding of overall programmes and designated contributions to specific projects.

- . Trends, uncertainties and problems related to funding of international infrastructure and co-ordination including of WCRP, IGBP, and IHDP, and their core projects.
- . Exciting new research programs/groups/plans, including highlights of research findings.
- . National strategies on communication of scientific results to the public, decision makers and the private sector.

Members are invited to make brief oral presentations of new/emerging issues related to trends, funding problems and communication /inter-action science-policy (see item 15 October).

Please keep these presentations strictly under ten minutes due to time limits.

Enclosed is a copy of "Visions by Swiss Researchers - Research on Sustainability and Global Change - Visions in Science Policy by Swiss Researchers"

14 October

12:30 - 13:00

Pick-up lunch

13:00 - 15:00

National presentations, continued

14 October

15:30

Leave for Biosphere-2;

16:00-18:30

Tour through Biosphere-2 Experiment

18:30-19:30

Open bar

19:30

Dinner at the Biosphere-2 Conference Centre.

III

IGFA Working Groups and Activities

15 October

08:30 - 10:00

WG on observations and data, IGOS

The chair of the WG will report on recent activities, mainly on efforts underway, in close collaboration with the Committee on Earth Observation Satellites (CEOS) to implement the Integrated Global Observing Strategy (IGOS). Members are invited to discuss guidelines intended to lead future activities of the WG.

10:00 - 10:30

WG on the Relationship between Research Funding and Development Aid Agencies

Dr. Corell will present the results of the consultations undertaken with representatives of research funding and development aid agencies in Member countries as summarized in the draft paper on this subject.

He will present recommendations for future IGFA activities in this area. IGFA is invited to review the paper and recommendations and to decide on its future course of action in this area.

10:30 - 11:00

Coffee break

11:00 - 11:30

WG on Human Dimensions issues

Prof. Svedin will report on the results of the WG's meeting held at IIASA in June 1997 and on the inventory of support for centralized costs of IHDP and other items.

Members are invited to discuss the preliminary workplan for the WG which presents their actions for the next year. Conclusions will be developed on October 17th after the presentation on IHDP and an ad hoc meeting of the WG on October 16th.

11:30 - 12:30

WG on resource assessment

a) Presentation of final report on Phase 2

Although phase 1 of the Resource Assessment (1992) had produced very useful information on funding levels of the international global change research programmes, it remained unclear whether some data presented by IGFA members fully represented the funding available.

In order to improve the methodology for the assessment, a meeting was held in 1995 in the Birlinghoven Castle which was attended by experts from 15 countries. There it was agreed upon to use a standardized format for collecting individual project information within the Resource Allocation Survey and to discuss and harmonize the categorization of national projects in collaboration with the international programmes.

In several additional meetings the WG on the Resource Assessment also better defined the format in which the

international programmes are invited to present their future resource needs within the Resource Requirements survey.

Both surveys were discussed in detail at a joint meeting of representatives from IGFA and the international programmes in Potsdam (August 1997).

The chair of the WG will inform IGFA on the outcome of the Potsdam meeting and will present the final report on phase 2 of the assessment, including the methodology used, the statistics and an analysis of the data together with a comparison between results of both phases.

15 October

12:30 - 13:00

Pick-up lunch

13:00 - 14:00

Resource Assessment, continued:

b) Discussions on Phase 2 and the Future of the Resource Assessment

Members are invited to discuss the results and analysis of the assessment and draw conclusions. As the IGFA Steering Committee has recommended to continue the assessment, IGFA members are asked to discuss guidelines for phase 3. Final conclusions regarding the allocation of resources for Global Change Research will developed in agenda item V.

14:30

15:30 - 18:30

Leave for the host country programme

Host country programme (University of Arizona and Desert Museum)

18:30

19:00

Reception

Dinner at the Desert museum

16 October

08:30 - 10:00

Interface between Science and Policy and the Private Sector

At the 1996 plenary meeting of IGFA in Oslo discussions were held about IGFA's potential role in promoting interaction or communication between global change research and the policy process.

It was decided that an IGFA workshop should be held (in Sweden) to address this issue. However, the OECD Megascience Forum picked up the same issue on a broader

scale and on the initiative of Japan, an OECD workshop on this issue is being planned for early 1998. The Steering Group considered that IGFA might contribute to this workshop rather than convene an IGFA workshop on this subject.

Dr. Marks and Prof. Svedin will introduce this item and lead the discussion on co-operation with the Megascience Forum, to be followed by a Tour de Table in which members are invited to briefly give their views.

10:00-10:30 *coffee break*

IV

16 October

10:30 - 11:30

The International Research Programmes

WCRP

Scientific highlights, organizational highlights, problems

11:30 - 12:30

IGBP

Scientific highlights, organizational highlights including implementation of recommendations resulting from the "Evaluation.....", problems

12:30 - 13:30

Lunch

13:30 - 14:00

IHDP

Highlights, organization, prospects and problems

14:00 - 15:00

Intercore Projects, Capacity Building and Regional Co-operation (APN, IAI, ENRICH and START)

V

Funding Issues

16 October

15:00 - 16:00

Focus on funding issues, including WCRP/IGBP/IHDP/START and Conclusions on the Resource Assessment

Discussions will be held on the funding of co-ordination of international projects and intercore project activities. The outcome of the resource assessment will be taken into account.

Key issues are:

- is the funding level for centralized costs adequate?

- if not, should IGFA call upon individual members to adapt their funding strategies to better meet the needs of Global Change Research and its international coordination?

IGFA will review the results of that part of the Resource Assessment that deal with this issue, including the identification of requirements for such support by IPO's and the information provided by funding agencies regarding their actual support.

An opportunity will be provided for members to identify, in accordance with the process IGFA adopted last year, any needs identified for shared IGFA support for existing or proposed IPO's.

16:00 - 16:30 *Coffee break*

VI

Discussion sessions

16 October

16:30 - 17:30

Tour de Table: additional remarks on various items

Participants will be invited to provide additional comments on all items previously discussed to provide input to the break-out meetings to follow.

17:30 - pm

Break-out sessions (refreshments will be provided)

Opportunities will be provided in order to finalize discussions upon various items(to be decided during previous sessions), including Working Group workplans, and to draft conclusions for presentation and approval in the final plenary session on October 17th.

20:00

Buffet/grills

VII **IGFA in the Near Future and in the Long Term**

17 October

08:30 - 10:30

Decisions**Reports of ad hoc meetings, Recommendations and**

10:30 - 11:00

Coffee break

11:00 - 12:00

**Tour de Table: results and expectations of IGFA in
the next year**

The chair will review the results of the meeting to this point and will present recommendations on behalf of the Steering Group regarding IGFA's future role, responsibilities and functions, both in the near future (the coming two years) and in the long term. Members are invited to discuss and to reach conclusions on these issues.

12:00 - 12:30

- **Election of IGFA chair**
- **Arrangements for future meetings of IGFA**

12:30

Closing

12:30-14:00

Lunch

17 October

14:00-16:00

**Informal Meeting of the IGFA Steering Group with
IGBP, WCRP, and IHDP**

17:00 - 19:00

Steering Group and Staff Group Dinner Meeting

III Resources for International Scientific Integration of Global Change Research -- "Glue Money"

1. What is "Glue Money"?

A critical element for the success of international global change research programmes is a suite of scientific integration activities which knit the individual projects into a coherent network or consortium. The funds to support scientific integration activities -- sometimes called "glue money" -- are thus an essential complement to the funding of the individual research projects themselves (but are only a very small percentage, usually 1-2%, of the cost of the individual research projects).

There are basically THREE types of scientific integration activities in the IGBP/WCRP/IHDP system:

- a. The IGBP, WCRP, and IHDP offices/secretariats;
- b. a supporting office ("international project office" or "IPO") and officers (usually 2-4) for core projects and a small number of post-docs or scientific officers to support the project's lead scientists (e.g., "focus" leaders); and
- c. a series of important, but small-scale integrating activities through which the network/consortium develops "added value" for the projects conducted under the umbrella of international programmes such as the IGBP, WCRP and IHDP.

2. Scientific Integration Activities

The types of activities in the latter category which "glue money" supports include:

- a. Common experimental protocols -- it is usually necessary to bring researchers together at the beginning of network activities through workshops to develop common methodologies and protocols so that the work of the individual projects can be compared;
- b. Data standardization -- network members often bring existing data sets to the network activities. Standardizing these data into a common format greatly enhances their value for model testing;
- c. Model intercomparisons -- rigorous testing and comparison of models speeds their development, increases their reliability, and enhances their value for analysis, interpretation, and assessment activities; and
- d. Synthesis and integration -- scientists need to be brought together, at critical

points in a network's development, to synthesize what has been learned and, on that basis, to plan the next activities, usually through workshops.

An essential component of integration activities in all of the above areas is assuring effective communications and interactions among the scientists involved, e.g., through expansion of electronic communications and through workshops and other scientific planning meetings.

3. The Added Value of "Glue Money"

As noted above, the IGBP experience has shown that the "glue money" is *generally* about 1-2% of the aggregate value of the contributing research projects. IGFA estimate that the return on this investment -- in terms of an enhanced rate of increase of scientific understanding and a more secure set of scientific results -- is substantial, in fact, many times the value of the costs of integration. Thus, "glue money" has a very high benefit/cost ratio.

Some important examples of the effectiveness of "glue money" can be drawn from two of the major projects of the World Climate Research Program (WCRP) -- the world ocean circulation experiment (WOCE) and the Coupled Ocean Atmosphere Response Experiment of the Studies of the Tropical Ocean and Global Atmosphere (TOGA). Both WOCE and TOGA/COARE were supported by strong and effective international project offices -- the WOCE IPO in Wormley, United Kingdom, and the TOGA IPO at the World Meteorological Organization (WMO) in Geneva, Switzerland.

An essential component of WOCE was an initial global description of ocean circulation. This effort required decades of research-vessel time allocated by national funding agencies of virtually every country with significant oceanographic capability. These allocations and divisions of responsibilities resulted in what is essentially the first comprehensive study of the circulation of the world's oceans, a baseline on which future studies of ocean circulation will be based.

TOGA/COARE required integration of meteorological and oceanographic research at levels not previously achieved. This integration was achieved through a comprehensive set of both international and scientific workshops and planning meetings. In addition, results of TOGA/COARE research were applied in real time to resolution of practical economic problems, such as agricultural planning in anticipation of extreme climatic conditions. This linkage was achieved through a similar set of workshops and meetings which brought together research scientists and agricultural planners.

A third example of the value of "glue money" is the work of the Elevated CO₂ Network of the GCTE Core Project of the IGBP.

This network has used a number of integration activities -- development of an international framework for the rational deployment of expensive FACE (Free Air Carbon dioxide Enrichment) experiments, agreement on experimental protocols, series of synthesis workshops -- to significantly accelerate research on the effects of increasing atmospheric CO₂ on the functioning of terrestrial ecosystems. The results of these integration activities are highlighted in the Executive Summary of the recent GCTE synthesis (IGBP Science Report No. 1) and in the associated IGBP Book Series volume (*The Terrestrial Biosphere and Global Change: Implications for Natural and Managed Ecosystems*, Cambridge University Press, 1998).

There is another, more practical value of "glue money" from the IGFA perspective. By effectively moving individual research projects from "Relevant" or "Regional/National" categories into the "Core Research" category, the requirements of the Core Projects can be met through very modest incremental increases in expenditure. It should be emphasized that this is not just a reclassification exercise; it represents added scientific value, directly aimed at the objectives of the Core Projects, through the formation of networks from existing individual research projects and support of the associated integration activities.

The network approach, whereby existing research forms the building blocks of the Core Projects, cannot meet all of the requirements of the research agendae, but can meet most. Where new research efforts are genuinely required, the network's "glue money" approach can help identify where these gaps lie by doing as much as possible with existing research.

4. Practical implementation of the concept of "Glue Money"

Much of the "glue money" required by the international global change research programmes can be obtained through existing national and international funding mechanisms, such as postdoctoral positions, workshops, research grants for joint modelling studies, etc. These can be obtained via the normal competitive peer-review process by scientists working as Core Project task leaders or network coordinators. This is, in essence, the second type of "glue money" described above.

However, it is very important to note that the first type of "glue money" -- a supporting office or sub-offices with a small number of scientific officers (normally 5-6 per project) -- is essential for the "glue money" approach to work. It is usually these scientific officers, working closely with busy senior scientists, who do the preparatory work that accesses the second type of "glue money" and coordinate the network's integration activities. Experience in IGBP has shown that Core Projects with an adequately funded and staffed office system are successful in using the "glue money" approach to achieve most of their objectives; those without an effective office support system are much less successful.

There are a variety of ways in which scientific integration activities can be supported through "glue money". Scientists can be encouraged to include requests for small amounts of additional "glue money" in their proposals to national funding agencies for support of Core Project research with the objective of aggregating these small amounts of funds to support substantial international integrating activities.

Another approach would be for national funding agencies to either create national "glue funds" to which scientist could apply directly or accept, through their regular competitive

review process, proposals from scientists to conduct specific integrating activities, either on their own or in conjunction with an international team. Finally, "glue money" could be provided to IPO's, either directly by funding agencies or through national project offices.

The present system for providing "glue money" applies, in effect, all of these methods. In fact, many national funding agencies utilize various mixes of these approaches to meet needs in this area.

IV List of Participants

AUSTRIA

Irene **Gabriel**

Dept. Of Ecosyst. Research
International Research Cooperations
Ministry of Science and Transport
Rosengasse 4
A-1010 Vienna
Austria
Tel.: 43-1-53120-7153
Fax: 42-1-53120-7153
E-mail: irene.gabriel@bmwf.gv.at

Gordon A. **McBean**

Atmospheric Environment Service
Environment Canada
4905 Dufferin Street
Downsview, Ontario M3H 5T4
Canada
Tel.: 1-416-739-4770
Fax: 1-416-739-4232
E-mail: Gordon.Mcbean@ec.gc.ca

BELGIUM

Martine **Vanderstraeten**
Advisor for Scientific Affairs
Federal Office for Scientific,
Technical and Cultural Affairs
Rue de la Science 8
B-1000 Brussels
Belgium
Tel.: 32-2-238-3411
Fax: 32-2-230-5912
E-mail: vdst@belspo.be

CHINA -BEIJING

Sun Shu
Vice-President
National Natural Science
Foundation of China (NSFC)
35 (East Gate), Huayuanbei Road
Haidian District
100083 Beijing, China
Tel: 86-10- 6202-6365/86-10-6201-
0305
Fax: 86-10-6201-0306
E-mail: sunshu@rose.nsfc.gov.cn

CANADA

Elizabeth **Boston**
Natural Sciences and Engineering
Research Council of Canada
Constitution Square, Tower II
350 Albert St.
Ottawa, ON K1A 1H5
Canada
Tel.: 1-613-996 6521
Fax: 1-613-992 5337
E-mail: erb@nserc.ca

CHINA-TAIPEI

Stephen. S.H. **Shen**
Director of the Division
of Planning and Evaluation
National Science Council
20 fl. no. 106, Ho-Ping E. Rd., Sec. 2
Taipei 10636, China
Tel.: 886-2-7377530
Fax: 886-2-7377672
E-mail: shensh@nsc.gov.tw

Ching-Yen Tsay
 Vice Chairman
 National Science Council
 106 Hoping E. Rd., Section 2
 Taipei, China
 Tel.: 886-2-737-7506
 Fax: 886-2-737-7785
 E-mail: cytsay@nsc.gov.tw

Wayne Wang
 Section Chief
 National Science Council
 19F, no. 106 Hoping E.Rd. Sec. 2c
 Taipei, China
 Tel.: 886-2-737-7881
 Fax: 886-2-7377785
 E-mail: yjwang@nsc.gov.tw

EUROPEAN COMMISSION
Steve Morgan
 ENRICH Secretariat
 DG XII-D, SDME 7/23
 8, Square de Meeus
 B-1050 Brussels
 Belgium
 Tel.: 32 2 299 4184
 Fax: 32-2-2963024
 E-mail: steven.morgan@dg12.cec.be

Christian F.J. Patermann
 Director Environment Programme
 DG XII/D 7/62
 European Commission
 Rue de la Loi 200
 1049 Brussels
 Belgium
 Tel.: 32-2-295-1815
 Fax: 32-2-296-3024
 E-mail:
 christian.paternmann@dg12.cec.be

FRANCE
Katia Laval
 1, Rue Descartes
 75231 Paris Cedex 05
 France
 Tel: 33-1-44-277-402
 Fax: 33-1-44-276-272
 E-mail: laval@lmd.ens.fr

GERMANY
Gerhard Hahn
 Bundesministerium für Bildung,
 Wissenschaft, Forschung und
 Technology (BMBF)
 Heinemannstrasse 2
 53175 Bonn
 Germany
 Tel.: 49-22-8-57-3250
 Fax : 49-22-8-57-3601
 email
 gerhard.hahn@bmbf.bund400.de

Johannes Karte
 Programme Director for Earth
 Sciences,
 Environment Research Coordinator
 Deutsche Forschungsgemeinschaft
 Kennedyallee 40
 D-53175 Bonn
 Germany
 Tel.: 49-228-885-2319
 Fax: 49-228-885-2777
 E-mail:

Helmut Kühr
 DRL/PT, Agency of the Federal ministry
 for Education, Science, Research and
 Technology/BMBF
 Godesberger Allee 117
 5317 5 Bonn
 Germany

Tel.: 49-228-81996-18

Fax: 49-228-81996-40

E-mail: helmut.kuehr@dlr.de

ICELAND

Halldor Thorgeirsson

Head of Department of Environmental
Research

Agricultural Research Institute

Keldnaholt

Reykjavik IS-112

Iceland

Tel.: 354-577-1010

Fax: 354-577-1020

E-mail: dori@rala.is

JAPAN

Kazuhiro Kitazawa

Special Staff

Division of Ocean and Earth
Science and Technology Agency

2-1-1- Kasumigaseki

Chiyoda-Ku, Tokyo

100 Japan

Tel.: 81-3-3580-6561

Fax: 81-3-3581-7442

E-mail: kitazawa@jamstec.go.jp

Yoshihiro Natori

Director Research and Information
Office

Global Environment Department
Environment Agency

1-2-2, Kasumigaseki

Chiyoda-Ku, Tokyo

100 Japan

Tel.: 81-3-3581-3422

Fax: 81-3-3581-3423

E-mail: yoshihiro_natori@eanet.go.jp

Eitaro Wada

Center for Ecological Research

Kyoto University

Shimosakamoto 4-1-23, Otsu

520-01, Japan

Tel.: 81-775-78-8055

Fax: 81-775-78-1436

E-mail: wadaei@ecology.kyoto-u.ac.jp

THE NETHERLANDS

Hans de Boois

IGFA-secretariat

Netherlands Organisation for
Scientific Research, NWO

P.O. Box 93138

2509 AC The Hague

The Netherlands

Tel.: 31-70-3440-752

Fax: 31-70-3819-874

E-mail: IGFA@nwo.nl or boois@nwo.nl

John Marks

Head Science, Technology,
Environment

Ministry of Education

Culture and Science

P.O. Box 25000

2700 LZ Zoetermeer

The Netherlands

Tel: 31-79-3232294

Fax: 31-79-3234816

E-mail: j.marks@minocw.nl

Astrid van Esch

IGFA-secretariat
 Netherlands Organisation for
 Scientific Research, NWO
 P.O. Box 93138
 2509 AC The Hague
 The Netherlands
 Tel.: 31-70-3440-619
 Fax: 31-70-3819-874
 E-mail: IGFA@nwo.nl or esch@nwo.nl

NORWAY

Kirsten Broch Mathisen
 Division of Environment and
 Development
 The Research Council of Norway
 P.O. Box 2700 St. Hanshaugen
 0131 Oslo
 Norway
 Tel.: 47-22-03-72-25
 Fax: 47-22-03-72-78
 E-mail: kirsten.broch-mathisen@nfr.no

SPAIN

Esteban Manrique
 Secretaria General del Plan Nacimal I+D
 CICYT
 Rosario Pino 14-16
 28020 Madrid
 Spain
 Tel.: 34-1-3941771
 Fax: 34-1-3941774
 E-mail: emanri@eucmax.sim.ucm.es

SWEDEN

Uno Svedin
 Director of Research
 Swedish Council for Planning and
 Coordination of Research (FRN)
 Box 7101
 10387 Stockholm
 Sweden
 Tel.: 46-8-454-4123
 Fax: 46-8-454-4144
 E-mail: uno.svedin@frn.se

UNITED KINGDOM

John Krebs
 Natural Environment Research Council
 Polaris House
 North Star Avenue
 Swindon SN2 1EU
 United Kingdom
 Tel.: 44-1793-411653
 Fax: 44-1793-411780
 E-mail: HQPO@nerc.ac.uk/CYN@
 wpo.nerc.ac.uk

Ian Simpson

UK GER Office
 Polaris House
 North Star Avenue
 Swindon, SN2 1EU
 United Kingdom
 Tel.: 44-1793-411734
 Fax: 44-1783-444513
 E-mail: iss@wpo.nerc.ac.uk

UNITED STATES**Lou Brown**

Directorate of Geosciences
National Science Foundation
4201 Wilson Blvd., Room 1070
Arlington, VA 22230
USA
Tel.: 1-703-306-1516
Fax: 1-703-306-0091
E-mail: lbrown@nsf.gov

Robert Corell

Assistant Director
Directorate for Geosciences
National Science Foundation
4201 Wilson Blvd., room 705
Arlington, VA 22230
USA
Tel.: 1-703-306-1500
Fax: 1-703-306-0372
E-mail: rcorell@nsf.gov

Mick Devin

Directorate of Geosciences
National Science Foundation
4201 Wilson Blvd., Room 1070
Arlington, VA 22230
USA
Tel. : 1-703-306-1993
Fax: 1-703-306-0091
E-mail: mdevin@nsf.gov

Hilleary Everist

Deputy Director
Division of Social, Behavioral and
Economic Research
National Science Foundation
4201 Wilson Blvd, Room 995
Arlington, VA 22230
USA

Tel.: 1-703-306-1760
Fax: 1-703-306-0485
E-mail: heverist@nsf.gov

Jeff Fenstermacher

National Science Foundation
4201 Wilson Blvd.
Arlington, VA 22230
USA

Timothy Pieper

Office of the US GCRP
400 Virginia Ave, SW
Suite 750
Washington DC 20024
USA
Tel.: 1-202-314-2232
Fax: 1-202-488-8681
E-mail: tpiiper@usgcrp.gov

CEOS**Jean-Louis Fellous**

Medias-France
CNES-Bpi 2102
18, Avenue Edouard-Belin
31401 Toulouse Cedex 4
France
Tel.: 33-5-6128 2209
Fax: 33-5-6128 2905
E-mail: fellous@medias.cst.cnes.fr

ICSU**James J. McCarthy**

ICSU ACE
Harvard University,
26 Oxford Street, MCZ,
Cambridge, MA 02138
USA
Tel.: 1-617-495-23-30
Fax: 1-617-495-05-06
E-mail: jmccarthy@oeb.harvard.edu

IHDP

Larry **Kohler**

IHDP

Nussallee 15a

D-53115 Bonn

Germany

Tel.: 49-228-739050

Fax: 49-228-739054

E-mail: kohler.ihdp@uni.bonn.de

START

Dr. Roland **Fuchs**

Director

International START secretariat

2000 Florida Avenue, Suite 200

Washington, D.C. 20009

USA

Fax: 1-202-457-5859

E-mail: rfuchs@kosmos.agu.org

ICSU

Jean-Francois **Stuyck-Taillandier**

Executive Director

ICSU

51, Bd de Montmorency

75016 Paris

France

Tel. 33-1-4525-0329

Fax: 33-1-4288-9431

e-mail: jfst.icsu@imcp.jussieu.fr

IGBP

Chris G. Rapley

Executive Director International
Geosphere-Biosphere Programme
The Royal Swedish Academy of
Sciences, Lilla Frescativägen 4
Box 50005
S-104 05 Stockholm
Sweden
Tel.: 46-8-166448
Fax: 46-8-166405
E-mail: cgr@igbp.kva.se

Will Steffen

GCTE Executive Officer
GCTE Core Project Office
PO Box 84
Lyneham ACT 2602
Australia
Tel.: 61-6-242-2362
Fax.: 61-6-241-2362
E-mail: Will.steffen@dwe-.csiro.au

New Address: see Rapley