

INTERNATIONAL SCIENTIFIC COLLABORATION: INTERNATIONAL YEARS OF SCIENCE AND THE LAUNCH OF THE INTERNATIONAL POLAR YEAR 2007-2008

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1 Introduction

Generic aspects of international scientific collaboration have been a recurring theme of Global Science Forum studies. In recent years, workshops on “*Best Practice in International Scientific Co-operation*”, February 2003⁽¹⁾ and “*Management Practices for Establishing Large International Scientific Research Projects*”, October 2004⁽²⁾ have led to the compilation of a “*Checklist of Best Practice Principles*”, February 2003⁽¹⁾ and the preparation of a “*Template for Establishing, Funding and Managing an International Research Project . . .*”, June 2005⁽³⁾. Other studies have concentrated on specific international collaborations, for example a report on the establishment of the GBIF (a Global Science Forum initiative) “*Lessons Learned from the Global Biodiversity Information Facility*”, October 2001⁽⁴⁾.

International science-oriented Years – “The International Year of X” – are a particular form of research collaboration which fall within the ambit of these studies, and it is interesting to examine how closely the generic guidelines can be applied to the initiation, establishment and operation of Years of Science and, on the other hand, what we can learn from specific International Years for the conduct of future collaborations. To this end the Global Science Forum has agreed to engage with the International Polar Year (IPY) 2007-2008⁽⁵⁾ in order to expose general issues of interest to large international research initiatives, and to discover if lessons can be learnt for the planning of future programmes. IPY 2007-2008, launched in March 2007, is one of the largest, most ambitious scientific exercises ever undertaken, with over 60 countries involving some 50000 participants working on over 200 projects, and thus provides a relevant and topical case study.

The present survey examines the planning and initiation of the IPY as a role model for International Years in general. It is envisaged that further work will deal with the execution and outcomes of the ‘Year’. It must be stated at the outset that it is not about polar science *per se*, and is not intended to be an evaluation of the IPY; this will doubtless follow in appropriate forums in due course.

2 International Years of Science

‘International Years’ are nowadays a commonplace. For example 2007 alone has been designated “Year of the Dolphin” (by UNEP^(*) and the United Nations), “International Heliophysical Year” (IUGG/AGU), “International Polar Year” (ICSU/WMO), “International Year of Rumi” (UNESCO) and “Electronic Geophysical Year” (IUGG/IAGA), while 2008 is to be “International Year of Planet Earth” (IUGS/United Nations), “International Year of Languages” (United Nations), “Year of Cultures and Civilisations for Human Development” (IGU), “International Year of the Reef” (ICRI), “International Year of Sanitation” (United Nations) and “International Year of the Potato” (FAO/United Nations). Doubtless there are many more.

What characterises these ‘Years’, what legitimises them and what is the role of the nominating body, or ‘sponsor’? At first sight there would seem not to be a common thread, but is there a basic set of criteria against which a topic can be assessed? First, it is instructive to note that there is no single authorising body. The United Nations, usually acting through UNESCO, often takes the lead, but in science-oriented Years in particular, this is not always the case. For example the International Council for Science, ICSU, is often the sponsor, usually in conjunction with one or more of its constituent Unions. (ICSU is a non-governmental organisation representing a global membership that includes both national scientific bodies (111 members) and international scientific unions (29 members)). Table 1 is a selection of Years from the present decade which might be deemed to have a scientific dimension; the listing is not comprehensive, and there are numerous other Years, particularly in the political and sociological arenas.

(*) A glossary of acronyms is given at the end of the report.

TABLE 1			
International Science Years			
Year	Title	Lead Organisation	UN status*
2001	International Biodiversity Observation Year	DIVERSITAS	No
2002	International Year of Mountains	FAO	Yes
2003	International Year of Freshwater	UNESCO	Yes
2004	International Year of Rice	FAO	Yes
2005	World Year of Physics	IUPAP**	Yes
2006	International year of Deserts and Desertification	UNCCD	Yes
2007	International Polar Year	ICSU/WMO	No
2007	Year of the Dolphin	UNEP	No
2007	Electronic Geophysical Year	IUGG**/IAGA	No
2007	International Heliophysical Year	IUGG**/AGU	No
2008	International Year of Planet Earth	IUGS**	Yes
2009	Year of Astronomy	IAU**	Proposed
* Proclamation by the UN General Assembly ** Member Union of ICSU			

Table 1 immediately shows the diversity of sponsoring organisations; each will have its own objectives, which in turn determines the nature of the Year with regard to its execution and end result. For example the International Year of Rice had a strong sociological dimension because of the role of rice as a staple crop in vast areas of the world, often in less developed regions. The Year of Physics was closely linked to the great discoveries at the beginning of the last century, and served to bring the importance of the discipline to a wide audience. And the International Polar Year is firmly based on a programme of new collaborative research with the aim of launching a new era in polar science. In all cases there is much overlap in the aims and objectives, but there are also distinct differences of emphasis.

As indicated in Table 1, ICSU's member International Unions have been involved in a number of International Year initiatives, some of which have been endorsed by the UN. In some cases ICSU itself has taken the primary role in setting up a Year, particularly in multidisciplinary areas. At present ICSU has no established policy on either the criteria or the mechanism for becoming involved in an initiative. *De facto*, the ICSU position has been to be supportive of all proposed Years, but not to formally co-sponsor any unless they had been developed by ICSU itself. IPY 2007-2008, which is not a UN Year, is a case in point. On occasions this has led to some friction between ICSU and its member Unions who have thought that they were being inadequately supported; ICSU is currently seeking to clarify the position with the preparation of a set of definitions of its different levels of support.

On the other hand, the United Nations has formally adopted guidelines, and the course of action to be followed, for the proclamation of (UN) International Years, given in Table 2.⁽⁶⁾ It might be considered that these are in reality procedural guidelines consistent with the particular role of the United Nations, and that they will not necessarily apply to areas outside the UN's domain. In particular, collaborative scientific research programmes will have different aims from, say, overtly political initiatives. It will also be noted - compare Table 1 for example - that these principles are in many ways more honoured in the breach than in the observance.

TABLE 2**United Nations****Procedure for the proclamation of the international years ⁽⁶⁾****Criteria**

- A subject proposed for an international year should be consistent with the purposes and principles of the United Nations as stated in its Charter.
- It should be of priority concern to all or the majority of countries and should contribute to the development of international development of international cooperation in solving global problems, in particular those affecting developing countries.
- It should involve action at the international and national levels and should be expected to generate sufficient follow-up at both levels in the form of new activities or the strengthening of existing ones.
- There should be an interval of at least two years between two international years and a longer period between years concerning similar subjects.
- The proclamation of an international year should be considered only when celebrations of shorter duration (a month, week, day) would not suffice.
- An international year should not be proclaimed when a world conference has been convened separately on the same subject or when a subject is already of wide international concern and effective programmes exist to further its ends.

Procedures

- As a general rule, a final decision on a proposal is taken by the General Assembly not earlier than one full year after the introduction of the proposal in order to take into account the views expressed by all Member States and allow a thorough assessment of the proposal by the competent organs.
- In general, there should be a period of two years between the proclamation and the beginning of an international year.
- An international year should not be proclaimed before basic arrangements necessary for its financing (which in principle should be based on voluntary contributions) and its organisation have been made.
- There should be effective coordination of the activities of all United Nations organisations and bodies concerned to avoid duplication.
- Each international year should have objectives that are likely to lead to identifiable and practicable results.
- Procedures for evaluation should be established in the preparatory phase and form part of the implementation and follow-up of each year.

So there continues to be a debate on the proclamation of 'Years'. What is their function, and their value to society and the world order. There is no doubt that some Years have been viewed as self-serving publicity vehicles and inappropriate in the global context. Notwithstanding, in the scientific field, it is possible to formulate criteria that would find widespread acceptance, and for the basis of subsequent discussion these are summarised in Table 3.

TABLE 3**Suggested criteria for establishing International Years of Science**

- There is a necessity to engage in international co-operation to fulfil the aims of the programme.
- There should be recognised benefits to be gained through setting a fixed duration for the activity.
- There should be added-value on top of on-going existing programmes.
- There should be a degree of topicality and/or urgency in the proposed programme.
- There should be the expectation of significant follow-up in the form of new activities and the strengthening of existing ones.
- There should be benefits to be gained through public awareness and education.

3 Planning for an International Year of Science**3.1 Introduction**

International Years can be difficult and time-consuming to establish and to follow through, they can be expensive, possibly diverting funds from other worthwhile areas, and they can lead to resentment amongst communities that are not included. Overcoming these potential drawbacks requires that a number of issues be addressed from the outset, with the criteria and the objectives widely accepted by the relevant communities – which will include both the participants and those who will not be taking part. The essential features of an International Year, as with any large-scale collaboration, can be summarised as follows:

- there should be widely-understood programme objectives, with clearly defined boundaries;
- there should be widespread acceptance by the relevant communities, and other stakeholders, of the need and benefits of the programme;
- in most cases, it is beneficial if the programme is initiated and established by a group of motivated scientists who in due course interact with potential sponsors, governments, funding agencies, etc, and with the public at large;
- financial issues, in particular funding arrangements, need to be defined at an early stage.

3.2 Achieving International Year status

At any time there will be a plethora of suggestions for holding International Years, from informal discussions amongst keen scientists at a conference dinner, to formal resolutions of the UN General Assembly. Many, if not most, proposals will be dropped as time passes, perhaps because of dwindling enthusiasm, or failure to meet the basic criteria required. Of the survivors, assuming the criteria and objectives are accepted, a key factor is sound leadership, in particular the emergence of a champion or

champions – motivated individuals who act to ensure that the proposal is steered through the scientific, administrative and political processes.^(*) The identification of a sponsor is usually deemed necessary, perhaps to provide funding, but if for nothing else to provide an aura of authority and legitimacy to the claim to be an ‘International Year’.

3.3 *Legitimacy*

What is meant by ‘legitimacy’? Although proclamation by, for example, the UN General Assembly gives an air of authority, it confers no legal status. Ultimately, legitimacy is best judged by the widespread consensus of the participating scientists and other stakeholders. This is often achieved by ensuring that all relevant agencies, including for example International Unions, have signed up to the concept.

3.4 *Mechanisms and structures*

An enthusiastic group of scientists can only take the process so far. The time required to complete the planning stage will usually take many years, involving widespread consultation, negotiation, and formulation of the research programme. Thus the advantage of appointing a sponsor to help provide the essential infrastructure of the planning process. There is benefit to be gained in establishing an executive office at an early stage to keep the show on the road, and resource for this, whether in cash or kind, must be ensured.

4 *The International Polar Year 2007-2008*

4.1 *Introduction*

The International Polar Year is a large-scale, internationally coordinated scientific programme focussed on both the Arctic and the Antarctic, but with a global dimension. It was formally launched on 1 March 2007 after some years of preparation, and will run until March 2009, two years being necessary to encompass a complete summer-winter-summer season in each hemisphere. In fact it is the fourth IPY, the others being held in 1882-83, 1932-33, and 1957-58 (the latter also being known as the International Geophysical Year). IPY 2007-2008 is intended to initiate a new era in polar science with a stronger emphasis on interdisciplinary research including physical and social sciences, indigenous communities, and educators. The emphasis on the ‘human’ dimension is a significant expansion from the earlier Years, strongly promoted by a number of countries. IPY projects will exploit new technological capabilities and strengthen international coordination of research.

4.2 *Planning chronology*

During 2002, various individuals, institutes and organisations raised the possibility of an IPY and suggested possible objectives and approaches. A number of websites contributed to this surge of interest, though with little coherence or coordination. It quickly became apparent that there was a need for worldwide cooperation and leadership and, to this end, an unsolicited proposal was put to ICSU, the International Council for Science, by prominent individual scientists. ICSU decided to form an IPY Planning Group, with the provision of support funding. The Planning Group was established in February 2003, and in the period from July 2003 to September 2004 met on four occasions, while consulting widely with polar communities, directly and through relevant agencies. Meanwhile, in May 2003, the World Meteorological Congress, the governing body of WMO, the World Meteorological Organisation, had approved the resolution on holding of an International Polar Year in 2007-2008 as a means to determine present and evaluate future climate change and the state of the environment in Polar Regions. This activity was independent of the initial ICSU planning, though communication was swiftly established. In September 2003, WMO proposed that the WMO and ICSU activities be merged and the WMO representative was invited to join the ICSU Planning Group. In November 2004 the ICSU published a Framework document⁽⁷⁾ for the International Year produced by the IPY 2007-2008 Planning Group.

(*) The specification was defined in an earlier report ⁽¹⁾ as follows: “Usually these will be scientists with a background in the discipline, but it is more important that they are resilient individuals who have the time, drive, tenacity, credibility, contacts, breadth of vision, and the ability to interact with the various stakeholders, to see the project through.”

In November 2004 an ICSU-WMO Joint Committee was formed to oversee the IPY programme. There were many advantages to this co-sponsorship. Historically, the two bodies together had sponsored the International Geophysical Year 1957-58, and they had existing links in other organisations. The WMO is an international governmental organisation with corresponding links to governments across the world; its interests and expertise are in the behaviour of the earth's atmosphere and its effect on weather and climate, providing an added dimension to the envisaged research programme. In November 2004 an IPY International Programme Office (IPO) was formed, and the first call for Expressions of Intent for IPY was issued by ICSU and WMO. It was the momentum generated by these activities and, most crucially, the involvement of dozens of individual boards and national polar agencies, that ensured the acceptance of the programme as a whole, which was formally adopted by the ICSU General Assembly in October 2005.

4.3 Objectives

IPY projects will collect a broad-ranging set of samples, data and information that is intended to be made available to an unprecedented degree. The aim is to leave a legacy of enhanced observational systems, facilities and infrastructure, usually within the framework of existing international research programmes. This will include integrated ocean observing systems in both the Arctic and Southern Oceans, coordinated acquisition of satellite data from multiple space agencies, and observational systems for astronomy, sun-earth physics, atmospheric chemistry, meteorology, permafrost, glaciers and geophysics. A positive aim is to attract, engage and develop a new generation of researchers and raise the awareness, interest and understanding of polar residents, educators, students, the general public, and decision makers worldwide.

The rationale for IPY 2007-2008 (see Table 4) was set down in the earliest days of planning, and is seen to be consistent with the requirements for an International Year as discussed above.

Projects will be carried out under six major themes, summarised in Table 5.

TABLE 4
IPY 2007-2008: rationale

Why International?

- Polar processes extend across national boundaries
- The science challenge exceeds the capabilities of any one nation
- A coordinated approach maximises outcomes and cost effectiveness
- International collaboration shares benefits and builds relationships

Why Polar?

- Polar regions are active, highly connected components of the planet
- Significant changes are occurring in the polar regions
- Polar regions hold unique information on the past behaviour of the Earth system
- Polar regions have growing economic and geopolitical importance, especially the Arctic
- The harsh conditions and remoteness of the polar regions have hampered scientific enquiry compared to mid- and low-latitudes
- There is a need to re-establish and enhance operational observing systems in the polar regions
- The polar regions offer a unique vantage point for a variety of terrestrial and cosmic phenomena

Why a “Year”?

- An intensive, coordinated burst of effort will accelerate advances in knowledge and understanding
- A defined period polar “snapshot” will provide a crucial benchmark for detecting and understanding change in comparison with past and future data sets
- It provides an opportunity for observations in both polar regions throughout all seasons
- The legacy of enhanced observing systems generated by IPY will provide an improved foundation for ongoing monitoring

Why 2007-2008?

- The anniversaries of past IPY and the IGY set a firm deadline
- There is a pressing need to capture contemporary information on change
- The timescale allows advances in technology and logistics to be exploited to address new issues and access new areas

(IPY November 2004)

TABLE 5
Scientific themes for IPY 2007-2008

Status: to determine the present environmental status of the polar regions;

Change: to quantify and understand past and present environmental and social change in the polar regions and to improve projections of future change;

Global linkages: to advance understanding on all scales of the links and interactions between polar regions and the rest of the globe, and of the processes controlling these;

New frontiers: to investigate the frontiers of science in the polar regions;

Vantage point: to use the unique vantage point of the polar regions to develop and enhance observatories from the interior of the Earth to the sun and the cosmos beyond;

The human dimension: to investigate the cultural, historical, and social processes that shape the sustainability of circumpolar human societies and to identify their unique contributions to global cultural diversity and citizenship.

5 The scientific dimension

5.1 Involvement of the scientific community and other stakeholders

As indicated above, there has been intense ‘bottom-up’ consultation since the earliest days of the IPY initiative. The ICSU Planning Group consulted with over 40 governmental and non-governmental organisations and with the international polar research community. National IPY committees were rapidly established in over 30 countries. The functional responsibilities of the National Committees vary between countries – in some, National Committees may be involved in funding processes; in all countries, the Committees are expected work under the following general terms of reference ⁽⁷⁾:

- to act as an information conduit from the Joint Committee to the national scientific community and national meteorological services to promote awareness of and interest in IPY 2007-2008;
- to provide national input to the Joint Committee for the formulation of the IPY programme of activities;
- to facilitate the planning and implementation of national activities contributing to IPY 2007-2008 including, where appropriate, the endorsement of IPY Expressions of Intent and/or proposals;
- to ensure that nationally-collected IPY data are available to the international research community in accordance with protocols developed for data exchange;
- to take a lead on issues of outreach, education and communication at the national level;
- to encourage and facilitate national contributions to the cost of the international scientific coordination and integration of the IPY;
- to assist the Joint Committee in the planning, implementation, data management and delivery of IPY 2007-2008;
- to host regional and national IPY 2007-2008 meetings.

A document outlining the scope of science for the International Polar Year 2007-2008 was published by the ICSU-WMO Joint Committee in February 2007⁽⁸⁾. The report lists 62 international and national organisations endorsing or supporting IPY 2007-2008; 63 nations are involved. This massive support provides the clearest manifestation of the 'legitimacy' of IPY as an International Year.

5.2 Project selection

Because of the extensive consultation process, there was an overwhelming response to the call for Expressions of Intent that followed publication of the IPY Framework report. The first call in November 2004 resulted in over 1000 responses. The first call for full proposals was made in June 2005, and the third and final call in January 2006. Criteria for identifying IPY 2007-2008 activities were set down in the Framework document, taken from the IPY objectives and characteristics. Projects were expected to:

- make significant advances within one or more IPY 2007-2008 themes;
- involve at least one polar region and take place within the 2007-2008 timeframe;
- contribute to international collaboration;
- present a viable approach for securing funding;
- propose a viable plan for securing appropriate logistical support;
- sign up to the principles and aims of IPY 2007-2008 data management and propose a viable data management plan;
- propose a viable plan or approach for education, outreach and communication activities;
- show how it would foster the next generation of polar researchers;
- include nations not traditionally involved in polar research;
- provide the opportunity for a legacy of infrastructures (observation sites, facilities, systems);
- build on existing plans, programmes or initiatives or at least not conflict with them;
- have interdisciplinary elements;
- be endorsed by one or more IPY 2007-2008 National Committees.

It was recognised that in some cases not all criteria could be met, especially at the preliminary stage. The Joint Committee took responsibility for evaluating the proposals, and examining how closely they satisfied the listed criteria, with active communication between the Joint Committee and project proponents. As proposals were steadily refined, or in some cases withdrawn, a valuable 'match-making' role was carried out by the International Programme Office, by bringing together separately submitted proposals with the aim of making the whole greater than the parts. Two examples will suffice to illustrate this important activity:

- Proposals concerned with the biodiversity of Arctic chars – a valuable northern fish resource – were originally received from five individual research teams. These were brought together in a unified project, featuring no less than three international organisations and 13 countries. The new network is better matched to the criteria for identifying IPY projects.

- In the Antarctic, a consortium to study Antarctic climate and atmospheric circulation was formed by merging two major meteorological projects, representing 10 proposals submitted in the original call for Expressions of Intent. Seven countries are involved, interestingly including Malaysia, a new player in polar research.

The list of endorsed IPY projects has been published widely, and gives full details of the background to each individual project. Although the list is ‘managed’ by the International Programme Office, the Office has striven to keep a light touch, and no proposals have been rejected by central diktat. Contrariwise, the IPO has sought to enhance programmes, for example in the match-making role as indicated above.

6 Structure and mechanisms

6.1 Organisational structure

From the beginning, an aim of IPY 2007-2008 has been to provide a sound organisational structure with minimal bureaucracy that would promote efficient communication and attract excellent people. This meant a simple framework that would make effective use of existing polar organisations, avoiding duplication of the roles of those organisations, yet providing the required additional coordination and oversight. It would provide a means to influence major stakeholders while seeking to adapt and link to existing plans in innovative ways. A crucial early step was the formation, and funding, of the IPY 2007-2008 Joint Committee by the co-sponsors ICSU and WMO in November 2004. The Joint Committee will exist until the end of 2009. It consists of two Co-chairs and up to 12 members appointed by ICSU and WMO. In addition five international polar organisations are represented on an *ex officio* basis, International Council for Science, the World Meteorological Organisation, the Intergovernmental Oceanographic Commission of UNESCO, the Scientific Committee on Antarctic Research and the International Arctic Science Committee. The Arctic Council and Antarctic Treaty Consultative Meeting representatives attend Joint Committee meetings as observers. The Joint Committee is responsible for overall scientific planning, coordination, guidance and oversight of the whole programme. Three subcommittees have been created to provide specialist advice to the Joint Committee. These deal with observations, data policy and management, and outreach and communication. An open consultative forum has been held at least once a year to provide a mechanism for National Committees and various national and international organisations to communicate with the Joint Committee.

6.2 Establishment of an executive office

It was recognised from the outset that an activity as large and complex as 2007-2008 would require daily, full-time staff support. Following an international competition in 2004, ICSU and WMO agreed that the International Programme Office (IPO) would be established in Cambridge, UK, from November 2004, with funding secured until 2010. A full-time Director was appointed to take office in May 2005. The functions of the International Programme Office are set down in Table 6.

6.3 Data and information management

Building an integrated data set from the broad range of IPY research activities represents one of the most daunting challenges for IPY 2007-2008. An enduring data set, accessible to scientists and the public during IPY and for many decades into the future, will represent one of the main legacies of IPY 2007-2008.

Data policy was firmly stated, and discussed in detail, in the IPY Framework document (November 2004): “The data management plan strives to ensure that data usability is a primary objective for all IPY 2007-2008 scientific projects. The basic principle is that IPY-generated data should be collected, used and preserved. These data should be freely available, although restricted access can exist initially. . . . The overarching objective of IPY 2007-2008 data management is to ensure the security, accessibility and free exchange of relevant data that both support current research and leave a lasting legacy.”

It appears that, to date, robust structures and mechanisms have not been firmly established to ensure that these aspirations can be met. The challenge is clearly recognised, and negotiations to involve, for example, European and US data centres are currently in hand.

TABLE 6
Functions of the IPY International Programme Office

Overall:

- to provide active support to the ICSU-WMO Joint committee for the central planning, coordination, oversight and guidance.

Specifically:

- to support the meetings and activities of the Joint Committee;
- to act as the central point of contact for IPY National Committees, related international programmes, and other relevant organisations and individuals;
- to organise and coordinate IPY meetings and workshops;
- to promote the IPY internationally by appropriate means;
- to coordinate the dissemination and uptake of research outputs across IPY;
- to facilitate the acquisition of funding;
- to support the development of outreach and education programmes through development of IPY branding and through coordinating the creation of promotional material;
- to support and maintain the IPY website.

6.4 Legal considerations

It has been claimed ⁽⁴⁾ that “a key requirement in any complex scientific collaboration is a body with a legal identity, able to undertake or manage the work programme.” This general observation is no doubt true for an organisation requiring legal backing to employ staff, to purchase goods and services, and to own property. The backing to ensure that participants live up to their commitments can sometimes be necessary, as is the ability to sue and be sued.

IPY 2007-2008, including the IPO, does not have a legal identity.

This decision was arrived at by consideration of the IPY’s structure, whereby the individual work programmes are carried out in a standalone manner with a hands-off approach from the central organisation. The IPY itself makes no significant purchases or enters into other financial contracts. The main exception is the International Programme Office and, after international competition, this was embedded in an existing national organisation (the Natural Environment Research Council (NERC), British Antarctic Survey, Cambridge, UK). In practice, the Director’s letter of appointment is issued by ICSU and WMO, and he and other staff are seconded to work within the NERC.

It appears that, to date, no problems have arisen because of these arrangements.

Since IPY 2007-2008 is not a funding body, it has little, if any, control of Intellectual Property arising from IPY programmes. Control and ownership of Intellectual Property Rights will ultimately depend on the policies of the body which funded the data collection or creation. It is possible that these might conflict with the basic policy of free access to IPY data, and this has been recognised by allowing the right to restrict release of data by special negotiation. Exceptions to the general policy will only apply to protect confidentiality of information about human subjects, to respect needs and rights of holders of local and traditional knowledge and to ensure that data release does not lead to harm of endangered or protected resources.

7 Funding issues

7.1 General

IPY 2007-2008 is a distributed programme, with work programmes being carried out, and funded, by individual bodies, or consortia, worldwide; IPY 2007-2008 does not of itself fund or control research funds. By the very nature of the IPY evolution, funding has largely been a ‘chicken and egg’ operation. Initially, in November, before the IPY had been formally established, there was a call for Expressions of Intent. These were expected to demonstrate that projects could meet criteria requiring a viable management plan with a timeline when funding and logistical commitments might be secured. Because of the requirement to raise new sources of funding, the responses were varied. For example there are varying timeframes for governments or other agencies to approve funds; there are different national priorities that could influence where funds are to be directed (for example to support climate research, or to research the well-being of polar communities, or to study geophysical processes); there are differences in how countries reallocate funds between existing national programmes and new IPY initiatives; and there are particular issues concerned with the logistics of providing the high-cost equipment which is often required for polar research such as ships and satellites. Overarching these considerations is the perennial concern that there is no accepted mechanism for making decisions on the funding of large international projects, a recurring theme in past Global Science Forum studies.

Today, in 2007, it is believed that about one third of projects are substantially funded and one third partially funded; details concerning the remaining third are at present unknown.

Because of the distributed nature of the funding, operating to different timeframes, there are varying estimates of the total funds accruing to IPY projects. A recent evaluation puts additional funds at about \$404M over the two years of the IPY for new science; this does not include money for logistics and infrastructure. There is a residual uncertainty in the figure because a few countries have announced only 2007 funding, but not that for 2008. This new money is in addition to some \$800M of perennial polar funding which will be directly specifically to IPY activities over the two years, again for new science, not infrastructure.

7.2 International Programme Office

Funding for the International Programme Office has been provided by the UK at €225k per year, with an additional €70k being raised from other national and private sources, including IPY Trust Fund established by ICSU and WMO through Memorandum of Understanding. The overall resources available to the IPO seem modest for an international enterprise of the scale of the IPY.

7.3 Seeding and catalysis

ICSU provided €60k to initialise the IPY, and with the WMO has allocated €35k per year through to 2009 to support the Joint Committee.

7.4 *Legacy funding*

Formally, IPY 2007-2008 comes to a close on 1 March 2009. Obviously, however, scientific activity will not terminate on that date, and there will be many following years of data analysis and other activities. A crucial outcome of the IPY is the development of new activities: multidisciplinary observational systems will enhance existing networks and leave a substantial legacy of facilities, technologies and ways of coordination and data access. A crucial task of scientists and funding agencies during IPY 2007-2008 is to ensure that adequate funding is secured to ensure the viability of these new opportunities.

8 **Termination and legacy issues**

The planning process for IPY 2007-2008 has given considerable attention to sunset issues, while recognising that the development of new activities, and the strengthening of existing programmes, will continue well into the future, in some cases for many decades. These activities will have to be nurtured. A particularly important issue is continuing access to data and information accrued during IPY, as discussed above.

In addition to ongoing activities, there are activities associated with the International Year itself, and these will come to a natural conclusion. For example there will, no doubt, be celebratory closing events which will match the launch ceremonies in 2007. It is intended that open conferences be held at strategic points, in 2008 (“How is it going?”), 2010 (“What did we get?”) and 2012 (“What did we learn?”); planning for the first two of these is already in hand.

9 **Comparison with analogous International Years**

9.1 *The International Geophysical Year*

The third International Polar Year, known as the International Geophysical Year (IGY) was held in 1957-58. It was sponsored jointly by ICSU and WMO, and brought together more than 60000 scientists and engineers from 67 nations. Occurring at a time of massive technological growth, not least in the introduction of satellite technology, IGY provided a profound and lasting legacy in our understanding of earthly processes, not only in the polar regions. A major geopolitical advance was the establishment of the Antarctic Treaty System. As an intense global collaboration the IGY has provided a benchmark against which future International Years can be judged. IPY 2007-2008, the International Heliophysical Year, the Electronic Geophysical Year and the International Year of Planet Earth, can be seen as successors to the IGY.

9.2 *The International Heliophysical Year (IHY)*

The objectives of the International Heliophysical Year ⁽⁹⁾ are to discover the physical mechanisms that drive the coupling of Earth’s atmosphere to solar and heliospheric phenomena. The stated objectives of the IHY are to advance understanding of the heliophysical processes that govern the Sun, Earth and heliosphere; to continue the tradition in international research engendered by the IGY, and to further advance the legacy; and to demonstrate the beauty, relevance and significance of space and Earth science to the world.

Plans for the IHY were initiated around 2001, quickly followed by the establishment of a Secretariat and the formulation of the main elements of the IHY programme. National and regional coordination meetings were instigated to engage the whole community, including professional space organisations. The IHY was formally launched in February 2007, and will run towards the end of 2008.

IHY is intended to be a bottom-up science-led operation driven by the interests and inputs of contributing scientists. A major aim has been to encourage and enable the widest access to existing instruments and data using a structure of coordinated research programmes. This method is intended to encourage collaboration, in particular with developing countries.

IHY is not a UN-proclaimed International Year, but is endorsed by a number of agencies some of which report to the UN, and to ICSU. Although it was decided at an early stage that IHY and IPY should remain separate, because of their different programmes and aspirations, there are close links, and IHY projects are included as part of IPY 2007-2008.

9.3 The Electronic Geophysical Year (eGY)

The Electronic Geophysical Year ⁽¹⁰⁾ is a direct development of the legacy of the International Geophysical Year 1957-58. A key achievement of the IGY was to provide efficient access to data by means of a worldwide network of physical observatories and data centres. The eGY concept is based upon the enormous present potential, generalised acceptance and rapid growth of e-science using internet technologies. The main aims of the Year are to discover records of what data holdings exist and where; to encourage data owners to make them available to the international community and to provide descriptive information; and to enable users to obtain and share data, often from distributed sources. The eGY is sponsored by the International Union of Geodesy and Geophysics (IUGG), a member Union of ICSU, and is closely affiliated with the International Association of Geomagnetism and Aeronomy (IAGA). The Year was formally launched in July 2007.

9.4 The International Year of Planet Earth (IYPE)

“The International Year of Planet Earth ⁽¹¹⁾ aims to ensure greater and more effective use by society of the knowledge accumulated by the world’s 400000 Earth scientists. The Year’s ultimate goal of helping to build safer, healthier and wealthier societies around the globe is expressed in the Year’s subtitle ‘Earth science for Society.’

“The International Year runs from January 2007 to December 2009, the central year of the triennium (2008) having being proclaimed by the UN General Assembly as the UN Year. The UN sees the Year as their contribution to their sustainable development targets as it promotes sustainable use of Earth materials and encourages better planning and management to reduce risks for the world’s inhabitants.”

These quotes from the IYPE prospectus indicate a clear distinction in aims and methodology compared with IPY 2007-2008. A major emphasis is on ‘outreach’ and the raising of public awareness, rather than scientific research *per se*. The Year is a joint initiative by UNESCO and the International Union of Geological Sciences (IUGS).

10 The IPY 2007-2008 launch: how is it going?

Less than six months into the two-year research programme, there are signs that the aspirations of the individuals and organisations that launched the IPY programme are being achieved. Specifically:

- A comprehensive, worldwide, coordinated set of research projects has been established, and observations and measurements are underway.
- A robust organisational structure is in place, with a well-managed executive office.
- There has been massive publicity and public awareness, amongst scientists, policy-makers and governments, and the public at large.

It is suggested that the following factors have contributed to the this apparent success story, and they might well constitute a checklist for future collaborations of this kind:

- The existence of a core group of motivated, enthusiastic and energetic scientists, prepared to take the concept forward.
- The evolution of a robust rationale for holding a ‘Year’.
- The existence of a worldwide body of stakeholders who would be willing to sign up.
- The early establishment of a coordinating group, widely respected.

- The appointment of a sponsor or sponsors able to provide initial funding, and to provide a recognised level of authority.
- Widespread and transparent consultation with the relevant communities.
- Adequate funding during the planning and launch phases.
- Formulation of a programme of research to meet the objectives of the ‘Year’.

On balance, the decision to create a light-touch structure with low level bureaucracy would seem to have found widespread favour. However there are issues which remain to be resolved, and these need to be monitored closely as the programme unfolds. Three are of particular importance:

- Although funding for IPY 2007-2008 seems secure - for example many governments and agencies have allocated substantial new money up-front, explicitly earmarked for IPY activities - there are major inhomogeneities within the overall funding envelope. These arise, for example, because of different levels and timings of support, from caveats attached to certain funds, or from the balance of in-kind contributions. There is scope for detailed analysis in this area.
- The importance of data and information management, particularly after the formal termination of the IPY, has been recognised from the earliest days of the programme. As mentioned earlier, urgent steps are being taken to resolve outstanding issues and to ensure that robust systems are put in place.
- There is a necessity to ensure that follow-up activities are carefully planned, and this will evolve during the course of the IPY. To this end there might be merit in drawing up a form of road map, to which the Global Science Forum might wish to contribute.

11 References

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- (5) <http://www.ipy.org>
- (6) Resolution 53/199 of the UN General Assembly, 15 December 1998
- (7) *A Framework for the International Polar Year 2007-2008*, ICSU, November 2004, produced by the ICSU IPY 2007-2008 Planning Group
- (8) *The Scope of Science for the International Polar Year 2007-2008*, WMO TD-No 1364, February 2007, produced by the ICSU/WMO Joint committee for IPY 2007-2008
- (9) <http://ihy2007.org>
- (10) <http://www.egy.org>
- (11) <http://www.yearofplanetearth.org>

12 Glossary of acronyms

AGU	American Geophysical Union
eGY	Electronic Geophysical Year
FAO	Food and Agriculture Organisation of the United Nations
GBIF	Global Biodiversity Information Facility
IAGA	International Association of Geomagnetism and Aeronomy
IAU	International Astronomical Union
ICRI	International Coral Reef Initiative
ICSU	International Council for Science
IGU	International Geographical Union
IGY	International Geophysical Year
IHY	International Heliophysical Year
IPO	International Programme Office (of IPY 2007-2008)
IPY	International Polar Year
IUGG	International Union of Geodesy and Geophysics
IUGS	International Union of Geological Sciences
IUPAP	International Union of Pure and Applied Physics
IYPE	International Year of Planet Earth
NERC	Natural Environment Research Council (United Kingdom)
UNCCD	UN Convention to Combat Desertification
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WMO	World Meteorological Organisation