Report on UK Future Earth Town Hall Meeting: London, 21 June 2013

held at the Royal Society and British Academy

1. Summary

Future Earth is a new 10-year international research initiative that will develop the knowledge to respond effectively to the risks and opportunities of global environmental change and support a transformation towards global sustainability in the coming decades. The Future Earth programme arose from, and will replace, the existing framework of global environmental change programmes; it will be taken forward by the Science and Technology Alliance for Global Sustainability, currently comprising the International Council for Science (ICSU), the International Social Science Council (ISSC), the Belmont Forum of funding agencies and three UN bodies (UNESCO, UNEP and UNU)[1]. Based on the vision developed by the Future Earth Transition Team, a series of worldwide national and regional events have been held since late 2012 to engage the broad research community in the co-design of Future Earth actions and activities. Over 170 individuals from academic, private sector, governmental and civil society backgrounds participated in the UK 'town hall' meeting on 21 June, contributing their ideas through plenary discussions and breakout sessions. Key messages arising from the UK meeting included the need for improved awareness of the implications of current trajectories of resource use and global-scale impacts; the importance of interdisciplinary research to achieve fundamental changes in economic systems and human behaviours; and the twin challenges of linking local to regional and global, and connecting science to policy-making and business, within the research agenda for Future Earth.

2. Background

Two of the simplest, yet profound, scientific developments of the past 50 years have been the linked realisations that firstly, the Earth system operates as a single dynamic entity, with its component physical, biological and human systems all interacting; and second, that all those systems are currently experiencing rapid, human-induced change, the continuation of which fundamentally threatens global climate, biodiversity, ecosystem services and human well-being – with potentially catastrophic consequences. Since 1980, four major international science programmes have been developed to provide the necessary knowledge and understanding to address such issues: the World Climate Research Programme (WCRP), the International Geosphere-Biosphere Programme (IGBP), the International Human Dimensions Programme on Global Environmental Change (IHDP) and DIVERSITAS, an international programme of biodiversity science. Following increasingly close collaborations between these programmes in the late 1990s, linkages between them were formalised in 2001, creating the Earth System Science Partnership (ESSP). When ESSP was reviewed in 2008, the potential benefits of full integration were identified[2] in the context of a new, holistic strategy for Earth system research, to be based on a comprehensive and interdisciplinary approach to global environmental change and governance options.

These ideas have since been explored through wider consultations, involving ICSU, funding agencies (the Belmont Forum[3]) and current global environmental change programmes. Such engagement

[1] Full list of acronyms given in Appendix
[2] ICSU-IGFA (2008) *Review of ESSP*; www.icsu.org/publications/reports-and-reviews/essp-review
[3] The Belmont Forum is an informal, non-binding grouping, with participation in its different actions on a voluntary basis according to its members' national statutes and strategies.

included an Earth System Visioning process[4], the establishment of an international Transition Team for Future Earth, and discussions at the 2012 Planet under Pressure conference[5]. The Future Earth initiative was formally launched at the 2012 UN Conference on Sustainable Development (Rio +20); subsequently, an Initial Design Report for Future Earth has been published[6] (with its Executive Summary and Overview available for the UK meeting) and a website[7] developed.

3. Plenary sessions

Morning and afternoon plenary sessions of the UK Future Earth town hall meeting held on 21 June were hosted at the Royal Society; they were chaired by **David Fowler, Tim O'Riordan** and **Peter Liss**. Participants were welcomed by **Martyn Poliakoff** (Foreign Secretary, The Royal Society) and **Adam Roberts** (President, British Academy), who together outlined the scope and aims of the meeting. The latter's opening remarks included congratulations to Frans Berkhout on his appointment as Interim Executive Director of Future Earth, also to the three UK members of the Future Earth Science Committee, Melissa Leach (Vice-Chair), Bina Agarwal, and Corinne Le Quéré.

Six speakers gave presentations[8] on the structure, goals and proposed implementation arrangements of the Future Earth initiative, stimulating discussion on its detailed content from a UK perspective.

Rik Leemans (Wageningen University) emphasised that business-as-usual was no longer a viable option for human society – nor for science. In order to remain within sustainable planetary boundaries for a population likely to reach 9 billion, it is now essential that a very wide range of damaging and human-driven environmental trends (and their associated impacts) are not just slowed but reversed. The necessary transitions and transformations require radical, policy-led societal changes; these in turn depend on new ways of organising, supporting and producing scientific information, and in making sure it is used. Future Earth has been developed to address such challenges, to provide the knowledge needed over the next ten years for society to not only recognise the risks posed by global environmental change, but also to seize the time-limited opportunity to successfully achieve the progressive transition to global sustainability.

The framework of the Future Earth programme, as envisaged by the Transition Team, will be based on three closely connected research themes:

- *Dynamic Planet*: observing, explaining, understanding and projecting environmental and societal system trends, drivers and processes and their interactions; anticipating global thresholds and risks
- *Global Development*: providing the knowledge for sustainable, secure and fair stewardship of food, water, biodiversity, health, energy, materials and other ecosystem functions and services, to address pressing short-term needs of human development
- *Transformation towards Sustainability*: understanding transformation processes and options, assessing how these relate to human values and behaviour, emerging technologies, and economic development pathways; and evaluating strategies for governing and managing the global environment across sectors and scales, in order to achieve longterm transitions.

[4] ICSU/ISSC (2010). *Earth System Science for Global Sustainability: The Grand Challenges*. ICSU, Paris
[5] Planet under Pressure (2012) State of the Planet Declaration; www.planetunderpressure2012.net/pdf/state_of_planet_declaration.pdf
[6] www.icsu.org/future-earth/media-centre/relevant_publications/FutureEarthdraftinitialdesignreport.pdf
[7] www.futureearth.info
[8] Online via www.britac.ac.uk/intl/future_earth.cfm

The involvement of a wide range of parties – scientists, funders, policy-makers, business and other stakeholders – in Future Earth is considered essential for its co-design, co-production and effective implementation. This is an extremely ambitious undertaking. Nevertheless, Future Earth is essentially an evolutionary development, not starting *de novo*; it is able to build on existing structures and networks developed through the current generation of global change programmes, at both national and regional levels. There is also strong support by the UN Educational, Scientific and Cultural Organisation (UNESCO), the UN Environment Programme (UNEP) and the UN University (UNU). The overall goals and proposed functioning of Future Earth provide a close match to the *The Future We Want*[9], the outcome document adopted at the 2012 UN Conference on Sustainable Development (Rio +20).

Steven Wilson (ICSU) summarised current planning for the implementation of Future Earth, including its governance, funding and engagement activities to date. Regional meetings had already taken place in Africa, Asia-Pacific and Latin America/Caribbean, also sessions at major conferences (AGU, AAAS and EGU). The Science and Technology Alliance for Global Sustainability will provide overall guidance for Future Earth's Governing Council, Engagement Committee, Science Committee and Executive Secretariat. Current arrangements are interim (for 18 months); following which, a permanent Director, headquarters and regionally-distributed Secretariat will be established. Future Earth will build on and integrate the activities of three global environmental change programmes – IGBP, IHDP and DIVERSITAS – from mid-2014, maintaining many of their projects. Although WCRP is expected to retain its identity, that programme has also made a commitment for engagement. The resources required to deliver the Future Earth research agenda will be primarily provided by national funding and research systems, with a smaller, but important, requirement for coordination to add international value. Four funding levels are envisaged: nationally-organised, 'ongoing' disciplinary research (likely to involve 1000s m€); nationally-organised emergent research, aligned to Future Earth priorities (100s m€); international research programmes (10s m€) and international coordination activities (< 10 m€).

Discussion on the introductory presentations included the following audience questions and speakers' responses, given here in summary form:

- *Why does Future Earth have a 10 year timescale?* That period reflects the urgency of the challenges to be addressed, but does not imply all problems will be solved on that timescale.
- *What features of Future Earth are different from current GEC programmes?* In addition to the more holistic approach, the inclusion of development-related research is novel; also the emphasis on co-design and co-production from the start.
- *What are the links to EU programmes?* Strong and synergistic links to regionally-based research programmes are anticipated, in Europe (e.g. Horizon 2020) and elsewhere
- *What will be the impacts on existing projects within GEC programmes?* Discussions on such issues with project/programme representatives are on-going, with the expectation of (project-specific) decisions by the end of 2013
- *Are global observing systems included in Future Earth?* Yes, although recognising that most structures and systems are already in place, e.g. via GCOS, GTOS and GOOS
- *Is the level of governmental commitment sufficient at the global scale, e.g. by China and India?* At this stage, the answer is "yes", although it is challenging to reconcile the political priorities of continued economic growth with global sustainability

[9] www.un.org/en/sustainablefuture

- *How will engagement with business be achieved?* The need for further work in this area is recognised, and it will be a priority for Future Earth's Engagement Committee as well as at national levels
- *How will Future Earth research be supported, in the UK and elsewhere?* Many UK funding bodies (not just the Research Councils) are expected to provide funding for research that supports the Future Earth agenda. Similar multi-sourced funding is expected in other countries.

Corinne Le Quéré (Tyndall Centre/University of East Anglia) identified 1940-2080 as a unique period in human history, that we are now around half-way through: those years not only cover the likely lifetime ranges of the meeting participants (from births of the oldest to likely deaths of the youngest), but are also when the human population will increase from 2 billion to around 9 billion, and is then expected to begin to fall. The next decade will be crucial in managing the 21st century human interactions with the Earth system in order to achieve "a safe operating space for humanity", i.e. without crossing ecological red lines. The target of limiting the increase in mean global surface temperature to 2°C, the widely-accepted threshold for dangerous climate change[10], has had insufficient political and public resonance – and now seems highly likely to be breached. Thus there is urgent need for metrics that are more widely understood, e.g. relating to flood risk and insurance, heat waves and mortality, economic costs, and quality of life for children and grandchildren.

Current UK research provides an excellent basis for the *Dynamic Planet* theme of Future Earth. In particular, integrated assessment models to explore 'the solution space' can be built on strong foundations in past/modern observations and integrated analysis capabilities. Important topic areas that might be addressed by the UK research community include extending our observations of the states and trends of biogeochemical parameters and human drivers; gaining better understanding of the interactions of these and other Earth system components; and improving the predictability of likely future environmental changes and their associated risks (relating to thresholds, planetary boundaries and tipping points).

Georgina Mace (University College London) illustrated the fundamental linkages between human development and global sustainability that provide the framework for Future Earth's *Global Development* theme. Many environmental changes are currently driven by global population increase; however, there are also major differences in consumption (and related environmental demands/impacts) between and within countries; e.g. with 10-100 fold per capita differences in such factors as CO_2 emissions, water use, meat consumption and waste production. Human Appropriation of Net Primary Productivity (HANPP) provides an index of human environmental impacts that can be compared between countries and regions: whilst the global total has nearly tripled in the past century, per capita values have declined, indicated increased efficiency.

Much UK research in this area – linking biodiversity, ecosystems, human wellbeing and sustainable development – is currently supported by the Ecosystem Services for Poverty Alleviation (ESPA) programme, jointly supported by DFID, NERC and ESRC. ESPA recognises that poverty is multi-dimensional, not just financial, and closely linked to vulnerability and equity. The overall challenge is to achieve economic growth without compromising natural capital and ecosystem services: this has not been achieved to date.

Example research questions relating to the global development theme of for Future Earth include:

[10] There is an international commitment to avoid dangerous climate change through the UN Framework Convention for Climate Change (UNFCCC), but 'dangerous' is not quantitatively defined

- What are the patterns, trade-offs and options for the equitable and sustainable use of, and access to, key resources (food, water, land, clean air, energy and materials)?
- How will climate change affect food, water, health, human settlements and ecosystems? How can climate services and disaster risk reduction reduce these impacts and facilitate adaptation?
- What options are available to provide energy for all with reduced environmental impacts, and what are the social implications of these energy choices?

Richard Wilkinson (University of York) focussed on issues of equity, providing a range of evidence that national economic growth does not necessarily deliver improvements in overall human well-being. Thus a global analysis[11] found that only 8 out of 69 measures of quality of life were significantly related to longterm economic growth; 43 were more closely related to the passage of time. Life expectancy is, not surprisingly, closely correlated to income per capita (and CO_2 emissions) when comparisons are limited to the poorest countries; however, the relationship is much weaker when income per capita exceeds $5000 pa, and is no longer statistically significant when comparisons are made between developed, rich countries, with average income greater than $18,000. For such countries, increases in income inequality – the within-country disparity between richest and poorest – have been found[12] to be associated with decreases in health (drug abuse, infant mortality, mental illness and obesity); in social relations (child conflict, homicide, imprisonment, social capital, loss of trust); in human capital (child wellbeing, high school drop outs, maths and literacy scores, social mobility and teenage births); and concern for the environment (private sector compliance, waste recycling, loss of local environmental quality).

The implications for Future Earth, in the context of global development and societal transformations, are firstly that reductions in CO_2 emissions should be achievable without reducing quality of life. Second, pathways to sustainable development need to take greater account of the relationship between societal inequality and status competition – the latter increasing consumerism (wasteful use of limited resources) and decreasing public-spirited behaviour (individual and national capacity to act for the common good). If economic growth is considered to be a substitute for equality of income ("So long as there is growth there is hope, and that makes large income differentials tolerable"; Henry Wallich), then equality may be a precondition for a steady-state economy.

Gina Adams (NERC) gave an account of the UK funding landscape for international global change research. Such work has been, and will continue to be, supported by a very wide variety of different funding routes. In addition to 'traditional' responsive and directed/strategic support by Research Councils (at both project and programmatic level), the research community ought to be aware of the interests of many other bodies – and hence funding opportunities – at the national level (Royal Society, British Academy, British Council, Government departments, Foundations) and internationally (Belmont Forum, Bonn Group, G8 HORCs, ERA-Nets, EU JPIs, OECD GSF).

Examples were given of previous ESRC- and NERC-supported contributions to global change programmes. For engagement with Research Councils in the context of Future Earth, the need is for science proposals providing 'excellence with impact'. Such work needs to be consistent with current and developing RCs strategies and policies, as developed by scientific advisory boards such as the ESRC Research Committee, BBSRC Strategy Panels and the NERC Science and Innovation Strategy Board.

[11] Easterly W (1999). Life during growth. *Journal of Economic Growth*, 4, 239-76.
[12] Wilkinson RG & Pickett K (2010) *The Spirit Level: why Equality is Better for Everyone.* Penguin

Plenary discussion on the presentations by Le Quéré, Mace, Wilkinson and Adams included the following audience questions and speakers' responses, given here in summary form:

- *Will the kind of societal transformations (e.g. with regard to income inequality) that are needed for global sustainability be politically acceptable?* The scientific need is to demonstrate that more sustainable (and societally more beneficial) pathways to development already exist, offer a higher overall quality of life, and could be adopted more widely. Fairer wealth distribution does not necessarily involve higher income tax, but can be achieved by reducing income differentials before tax.
- *How can non-academic bodies (e.g. the Met Office, ineligible for Research Council support) become involved?* Partnership arrangements are possible for many RC programmes, and there may be scope for their enhancement in the Future Earth context. High importance is given to wide involvement at the co-design level, that should assist in obtaining non-RC funding; e.g. with complementary governmental co-support.
- *How confident can we be that the total human population will peak in 30-50 years time?* This is a projection, with associated uncertainties; nevertheless, the relevant demographic models are relatively well-established.
- *How will Future Earth engage with 'real societal actors'?* Future Earth is a research programme, not a campaign or lobbying action. Nevertheless, it also has a communication role, to act as bridge between high quality global environmental research and decision-makers, the latter including business leaders as well as politicians.

Tim O'Riordan concluded the session by noting the challenge for new measurement approaches for both natural and social sciences (e.g. valuing natural functions and human wellbeing); the scope for more direct engagement – not only between research and business, but also with government, civil society groupings and schools; and the need for more attention to be given to developing resilience, especially for disadvantaged communities on a worldwide basis.

4. Breakout sessions

Meeting participants were allocated to five breakout groups for the afternoon discussion sessions, held in the British Academy. Each group was asked to address the following issues, initially at sub-group level:

i) What are the 3-5 most exciting research questions that can be significantly advanced through the international, interdisciplinary and transdisciplinary research agenda offered by Future Earth?

ii) For these research questions, explain how the international, interdisciplinary and transdisciplinary Future Earth research agenda can help advance the science.

The following individuals served as facilitators and/or rapporteurs of the breakout groups: Hannah Collins, Tracy Elliott, Karen Heywood, Sophie Hodgson, Philip Lewis, Paul Monks, Tim O'Riordan, Tom Roberts, Fred Steward and Eric Wolff. Breakout group outputs, below, are grouped according to the main Future Earth research themes that they relate to; however, several topics have cross-cutting elements, and a grouping of 'operational considerations' is also given.

These summaries provide a spectrum of research issues for further consideration. Topics are not ascribed to individual breakout groups since those that were closely similar are combined here. Note that although breakout reports were presented to the final plenary, there was no attempt to establish consensus on overall priority-setting, nor to develop definitive conclusions from the meeting.

4.1 ***Dynamic Planet***

- **Awareness of the default future: 'beyond dangerous' global change**. The implications of worst case scenarios (= current pathways, resulting in global temperature increases of 4-6°C) are poorly appreciated, yet such effects jeopardise humanity's future. We need to have a much clearer appreciation of the legacy of the default future in terms of risks for individuals and communities. In particular, the impacts of increased frequency of extreme events and the high potential for instabilities if planetary boundaries are crossed; e.g. irreversible sea level rise, continuing for centuries. Can these boundaries be better defined? Without knowledge of what the worst case could be, behavioural changes – and political action – at the scale required are unlikely to occur.

- **Processes affecting food production (for 9 billion).** It will be extremely challenging to increase global food production in a sustainable way, to match population growth (and in the face of climate change) over the next 50 years. For example, the availability of groundwater is likely to decrease in many regions; the supply of phosphate fertilizer is a finite resource (and geopolitically vulnerable); significant greenhouse gas emissions arise from nitrogen fertilizer production and application; and most of the world's fisheries are already over-exploited. Better understanding is needed of nutrient dynamics and other key natural processes, in soil, fresh-water and the ocean, that directly or indirectly affect food production.

4.2 ***Global Development***

- **Economic theory, valuation and behavioural change.** The fundamental problem (and solution) for sustainable development involves valuation and human behaviour. These aspects are not well addressed by standard economic theory, inherently growth-directed – whilst assuming the continuing availability of natural capital and ecosystem services, and 'discounting' the future. Better identification of the many institutional barriers to environmentally-sound development is the first step to their removal, or finding alternatives routes to avoid them.

- **The relationship between sustainability, well-being and growth.** This encompasses fundamental questions such as "how do you increase well-being?"; "how can sustainable growth be achieved?" (or are we kidding ourselves that it can be?), and "what do we actually mean by sustainability?", e.g. does a farmer's field have to be sustainable forever and under all circumstances?

- **Better metrics.** New approaches are needed to better capture, collate and synthesise information on human wellbeing (health, personal and community relations, housing quality and work satisfaction). Such measures should ideally be co-developed with very many interested parties and groups, including social units in various settings and cultures. Science involves engagement, not just observation – and credible science requires credible metrics. Thus we need to test out how our measures can be best understood by various stakeholders and governments, so that they in turn believe them and can use them. At the personal level, good metrics involve self-awareness and self-criticism, so that there is honesty and integrity in understanding and reporting.

- **Adaptation.** What can we learn from successful societal adaptations as to how much further we may need to and can adapt? This requires better impact modelling, and is relevant to both high uncertainty (stochastic unpredictability) and “extreme” adaptations, e.g. to global temperature increases of >4°C. The UNESCO Man and the Biosphere (MAB) programme offers examples of successful adaptation, hence the features of societies which appear to enable successful adaptation/resilience. We need to explore scenarios of adaptation by various ingenious means including art, drama, story-telling and creative videos. Good adaptation has explicitly to take into account justice and vulnerability, not creating more injustice or greater unfairness.

- **Resource security: food, energy, water**. The need is to find options that provide continuing security of supply and distribution of each of these resources without decreasing sustainability in other dimensions (such as air pollution). With regard to food security, both large- and small-scale agriculture will play critical roles in achieving sustainable transformations, with the need for much-reduced wastage and diets that involved decreased meat consumption, contrary to current trends.

- **Sustainability of megacities**. Whilst cities at all scales are key to the challenge of global change, very large urban developments provide a particularly important case study for sustainability: what are their limits and vulnerabilities, and what ecological footprint is required to maintain them? Such issues relate to the management and prediction of hazards (natural and human-made), as well as suitable resilience and adaptation measures – with cities providing sites for innovative policy responses.

4.3 ***Transformation towards Sustainability***

- **Decision-making in the face of uncertainty and risk.** Uncertainty about future Earth system scenarios and pathways will inevitably remain high with regard to unprecedented events; e.g. irreversible ‘tipping points’ in the climate system. Whilst physically-based research will help reduce the uncertainties, there is also the fundamental need to improve the ability of actors to make policy decisions in the face of those uncertainties, i.e. through risk assessment. Such decisions relate to both business (investment) as well as government (policy). Why are individuals and society increasingly risk-averse in other areas of life, but not in terms of environmental security?

- **Credible science for policy development**. The science we do must be both credible (reliable and trustworthy), and effective in terms of communication, intelligible metrics and citizen engagement: it needs to be both listened to and responded to. To help achieve that, evaluations are needed of the circumstances which influence how science is heard and understood. We need better understanding of how science achieves impact (power), not just through information *per se* but through effective persuasiveness, charisma, excitement and ‘celebrity’. Ideally, science should anticipate the ways in which governance evolves, so that the science leads where there is scope for its success; i.e. helping to shape the ways in which governments, cultures and business can shift to respond. This in turn means being empathetic to existing and potentially new moral frameworks.

- **New forms of teaching and learning.** Education is beginning to develop many new forms of learning. These are encouraged by novel internet technology, including phone apps and smart information. This in turn will require fresh approaches to online learning, to the role of apprenticeships in business, government and civil society (including think tanks) as well as researchers being engaged as ambassadors for sustainability change. This is part of the embedding process (linking to 'credible science' above), addressing existing and new moral frameworks for cultural and behavioural change.

- **Dynamics of sustainable transitions**. There is need to improve our understanding of the processes whereby transformative innovation and socio-technical change can be achieved. This would involve analysis of the interaction of multiple levels of social, political and business activities – connecting science to decision-making – from the global to regional (European) and local. Research on solution-oriented practices would focus effort on the dynamics and prospects for 'making transitions happen'.

4.4 *Operational considerations*

- **Co-design and co-production**. These aspects of Future Earth need urgent attention, nationally and internationally, particularly with regard to the interface of policy with science practice at the national scale, and the wider need to democratise knowledge-generation and application. How can researchers and stakeholders best work together on Future Earth, to make the whole greater than the sum of its parts? How do we match typical policy timescales (<5 years) with the 10-20 years often needed to realise significant scientific advances? How do we deliver science in the right place at the right time? What factors make national policies effective?

- **Interdisciplinarity.** The overall requirement for interdisciplinarity – getting social and natural scientists to work together – will not be easy to achieve. Strong leadership is needed by Research Councils and other funders to avoid funding silos; also greater recognition by REF of the importance of interdisciplinarity. Much more is needed than putting social and natural scientists on the same committee: the world is littered with examples where this interdisciplinarity has been required but not achieved. There must be real research into how this can be done; i.e. identifying best practice, and how it can be spread, and how worst practice can be avoided. Such aspects, involving co-design with a wide range of actors, will provide a critical test for the success of the Future Earth initiative.

5. Closing remarks

Peter Liss thanked the meeting organisers, speakers and participants for a stimulating and productive event. He made three comments from a personal perspective. Firstly, that the name Future Earth was deliberately short and simple, not intended to be shortened as an acronym. Second, that it was crucially important that existing global change projects were fully engaged in the transition process, evolving to meet the wider needs of Future Earth. Finally, and of particular importance, Future Earth provides the greatest opportunity to date of making the aspirations of scientific interdisciplinarity for global change research a tangible reality – and it was now up to the community to address that challenge.

The Royal Society and British Academy have convened a Working Group to discuss options of how a new UK Future Earth structure could best be formed and funded, and its future function.

Report prepared by Phillip Williamson with input from speakers, Chairs, breakout rapporteurs and meeting organisers.

Appendix: Acronyms and abbreviations

AGU	American Geophysical Union
AAAS	American Association for the Advancement of Science
DFID	Department for International Development
EGU	European Geophysical Union
ERA-Nets	European Research Area Networks
ESPA	Ecosystem Services for Poverty Alleviation
ESRC	Economic and Social Research Council
ESSP	Earth System Science Partnership
EU	European Union
GCOS	Global Climate Observing System
GOOS	Global Ocean Observing System
GSF	Global Science Forum (of OECD)
GTOS	Global Terrestrial Observing System
HANPP	Human Appropriation of Net Primary Production
G8-HORCs	Heads of Research Councils of G8 States (Canada, France, Germany, Italy, Japan, Russia, UK & USA)
ICSU	International Council for Science
IGBP	International Geosphere-Biosphere Programme
IHDP	International Human Dimensions Programme on Global Environmental Change
ISSC	International Social Science Council
JPI	Joint Programming Initiative (of EU)
MAP	Man and Biosphere
NERC	Natural Environment Research Council
OECD	Organisation for Economic Cooperation and Development
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNU	United Nations University
WCRP	World Climate Research Programme