

Harnessing science to society

Analytical report

to governments and
international partners on the follow-up to the

World Conference on Science

Science for the Twenty-First Century

A New Commitment

Budapest, Hungary, 26 June – 1 July 1999



Paris, December 2002

Preface by the Director-General of UNESCO

The World Conference on Science, convened in 1999 by UNESCO and the International Council for Science (ICSU), was a quest – a quest for a new relationship between science and society built on mutual respect and mutual assistance. In a rapidly changing world where knowledge from all fields of science is urgently needed to address pressing human needs and aspirations in a responsible manner that respects ethical values and the planet we rely upon for survival, the Conference sought to promote the idea of ‘science in society and for society’. In fact, it went beyond that by seeking a reciprocal commitment between science and society at a time of growing disaffection towards science even as the importance of science is growing.

The Government of Hungary hosted the Conference in its capital, Budapest. Many other partners from the key stakeholder groups in science made other valuable contributions: governments, the public and private sectors, international organizations and media groups.

After six days of stimulating debate, the Conference reached the consensus articulated in the political Declaration on Science and the Use of Scientific Knowledge and in the implementation tool, the Science Agenda – Framework for Action. Follow-up was to address three major topics: science for knowledge and knowledge for progress; science for peace and development; and science in society and for society.

Since UNESCO had taken the lead in preparing and convening the World Conference on Science, in cooperation with ICSU, it was only natural that UNESCO should assume a key role in follow-up. This role was to encompass both follow-up within UNESCO’s own programmes and a clearing-house function for Conference follow-up actions undertaken by numerous autonomous partners.

The World Conference on Science charted new territory for UNESCO. Drawing on its unique comparative advantage of housing education, natural and human sciences, communications and culture under one roof, UNESCO responded to Budapest by adopting a more integrated approach to problem-solving and the promotion of research and science education through multilateral cooperation.

The Organization’s Medium-Term Strategy for 2002-2007 gives full weight to implementation of the Science Agenda, with special emphasis on ‘freshwater and supporting ecosystems’ and on ‘the ethics of science and technology’ as the absolute priorities respectively of UNESCO’s science and social and human sciences programmes.

It is in its clearing-house capacity that UNESCO has prepared the present analytical report recommended by Budapest, in consultation with its partners. Harnessing science to society is based on information made available to UNESCO by Member States, United Nations specialized agencies, intergovernmental and non-governmental international organizations, regional institutions, science networks, centres of excellence and educational establishments. Naturally, the report also covers UNESCO’s own activity.

Harnessing science to society overviews developments during the two and a half years since the World Conference on Science; it provides a factual basis for assessing the real impact of the Conference. It can be concluded that the Budapest Conference was a worthwhile event; visibly, over the initial period of follow-up, it has inspired many partners to adopt innovative approaches to fostering science. There appears to exist a real need – and an opportunity – to further develop a worldwide partnership that has the potential to multiply the returns on the Conference.

Forward-looking, the report envisages the possibility that UNESCO will launch a comprehensive follow-up consultation with partners in 2004 (Budapest+5) in its capacity as clearing-house. A consultation in 2004 would have the advantage of enabling partners to evaluate collectively the returns on the Conference thus far as well as identify any necessary readjustments to the follow-up strategy.

The political commitment that governments agreed upon in Budapest in 1999 must be sustained if the Conference is to make a lasting difference. Harnessing science to society more effectively is not something that can be achieved overnight. But we cannot afford to let ourselves fall back into a ‘business as usual’ complacency. We must keep up the momentum and that means re-galvanizing our efforts and our collaboration.

I hope I can count on all the partners in the World Conference on Science process to go forward from here with renewed determination. We have already made some progress towards meeting the expectations of Budapest. We know how much remains to be done.

Koichiro Matsuura

December 2002

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1 – Introduction

After extensive consultations with the scientific community and governments in the midst of concern at growing disaffection for science, the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the International Council for Science (ICSU) resolved to convene the World Conference on Science (WCS): “*Science for the Twenty First Century. A New Commitment*”, (Budapest, 26 June - 1 July 1999), with support from other partners. The Conference proved to be a unique worldwide forum with far-reaching ramifications for science; it set the ball rolling for a fresh, energetic approach to science on the part of a wide range of stakeholders.

Over 1,800 delegates representing governmental bodies, national educational, scientific and industrial institutions from 155 countries took part in the Conference, as did representatives of some 120 international organizations embracing specialized agencies of the United Nations system and regional inter-governmental organizations (IGOs), international non-governmental organizations (NGOs) in science and technology and some 250 journalists from around the world. Eighty Ministers of Science and Technology, Research and Education or their equivalents participated in the Conference.

The Conference provided a unique opportunity to review the two-way commitment of science to society and society to science. It sought to reconcile the research agenda with the needs and expectations of society and to ensure that, in the 21st century, science becomes a shared asset benefiting all peoples in a spirit of solidarity. The Conference was designed to create a momentum among all stakeholders in science in order to yield a more effective response to urgent challenges posed by human and social development and the scope of environmental problems. Rapid globalization was exacerbating the uneven distribution of the benefits of science, widening the divide between knowledge-based and traditional national economies and multiplying ethical issues arising from advances in science.

The outcome of deliberations at the WCS is embodied in the two principal documents adopted by the Conference in Budapest, namely the *Declaration on Science and the Use of Scientific Knowledge (Declaration)* and the *Science Agenda - Framework for Action (Science Agenda)*. The *Declaration* proclaims the goals and principles identified and adhered to in Budapest. It highlights consensus on the political commitment required in coming years to drive the scientific endeavour and to solve problems at the interface of science and society. The *Science Agenda* makes specific recommendations and proposes lines of action. A catalyst, it leaves freedom for action-oriented interpretation. Interested partners are presented with a menu of challenging proposals

from which they may select those which correspond to their terms of reference.

Together, these two documents provide a strategic guide for action in the follow-up to the WCS. Participants in the Conference undertook to act with determination to attain the goals proclaimed in the *Declaration* and to implement the recommendations for follow-up set out in the *Science Agenda*. They appealed for co-operation between all partners and emphasized the responsibility falling henceforth to Member States, scientific communities and international organizations to ensure the implementation of the *Declaration* and the *Science Agenda*. It is worth noting that these documents also provide a useful ‘checklist’ for the present analytical review of the follow-up process.

The United Nations system and all other stakeholders in science were invited to use relevant parts of the *Science Agenda* when planning and implementing concrete measures and activities which embrace science or its applications. In line with the strategy articulated in the *Science Agenda*, partners in the WCS retain responsibility for their own action. In this way, a truly multilateral and multifaceted programme of follow-up is being developed.

The WCS asked UNESCO, in co-operation with ICSU, to act as a clearing house for the monitoring of follow-up. To this end, all partners were invited to send information on their follow-up action to UNESCO so that the Organization might disseminate this to Member States and all interested bodies, and in so doing promote concrete initiatives for international scientific co-operation. The Director-General of UNESCO accepted the clearing house function assigned to the Organization in the wake of the 26th General Assembly of ICSU (Cairo, September 1999) and the 30th Session of the General Conference of UNESCO (Paris, October-November 1999), both of which endorsed the principal documents of the WCS.

Participants in the Budapest Conference further recommended that UNESCO, in co-operation with ICSU and other partners, conduct a regular review of follow-up to the Conference; in this context, UNESCO and ICSU were invited to prepare two and a half years later the present analytical report to governments and international partners on the returns on the WCS, the execution of follow-up and further action to be taken.

In line with this proposal, the present report seeks to set in train a regular review of follow-up to the WCS. *Harnessing science to society* provides an analytical overview of the impact of the Budapest Conference and progress achieved in initiating, implementing and developing follow-up; it also proposes further steps to foster follow-up and widen participation. The report addresses governments and

international partners, as well as other national or regional bodies that may be interested in joining the follow-up process.

Harnessing science to society is the fruit of direct consultation between UNESCO in its clearing house capacity and a wide range of partners. Partners were asked about their own initiatives and for their views on the strategy to be pursued for the coming period. During the consultation exercise, UNESCO approached its Member States, ICSU, over 150 international scientific NGOs, including ICSU's own scientific unions, and 40 intergovernmental organizations, including relevant specialized agencies of the United Nations. The last round of consultations took place in April 2001. In preparing the Report, UNESCO also took into account the deliberations and decisions related to WCS follow-up arising from meetings of the governing or policy-making bodies of UNESCO and ICSU. Among these meetings were the:

- 160th and 162nd Sessions of the Executive Board of UNESCO (Paris, October 2000 and October 2001 respectively);
- 30th and 31st Sessions of the General Conference of UNESCO (Paris, October-November 1999 and October-November 2001 respectively);
- 26th General Assembly of ICSU (Cairo, September 1999);
- Meeting of Scientific Unions of ICSU (Paris, February 2001).

As a result of these consultations, UNESCO is in a position to issue the present report, not simply as a paper on the Organization's own programme activity, but as a report on the follow-up of various major partners. Such a process can evidently only be as rich as the information received from Member States and other partners makes possible.

When preparing the Report, certain other conceptual points had to be taken into consideration. The WCS was an exception brainstorming forum that yielded a great quantity of ideas and sober, well-balanced judgment on what needed to

be done to foster a reciprocal commitment between science and society. The final judgment was arrived at by consensus among an exceedingly wide range of stakeholders in science. There will therefore be no need to revise the *Declaration* and *Science Agenda* in the near future, although some emerging issues may of course be addressed.

At the current stage of follow-up, the essential issue is how these ideas are being translated into action and how information on follow-up at the national, regional and international levels could be better collated in future.

The period considered by the present report amounts to only half the quinquennial period that might be taken as a reasonable span for yielding and measuring tangible returns on a conference like the WCS, given the scope of the challenge for the scientific endeavour. Notwithstanding this, an analysis of follow-up at this early stage may still prove useful for identifying corrective measures and conceiving the most appropriate medium-term action for 2002-2007.

It should be emphasized that major goals of the WCS process can only be achieved through determined action on the part of partners. These actions are the condition *sine qua non* of follow-up to the WCS. We must be able to determine how the motivation and political momentum generated by the WCS is working in Member States, regions and in the activity of NGOs and IGOs. It is also imperative to identify the advantages and drawbacks of the process, as well as feasible remedial measures. It is for this reason that efforts made by major partners constitute the core subject matter of the present analysis.

Our approach has been to let the facts speak for themselves. Although the Report tries to avoid being a catalogue of follow-up activities, it does refer to many of these in order to demonstrate objectively the scope of efforts being undertaken and provide information on wise practices and opportunities for initiatives and co-operation. In so doing, we also pay tribute to the contributions already made by various partners and in this way hope to stimulate further action. In the text that follows, reference is made (by the numbers in brackets) to relevant paragraphs of the *Science Agenda*.

2 – Overviewing awareness of the WCS

One basic prerequisite for sustained follow-up is awareness of the conclusions and recommendations of Budapest. To build the new reciprocal commitment between science and society, there is a need to instil in the scientific community, policy- and decision-makers and the public at large an understanding of the analysis and proposals made by the WCS and the motivation for action.

It was in this context that, after approval of the principal documents of the WCS by the General Conference of UNESCO and the General Assembly of ICSU, UNESCO compiled and published an information booklet containing the *Declaration*, the *Science Agenda* and its *Introductory Note*, plus a succinct recapitulation of commitments contained in the *Science Agenda*. Published originally in English, French and Spanish, the booklet was subsequently translated into Arabic, Chinese, German, Portuguese, Russian and

Vietnamese, in co-operation with National Commissions for UNESCO. Over 20,000 copies of the booklet have to date been widely circulated among Member States, organizations of the United Nations system and the intergovernmental organizations that participated in the WCS, as well as ICSU and about 200 other international non-governmental scientific bodies.

In a volume of over 500 pages, the *Proceedings of the WCS* published by UNESCO in 2000 presents a thoughtful analysis of the interface between science and society. In so doing, the book focuses on key presentations at Forum I: *Science: Achievements, shortcomings and challenges*, Forum II: *Science and society* and on the outcome of 25 concurrent thematic meetings that constituted the broad in-depth brainstorming taking place in Budapest. The volume also overviews the outcome of presentations made at Forum III: *Towards a new commitment* by 103 national delegations and 26 representatives of international organizations.

The principal documents of the Conference are also reproduced in the *Proceedings*, as is the full list of Conference participants. The latter provides contact information on a unique community of scientists and policy- and decision-makers committed to the WCS process and open to co-operation.

Some 1,500 copies of the *Proceedings* were printed and circulated in July 2000 to the National Commissions for UNESCO, the heads of all national delegations attending the WCS, international organizations having participated in Budapest and other partners.

The full text of the *Proceedings, Declaration and Science Agenda* is available on a dedicated website (www.unesco.org/science/wcs) created to facilitate access to information on the WCS and its follow-up; information on follow-up activities carried out by UNESCO and its partners is regularly posted in the WCS electronic *Newsletter* accessible at the same url address.

In January 2000, the Director-General of UNESCO invited the Secretary-General of the United Nations to bring the outcome of the WCS to the attention of the United Nations General Assembly. Five months prior to the G-8 Summit in Okinawa, Japan (July 2000), the G-8 Sherpas were informed of the WCS recommendations and urged to consider opportunities for helping developing countries attain endogenous development through capacity-building in science at Information on the conclusions and proposals of the WCS was also diffused through other international organizations, including ICSU. The latter sent circular letters to its scientific unions, interdisciplinary bodies, scientific associates and national scientific members. It also published a special issue of its journal *Science International* dedicated solely to the recommendations of the WCS. The positive feedback on the Budapest Conference and proposed

follow-up contained in the following documents owes much to these efforts:

- Resolution 54/201 on science and technology for development adopted by the United Nations General Assembly at its 54th session;
- Resolution adopted by the 102nd Conference of the Inter-Parliamentary Union, Berlin, October 1999;
- the Statement on the transition to sustainability in the 21st century signed by over 60 scientific members of the Interacademy Panel on International Issues, Tokyo, May 2000.

Following the WCS, many National Commissions actively promoted awareness of the Conference recommendations. These efforts targeted national governmental and non-governmental decision-making bodies, research and educational institutions, and the public at large. A number of Member States went a step further by making information on national aspects of the WCS process available worldwide through their own websites. Among these were:

Australia:	http://www.dfat.gov.au/intorgs/unesco
Canada:	http://www.unesco.ca/english/wcseng2.htm
France:	http://www.org.comnat/france/comites_spel_sciences.htm ;
Germany:	http://www.unesco.de/c_english/recent_highlights.htm
Italy:	http://www.esteri.it/eng/archives/arch_events/unesco/icsu.htm
New Zealand:	http://www.unesco.co.nz/science
Republic of Korea:	http://www.unesco.or.kr/eng/science_n/d_1.html
Romania:	http://www.wsp.ro/cnrweben/science1.htm

This initiative deserves to be strongly encouraged and emulated, providing as it does a prompt mechanism for the delivery to other countries and international partners of up-to-date information, as well as data on the latest experiences and proposals for co-operation. We recommend that regional and international organizations participating in the follow-up develop their own websites on action they have taken, so as to favour a regular electronic flow of information between partners.

If science is to live up the expectations of society, public debate and public curiosity should be stimulated on the issues raised at the WCS and the need for the new commitment to science. Feedback on the WCS in the press provides a useful indicator for assessing the impact of the Conference and orienting follow-up.

The Conference was given intense media coverage. In 1999, some 500 informative and analytical articles were

published in highly respected journals throughout the world prior to, during and in the wake of the WCS. Over and above this, the world-renowned science journal *Nature* made a particularly noteworthy contribution to the WCS process. In November 1998, early into preparations for the WCS, it published an Editorial on the WCS entitled *Rewriting the rules for a post-cold war world*. The article concluded that the Conference would be 'a unique chance to reassess the dynamic of international scientific co-operation and address the challenges it currently faces'. In January 1999, *Nature* launched a WCS website accessible through its Internet home page which had an estimated 100,000 visits or more per week. In March 1999, in response to demands by the scientific community, the Site was expanded into French. For the three months immediately preceding the Conference, *Nature* ran a weekly page of news about events associated with preparations for Budapest. During the Conference itself, *Nature* not only provided a daily coverage of the event on its web site (<http://www.nature.com/wcs/>), thereby enabling a very wide public to follow the debates, but also printed and distributed a daily Conference newspaper.

The WCS was given positive coverage in the media, which considered it a success. This recognition is particularly gratifying insofar as the run-up to the WCS had been marked by a certain amount of scepticism and concern over the ambitious agenda, against a background of conflicting viewpoints, political systems and cultures, a differing perception of the needs and priorities for the *Science Agenda* and so on. That the Conference ultimately proved to be a success was an opinion unanimously endorsed by Member States at the 30th Session of UNESCO's General Conference (November 1999) and by ICSU's scientific members at its 26th General Assembly (September 1999).

The WCS was perceived as having established a consensus on the essentials of a new reciprocal commitment between science and society. It was also perceived as having reiterated the message that the strengthening of scientific capabilities is as much an imperative for the developed world as for the developing world. The Conference went farther: it elaborated a pertinent strategy for action.

The principal documents do not focus on concrete proposals and are not legally binding; they do, however, express the intellectual and moral solidarity of those Member States that endorsed them and will use them to guide their national scientific endeavour in the years to come.

The fact that the WCS was an international meeting organized jointly by an intergovernmental organization of the United Nations system (UNESCO) and an international non-governmental scientific organization (ICSU) - was particularly appreciated. The WCS introduced a model for future meetings. It showed that civil society can collaborate closely with the United Nations system and demonstrated a new way of doing business. *Nature* reported that, in a straw

poll conducted shortly after the WCS, all of those questioned - from both rich and poor countries - considered the Conference to have been a worthwhile event, and stated that they would go to another such gathering without hesitation. Moreover, on different occasions, some declared that such meetings should be held more frequently than once every 20 years, as has been the case since the last United Nations Conference on Science and Technology for Development (Vienna, 1979).

Beyond the positive assessments of the Conference and the useful presentations highlighted in the media, there were some critical observations of the WCS that merit further analysis within the framework of follow-up.

Although industry did have the opportunity to express its views at the WCS, in particular at the thematic meeting: *Science industry and knowledge as a public good*, the low profile of the private sector at the Conference was regretted by some observers who saw this as a serious shortcoming. As concluded by the *Economist*, 'the idea that science-based industrial firms had something significant to bring to the party seemed to be absent from the Conference, despite the fact that they pay for about 60% of all research that is done'. This observation stemmed from the small number of industrialists present in the National Delegations to the WCS and their limited contribution to the debate of the Conference, despite the efforts of the organizers.

The WCS recommendations avoided explicitly committing participants to calls for increased funding for science, whether from developed countries to the Third World or by developing countries themselves, although some countries did refer to the establishment of a new global fund for science, and to the target introduced at the Vienna Conference for an allocation of no less than one per cent of the gross national product to research and development. Notwithstanding this, as emphasized by observers, the Budapest Conference pointed out that "innovative mechanisms and cost-effective mechanisms for funding science should be examined with a view to their implementation by relevant institutions at regional and international level" (Science Agenda, paragraph 27). This recommendation urges further investigation of opportunities to foster the funding of science, for example through the debt relief for science and technology concept advocated at the Conference.

The WCS-media relationship is an on-going affair; it will continue to be of importance for the second stage of follow-up, having been enriched over the past few years by feedback from well-informed public opinion. In this regard, it seems timely to identify a communication strategy for co-operation between the media and other WCS partners for the next stage of follow-up. In its clearing house capacity, UNESCO is considering options for conducting a

consultation between partners and the media on the form this communication strategy would take.

Great emphasis during the preparatory part of the process was given to promoting awareness of the WCS. The conceptual design of the Conference stemmed from consultation with science leaders invited to join UNESCO's International Scientific Advisory Board (ISAB). The programme of the Conference and its draft documents were prepared through regular consultation with UNESCO's 188 Member States, 4 Associate Members and 13 Permanent Observer Missions, as well as with 22 UN agencies, 32 intergovernmental organizations, 166 NGOs, 100 Academies of Science and/or National Research Councils and the members of ISAB. UNESCO and ICSU invited many partners to associate their activity with the WCS process in order to launch, and benefit from, the worldwide debate preceding the WCS. Some 70 international and regional meetings associated with the WCS took place prior to the event and over 50 reports from these were submitted to the Conference in Budapest (<http://www.unesco.org/science/wcs/meetings/meeting.htm>).

A thoughtful contribution to the WCS prepared by the French National Commission for UNESCO, in co-operation with the Descartes Association and the Academy of Sciences of France, reflected on science stimulated by the WCS process. The document focuses on the interface of science with education, women, culture, development, ethics

and politics. When addressing issues of development, it introduced a new strategy for North-South co-operation based on the concept of the sharing of science. This concept goes far beyond the traditional transfer of knowledge to developing countries; it calls for progressive development of knowledge by both the North and the South and the building up of an equitable partnership between them. The document contains other interesting ideas and proposals. It would be most desirable if the momentum acquired by such a process of reflection on science could be maintained and harnessed in the course of follow-up to the evaluation of on-going effort and the quest for new ideas and initiatives.

The consultations and meetings held prior to the WCS and the reports prepared for the Conference greatly facilitated consensus at the Conference. They helped raise awareness and implicate in the WCS process a considerable number of scientists and decision-makers, including those not actually taking part in the Conference itself.

Reviewing the measures taken to promote awareness of the WCS process, we can conclude that the principal partners did have every opportunity to acquaint themselves with the message emanating from the Conference and to use this message to orient their responses.

As far as follow-up is concerned, however, more needs to be done to share information, in particular on activities at the grass-roots level.

3 – National follow-up: highlights

By definition, follow-up has three major components: national, regional and international. Although the present section is devoted to national follow-up, Member States are in fact the prime beneficiaries of all follow-up, be it national, regional or international in nature. In this connection, the Executive Board of UNESCO emphasized at its 160th Session (Paris, September 2000) the importance for Member States of promoting the principles set out in the *Declaration* and implementing the *Science Agenda*. The Board also asked Member States to regularly inform the Director-General of principal activities already taken or being carried out, and those planned or being proposed within the framework of WCS follow-up, so as to enable the Organization to fulfil its clearing house function (160 EX/Decision 3.3.2).

Member States can, and should, implement the Science Agenda through a wide range of activities, some of which they may wish to emphasize in the context of national priorities. Complete reports on national follow-up action are, of course, the prerogative of national authorities. It is, however, expedient for the clearing house to report on those activities that Member States have deemed fit to highlight in their messages to UNESCO, since they provide an overview

of national experiences, the momentum being acquired by the follow-up process and the returns it is yielding.

The involvement of Member States in consultations during the preparatory stages of the WCS inspired national delegations to launch or plan activities they were proud to announce in their presentations to Forum III; a selection is presented in the box.

National delegations also used Forum III three to announce planned action at the international or regional levels. These proposals totalled about 80. Speakers highlighted programmes, projects, centres of excellence and regional and international networks their governments were in the process of launching or designing; the list also included the drafting or revision of normative documents, agreements and planned conferences. Thus, Budapest had born its first fruits even before delegates had gone home.

The ink on the Conference documents was barely dry before a number of Member States were actively planning and implementing their follow-up activity. Examples are given below.

NATIONAL INITIATIVES ANNOUNCED

AT THE WORLD CONFERENCE ON SCIENCE

- Increase in national funding for scientific research from 0.2% to 1% of the Gross National Product (Algeria).
- Inclusion of integrated studies on women in science in the Argentinian Multiannual National Plan, as recommended by the WCS regional forum on Women, Science and Technology in Bariloche (Argentina).
- Creation of a National Fund for Support to Research and issuing by the government of a declaration on research priority (Chad).
- SchoolNet/ CANARIE initiative, in co-operation with the public and private sectors, to connect all schools and libraries in the country to internet and promote the use of advanced information and communication technologies in research, industry and education (Canada).
- Implementation of the new “Science Blossoms” Programme of the Ministry of Science, with respect to youth in urban and rural neighbourhoods (Israel).
- Development of a national innovation system appropriate for a small developed nation, and full participation of indigenous people and women in the scientific and technological enterprise, as well as preservation of the country’s wealth of biological diversity (New Zealand).
- Launching of a new National Plan for Research, Development and Innovation for 2000–2003, with increased resources for research, development and innovation (Spain).
- Significant increase in the financial allocation for S&T during the 9th Five Year Plan, and a radical improvement in education and S&T in the country within the Vision 2010 Programme (Pakistan).
- Adoption in 2000 of a Bill on the Funding and Organization of Research and a second on Gene Technology (Slovenia).
- Introduction of the new government policy prescribing that every primary school constructed is to have a science laboratory (Uganda).
- Establishment of a National Science and Technology Council and Science and Technology Business Centre, and increase in government funding for S&T from 0.02% to 3% of GNP (Zambia).

On the initiative of the Canadian Commission for UNESCO, an extensive report *Science in Canada – Giving Meaning to the 1999 World Conference* was prepared and published in April 2001 as an overview of programmes and initiatives that address areas where **Canada** is particularly active and which help fulfil commitments made in Budapest (contact information: <http://www.unesco.ca>). The report provides the *rationale* and practical framework for national follow-up. Five major themes, each representing a line of action, are identified in relation to the *Science Agenda*, namely:

- ✓ ethics in science, engineering and technology (SET), and bridging the information gap between science and the public;
- ✓ R&D capacity building and transdisciplinarity in the sciences;
- ✓ women, youth and disabled people in SET;
- ✓ first nation people's participation, traditional knowledge and SET; and
- ✓ sustainable development and environmental technology and research.

The report also incorporates the specific themes referred to in the *Science Agenda* that have particular relevance in the Canadian context. These themes are: climate change research and Arctic and circumpolar affairs; forestry and science; and science for peaceful purposes and human security.

Each of the themes in the Canadian report provides a thoughtful analysis of the national context and an action-oriented chapter. This chapter cites programmes and initiatives which serve as a practical guide for the participation of national institutions in WCS follow-up. One of the projects addressing capacity-building issues is the Networks of Centres of Excellence (NCE), a model for interdisciplinary research. The programme bridges disciplines and sectors – academic, private and public – and identifies an impressive number of institutions who are involved in solving complex problems. The national delegation informed the WCS that Canada would be prepared to expand the NCE activities into the international arena. The Canadian report was circulated at the 31st session of the General Conference

Some Member States have highlighted the international dimension of planned national action. In March 2000, the **Finnish** National Commission for UNESCO, the Ministry of Education of Finland and the Academy of Finland convened the seminar *Co-operation with developing countries – development needs and challenges in Finland*. Later in the year, the same Ministry of Education sent a letter to senior members of the science community in order to foster follow-up to the WCS at the national level. The Academy of Finland, the most important science funding organization in the country, is now

closely involved in the follow-up process, as are its Research Council for Biosciences and the Environment (RCBE) and its Research Council for Natural Sciences and Engineering (RCNSE). The RCBE decided to launch an extensive three-year programme on the Sustainable Use of Natural Resources (SUNARE 2001-2004). A RCNSE workshop was held in June 2001 to promote a programme on proactive information technologies, comprising computer S&T, psychology, law and health sciences.

In pursuance of the Budapest agenda, the **French** National Commission for UNESCO held an interdisciplinary seminar bringing together science education experts, teachers, representatives of science museums, journalists and editors to reflect on problems of science education (Palais de la Découverte, Paris, October 2000). Another follow-up activity being promoted by France is the reinforcement of the International Centre for Pure and Applied Mathematics (CIMPA) located in Nice (<http://www-mathdoc.ujf-grenoble.fr/CIMPA/Anglais/Content.html>). The development of CIMPA's activity will make an important contribution by training specialists from developing countries in a variety of areas of modern mathematics and computing sciences.

The international dimension is also highlighted in **Germany's** strategy. The policy of the Federal Government is to bring Central and Eastern European countries, including the Newly Independent States, closer to the European Union and its Framework programme of research, and to develop bilateral co-operation between the Max-Planck-Society and partners in China, India, Brazil and the least developed countries. In February 2000, the German Commission for UNESCO convened a meeting of German experts in Bonn to identify concrete ways of fostering international co-operation in science in the wake of the WCS and World Conference on Higher Education (WCHE) (UNESCO Headquarters, Paris, 1998). A focus of the meeting was paragraph 65 of the *Science Agenda* approved by the WCS. The experts discussed the potential of UNESCO and ICSU's intergovernmental and international programmes for counteracting the trend towards knowledge monopolies being nourished by –the tightening protection of intellectual property rights.

On the national stage, the science policy pursued by the Federal Government in Germany combines a significant increase in expenditure for science education and research with the setting of new priorities in education, the promotion of which is considered to be an important investment in future S&T. A priority programme in educational research, *Quality of School: Studying Students' Learning in Math and Science*, was launched by the German Research Council in 2000. Moreover, the Education Administration and German Research Council are contemplating co-operating on projects to translate the findings of research into education policies.

As part of its follow-up to the WCS, **Ghana** is hoping to host a Regional Centre for Humid Tropics Hydrology and Water Resources Management, due to become operational next year. The Centre will be responsible for enhancing the implementation of multidisciplinary water resource management strategies in West Africa and integrating efforts between scientists and policy-makers.

In November 2000, **Hungary**, the Conference host state, set up a far-reaching national agenda for action outlined in the document *Science and Technology Policy 2000*. Priorities include doubling national spending on research and development (R&D) to 1.5% of GNP. Another key objective is to complement this significant increase in Government investment in S&T by boosting the private sector's share of R&D from 37.7% to 50%. The strategy identified by the Government of Hungary incorporates the WCS recommendations, the priorities of the European Union's Research, Technology, Development and Demonstration Programme and OECD guidelines.

Japan's follow-up to the WCS is founded on the *Science and Technology Basic Plan* for the beginning of the 21st century that was prepared by the Government of Japan in March 2001. The Plan covers the basic concept, basic policy and the mission of the Council for Science and Technology Policy, which has been entrusted with overseeing implementation of the plan.

The basic concept stems from the goals the nation has set itself in building a new relationship between science, technology and society. This implies, in particular, introducing a comprehensive, strategic vision into S&T policy and expanding government investment in S&T with emphasis on the effective allocation of resources. Within basic policy, the promotion of fundamental research is given strategic priority. Four areas of S&T are singled out for priority investment: life science, information technology, environmental science, and nanotechnology and materials. Support is to be given to developing important emerging areas of S&T such as bio-informatics, system biology and nanobiology. When addressing the internationalization of S&T activities, the Plan proposes conducting projects on global-scale issues and international joint projects in areas of fundamental research.

Japan made a considerable effort to raise the ratio of women in Japanese universities and research institutions (for details, see 5.7).

An experimental pilot project on monitoring S&T to help map out future policy directions was launched in the **Republic of Korea** by the National Commission for UNESCO in 2000 as WCS follow-up. Encouraged by initial results, the National Commission is expanding the scope of monitoring to include such areas as science and technology

policy, science ethics, science education and the participation of women in science.

On the initiative of the Government of **Kuwait**, the Kuwait Institute for Scientific Research prepared a report in April 2001 entitled *Kuwait input to the Science Agenda of the World Conference on Science*. The Report outlines 21 principal actions being taken in line with national priorities and the *Science Agenda*. Within this framework, for example, in early 2001, the country passed a law on the protection of all forms of intellectual property rights in a move to enhance the previous law covering exclusively copyright and the protection of trade marks.

Mali is implementing a versatile national follow-up programme. In the area of science education, this programme focuses on the promotion of environmental education with its ethical dimension, the creation of private higher education establishments, and the provision of equipment to chemical laboratories. In the communication of science, priority is given to the establishment of regional committees of users of agricultural research results. Sub-regional science schools of excellence for girls and training sessions for science teachers on the methodology for teaching girls mathematics and science and technology are core efforts to foster the participation of women in science. The contribution of science to sustainable development is being promoted through the elaboration of research programmes for self-sufficiency in food supply, health, energy and the protection of the environment. One aspect of action being undertaken in health care is research on the production of improved traditional medicines. The adoption of the law on the status of researchers is at this stage a key implementation of Mali's science and technology policy. The First Salon of inventions and technological innovations organized in the country addressed the issue of the protection of intellectual property rights.

A greater effort in research and technological development is envisaged in the Five Year Plan 2000-2004 elaborated by the Government of **Morocco**. The Plan recognizes S&T as an essential national priority for the attainment of sustainable development. Investment in research has increased from 0.3% of GDP in 1998 to 0.4% in 2000. The goal is to attain 1% by the year 2010. Action to be taken at the institutional level embraces a variety of projects. The reinforcement of the national inter-university informatics network for education, training and research (the Morocco Wide Area Network) is one of the major initiatives. Other projects aim to establish national centres/institutes of excellence in the field of S&T information, water, energy, aromatic and medicinal plants, and Saharan research. The Plan also envisages setting up technical support units in five university cities and measures to promote research involving the human and social sciences.

The Government of **Pakistan** accords high priority to developing the information technology sector. In August 2000, the Government adopted a National Information Technology Policy and Action Plan. Within this policy framework, a report to the UNDP was later prepared at the Government's request. The Report contains a *Feasibility Study for the Pakistan Virtual Information Technology University (VITU) and the South Institute of Information Technology (SIIT)*; these institutions are designed to offer the country and the region a unique opportunity for quality education in information technology and to nurture the talent of the whole population rather than a mostly urban elite. The total cost of the project amounts to US\$21 million; it is envisaged that VITU/SIIT would attain self-sufficiency within four years and generate considerable returns in the subsequent years. It is estimated that, in five years, from an initial enrolment of 2,000 students, the information technology programmes would be accessible to 96,000 students. It is also expected that the project implementation will enable the local software industry to expand and participate in sizeable international undertakings.

An important point on WCS follow-up has been raised by **Papua New Guinea**. It has pointed out that, for many small developing countries, S&T is a new, useful, important but complicated field and that, in small countries, progress in this field can only be achieved with strong support from external sources. It is in this context that some countries are seeking support from UNESCO. It is worth recalling that, in 2000, the Government of the **Maldives** contracted Hickling Corporation of Canada, consultants in infrastructure and transportation, to develop the first National Science and Technology Master Plan. Technical assistance is being provided by the Asian Development Bank. The Plan addresses five key areas: science and technology, education, information technology, labour economics and marine biology. In this context, it is recommended that partners in follow-up to the WCS examine their current action and opportunities to provide help to countries lacking basic infrastructure in S&T and pool their efforts within a co-ordinated programme of assistance (59, 94).

In response to the on-going analysis of science needs in **Poland**, a new initiative to create a consortium of leading institutions in the life sciences was launched in January 2001 by ten national institutions, in co-operation with the International Institute of Molecular and Cell Biology, established earlier within the framework of UNESCO's science programme (7, 23, 27).

Desirous to foster the role of young scientists in the development of science and technology in **Sri Lanka**, the National Science and Technology Commission, a department of the Ministry of Science and Technology, established a Young Scientists Forum. This Forum held a first meeting in June 2000 resulting in the analysis of future requirements for science and career monitoring issues. The meeting called for the development of policies on the conservation of

biodiversity and for sustained support to basic research commensurate with national needs. A new impetus for action was sought at the first national biennial conference on *Science and Technology for National Development* (August 2000), which examined major issues in agriculture, industry, environment, education, information technology and health. The Conference recommended that the country's efforts be streamlined within a *Science and Technology Agenda for National Development (STAND)*. The Young Scientists Forum contributed to the Conference through a presentation evaluating research performance and forecasting the future needs and situation of science.

The follow-up strategy conceived by **Turkey** envisages action responding to five sub-chapters of the *Science Agenda* namely: 1.2, 1.3, 2.2, 2.3, and 3.2. Within this framework, the National Academic Network is being reinforced to share scientific information and knowledge through an interactive computer network for universities and other national S&T institutions (17, 20, 21). The Governmental R&D Assistance Programme to Industrial Companies was up-dated in 2001 to provide increased support (up to 60% of the project budget) for developing new products, production technologies and innovative methods (36, 38). The National Earthquake Council was established in 2000 to advise the Government on an earthquake-related policy and help raise public awareness (34, 61). Studies were conducted on the assessment of the National Innovation System and the establishment of the National Bio-security Council (8, 61, 62, 76). Feasibility studies are now underway for the creation, within the University-Industry Joint Research Centres Programme, of a centre for olive technologies and another for research on heating, cooling and air-conditioning (14,36).

As emphasized at the WCS thematic meeting on communication and popularization of science, the fruits of science are of use to everyone, scientific knowledge is a constituent of modern national cultures, progress in science changes the world and the social and ethical implications of science are of concern to each and every individual. This is why public awareness of science and understanding the impact of science on society are indispensable factors for the sustainable development of all nations striving for a knowledge-based society. It is for this reason that a number of Member States made science popularization and communication a follow-up priority.

Science days, which have been regularly held in **Finland** since 1922, offer a platform on which to publicly address issues highlighted by the WCS. Those organized in January 2001 by the Federation of Finnish Learned Societies took a look at science education, the use of research findings in decision-making and science ethics. The debate at the Science Days involves *inter-alia* several members of parliament and a large number of teachers and young people. Science communication and popularization has also been promoted in Germany by the National Research Council in

numerous ways, among which a series of lectures, exhibitions and internet chats. In 2000, the Council established the Communicator Prize to reward scholars for their accomplishments in conveying complex scientific topics and related social and ethical issues to the public (41, 42, 46, 63, 74, 75).

In **Portugal**, the Science Alive Agency has, for five years, been holding “Science in the Summer” Programmes; examples are Geology in the Summer, Astronomy in the Summer, etc. The programmes target the general public and/or secondary school students and are testimony to the country’s on-going commitment to supporting science education and expanding scientific literacy. Although the programmes may not directly have their origin in the WCS, they are being expanded in response to the recommendations in the *Declaration* and the *Science Agenda*. In 2000, the Agency supported 871 projects compared with just 216 in 1997 (41).

Conscious of the need to create widespread awareness of S&T, the Government of **Pakistan** entrusted the Pakistan Science Foundation with establishing science centres, museums, herbaria and planetaria throughout the country. Currently, the Foundation is developing a project to establish 15 Science Centres/Museums with public and private funding. The first of such centres is being established in Faisalabad. It will, in particular, promote awareness of the role of science in the development of the national economy and activate the interest of secondary and higher-secondary students in the biological and physical sciences, including biotechnology, computers, lasers, energy and the environment (49).

In response to the recommendation of an international workshop on *Science Communication* (London, July 2000) hosted as part of the WCS follow-up process by the authorities of the **United Kingdom**, two British organizations, the Science Museum and the British Association for the Advancement of Science are in the process of creating an International Centre for the Communication of Science to provide short training courses for science journalists, broadcasters and exhibition organisers from developing countries. Both players have a long tradition of communicating science to the public. The Centre will be located on the premises of the Museum in South Kensington (48).

An important component of UNESCO’s action is its Participation Programme, primarily designed to provide support for high-priority projects, activities or initiatives which have a national dimension. The use Member States make of this programme to reinforce national efforts within follow-up to WCS is an instructive indicator of their needs and the priority they attach to follow-up. In its decision 160 EX/Decision 3.3.2, the Executive Board of UNESCO had encouraged Member States to enhance their follow-up

action through the Participation Programme and extra-budgetary funding.

It is noteworthy that Member States have proposed over 50 follow-up activities for implementation within the Participation Programme.

Member States have laid emphasis on the execution of those recommendations of the *Science Agenda* which seek to promote the full participation of women and girls in all aspects of S&T (17, 41, 78-80, 90). The **Italian** National Commission for UNESCO, in co-operation with the International Forum of Mediterranean Women located in Turin, focused its effort within the Participation Programme on follow-up to the regional fora on women, S&T held within the framework of the WCS preparatory process (90). On a bilateral basis, four round tables on *Women and Science* were conducted with the participation of women scientists from Jordan (December 1999); Australia (February 2000), Israel (October 2000) and Syria (December 2000). The Italo-Australian round table was a step towards the creation of an International Network of Women Scientists (IPAZIA). This initiative of the Italian National Commission and the International Forum of Mediterranean Women was complemented by courses on Women, Science and Development: Training of Trainers, financed by the Italian Ministry of Foreign Affairs and launched in September 2000. They were destined for English- and French-speaking women scientists, teachers and medical practitioners of 11 southern Mediterranean countries.

Another important event was a preparatory meeting (Ottawa, May 2001) for the 12th International Conference of Women Engineers and Scientists: Women in the Knowledge-based Society to be held in Canada in July 2002. The meeting, organized by the Canadian National Commission for UNESCO with support from the Participation Programme, paved the way for the development of an international federation of women scientists and engineers, the objectives of which stem from recommendations in the *Science Agenda* (78, 79) and those made by the Asian Pacific Economic Association (APEC).

Three other activities promoting women in science within the framework of the Participation Programme were:

- ✓ two seminars for Careers in Science and Technology for Women (New Providence, Bahamas, January, and November 2001) ;and
- ✓ a sub-regional workshop on science and technology education for women and girls (Teheran, Iran, June 2001).

These activities sought both to assist women procure employment in S&T, and enhance the capacity of women specialists, planners and teachers of S&T. A comparative

study *Women in Science: Status and Perspectives* was undertaken by **Tunisia** (Tunis, March 2000) for the collection of information for a data base and a comparative analysis of women's place in science in Tunisia and countries of the region (80). (See also 5.7)

Other Participation Programme activities addressed such areas of the *Science Agenda* as science education and the raising of public awareness of science (**Argentina**: project on up-dating the teaching of science through the publication of periodicals; **Australia**: regional workshop "Science and community: bridging the gap"); science/industry co-operation (**Belarus** project on the elaboration of a national programme of co-operation between science education and the productive sector for sustainable development; **China**: 2000 UNISPAR International Conference on University-Industry Co-operation in Xi'an, **Georgia**: project on university/industry co-operation for societal development in the Caucasus); and continuing consultation on action to be taken within WCS follow-up (**Bulgaria**: conference on prospects for science in South-Eastern Europe, Sofia; **Uruguay**: regional meeting on WCS follow-up, Montevideo). This recapitulation should also be complemented by reference to the determined effort of **New Zealand** to appreciate the value of traditional knowledge. The Pacific Regional workshop on the *Contribution of Traditional Knowledge and Approaches to Scientific Understanding* assessed indigenous knowledge as a valid and constructive form of dealing with environmental management issues and brought together experts to develop effective tools for protecting knowledge from exploitation (83-87). (see also 5.7)

In many countries, availability of extra-budgetary support is an important factor in for the execution of projects designed to put into practice the recommendations of the WCS. A number of extra-budgetary projects are now aligned with priority actions called for within the follow-up to WCS. They highlight efforts to use scientific knowledge to meet basic human needs, promote sustainable development and build up national capacities.

The *Sahel project* was launched in 2000 with a view to supporting local development at the village level by means of improving access to fresh water, the use of solar energy and the rational use of natural resources. The project is being implemented in **Mali**, **Niger** and **Burkina Faso**, in co-operation with UNICEF, UNDP and other donors. Likewise, a project on the "Economic and ecological restructuring of land and water use in the region of Khorezm" in **Uzbekistan** earned generous funding from Germany and will be implemented in co-operation with the University of Bonn.

A significant effort, concomitant with follow-up to the WCS, is being made through five extra-budgetary projects in **Brazil**. The projects, which enjoy generous support from the Government, cover such areas as environmental education, biosphere reserves, management of water resources

and the development of a science information system for decision-making.

The project promoting a National Programme of Environmental Education mobilizes the competence of various segments of society to deal with environmental issues, seeking to establish decentralized institutions for environmental education, develop a network of multipliers and create electronic means for the exchange of experience and ideas. The project for the Consolidation of the Brazilian Biosphere Reserves focuses on the reinforcement of the biosphere reserves management system and encompasses pilot projects for sustainable development, the creation of an Internet/CD-ROM data base for Atlantic Forest and Cerrado biomes, and a Brazilian branch of the MAB Communication Network. Issues on water resources management are being addressed through projects on *Institutional Strengthening of the Secretariat of Hydrological Resources* and on *Support for the Coordination and the Management of the PROGUA in the Semi-arid Zones*. Brazil is seeking to refine the methods and processes of information management in environmental institutions and improve efficiency. This is being done within the project for a *Unified System of Strategic Information*. A string of projects for S&T and innovation in Brazil and support for strengthening a National Council of Scientific and Technological Development are also in the pipeline.

The Brazilian strategy of providing extra-budgetary funding to implement national priority projects that require international experience and input is worth mentioning. It should be added that for many years UNESCO has been instrumental in carrying out extra-budgetary activities for the benefit of Member States and international organizations. The Organization is ready and willing to assist Member States and partner organizations further in the identification and execution of extra-budgetary projects qualifying as WCS follow-up.

The various activities catalysed by the WCS and the fruits they bear provide a tangible measurement of the returns on the Conference. This is also true of the intellectual product embodied in the Proceedings and the decisions formulated in the two principal documents of the Conference. Activities undertaken in various Member States serve to illustrate the scope of national efforts associated with follow-up to the WCS.

The list of national efforts associated with WCS follow-up is not exhaustive. It should be borne in mind that, so far, reference has only been made to a relatively limited number of countries. A great deal of other events might have been referred to had information on them been passed on to UNESCO.

Although the preceding overview of national follow-up actions is incomplete, it nonetheless encompasses a versatile variety of national activities that respond to a wide

range of recommendations in the *Science Agenda*. Measurable efforts have been made by Member States to address national strategies in S&T and reinforce funding of science, science education, sustainable development and capacity-building, the role of women and young people, science ethics, the value of traditional knowledge and popularization and communication of science. It is apparent from initial action by Member States that the original 'diagnosis' contained in the twin documents was correct.

From what has been written above, we can conclude that the WCS was no self-contained event, but a forum that produced an evident return and set in motion a momentum of change conducive to a new attitude and commitment towards science. It should be recalled that the pride of place given to education and environmental issues in national agendas has been nurtured by a number of world conferences. The WCS was unique in that it provided the missing international reference and orientation national scientific communities and decision-makers could use as a means of fostering commitment to science and its service to society.

An important affirmation stems from the discussions during the 31st Session of the General Conference of UNESCO (Paris, October-November 2001). During debates on the Organization's programme and budget for 2002-2003, many Delegates supported the further development of follow-up within the framework of the *Science Agenda*.

It is thus the current strategy for compiling information which is at fault. A comprehensive analysis of national actions could of course give an insight into the needs of Member States, the returns on their follow-up action and their expectations. At the current stage of follow-up there is a lack of appropriate information. Many Member States have

not yet informed UNESCO of their action. In those reports UNESCO has received, the information provided is interesting and instructive but, as a rule, limited to selected fragments of national activity and devoid of an overall analysis or assessment of the situation.

We recommend that, during the 2002-2003 biennium, national reports on follow-up to the WCS be prepared in Member States themselves and that these be made available to all the partners through UNESCO; this will enable full benefit to be derived from the exchange of experiences, the appraisal of national science and the vision the principal beneficiaries have of the WCS process. It may be recalled that national reports on education prepared on a number of occasions have been instrumental in streamlining the action of Member States and the Organization in the field of education. It would be most rewarding if, during this biennium, the same could be done for science. In this way, Member States would be able to further motivate and reinforce their follow-up to the WCS within the Medium-Term Strategy 2002-2007 approved by the 31st Session of the General Conference of UNESCO.

Regional follow-up implies the participation of a variety of non-governmental and governmental institutions and international organizations not necessarily originating from the same region, which act within the framework of their own programmes. In this context, UNESCO's Field Offices co-operate with many partners who are active in a given region. Such co-operation is consolidated and streamlined within UNESCO's regional programmes in such a way as to provide a representative expression of a strategy followed by the entire community of partners within the region.

4 – Regional follow-up: highlights

Thus, when looking at the regional dimension of follow-up to the WCS, it may be useful to look at developments in the regional programmes of UNESCO's Field Offices, especially since these Offices have been acting as UNESCO's 'antennae' in the regions ever since the beginning of the WCS process.

After the Conference, the Executive Board of UNESCO assigned the Field Offices a clearly defined role : *"to promote, within the programmes of the Field Offices, the elaboration and execution of regional and sub-regional programmes of action to follow up the recommendations of the WCS"* (160 EX/Decision 3.3.2). The proposals originating from consultations with the Field Offices formed the basis of the *Regional and sub-regional strategies* in the Programme and Budget of UNESCO for 2000-2001 (document 30 C/5 Approved) and the *Main lines of action* in the Programme and

Budget for 2002-2003 (document 31 C/5 Approved). In May-June 2001, the Field Offices prepared reports on follow-up to WCS in their regions. As is apparent from these reports, regional programmes of action were conceived and are being implemented in line with the regional strategies identified in the wake of the Budapest Conference. The approach to follow-up in the regions so far can be characterized as follows.

4.1 Africa

In the basic and engineering sciences, national capacities were promoted through fellowships and travel grants awarded to African scientists to enable them to carry out research and receive training within the framework of the African Network of Scientific and Technological Institutions (ANSTI). Another contribution to the reinforcement of

capacities in science came from moves to improve university courses in mathematics, physics and chemistry in Africa and to orient regional life sciences towards poverty-alleviating biotechnology focusing on specific/endemic organisms in the Afro-tropical environment (<http://unesco-nairobi.unon.org/xindex.html>) (7, 11, 18, 24, 41, 45). A UNISPAR guidebook on the transfer of research results to industry is being compiled for use by researchers (36). A demonstration project for rural electrification using solar energy in Guinea is being carried out, as are a number of other projects within the World Solar Programme (35).

As regards environment and sustainable development, the International Conference *Role of Geology in Poverty Reduction in the 21st Century* was held in Nairobi (Kenya, November 2000) (23), and a regional conference on earthquake disaster preparedness was organized in Kampala (Uganda, December 2000) (34). The Field Office in Nairobi is actively working on projects to establish two new Biosphere Reserves within the AfroMAB network, in co-operation with FAO and UNDP (29). In water sciences, activity focuses on improving knowledge of hydrological processes in the region and on the methodology for assessing and managing water resources. To this end, for example, the Conference - *Lake Victoria 2000: a New Beginning* (Jinja, Uganda, May 2000) - made a considerable contribution to the sharing of information on the lake and the identification of issues requiring further co-operative research. Specialists from 13 African countries were trained on the course *Estimation and Modelling of Ground Water Recharge in Arid and Semi-arid Zones in Africa* (Niamey, Niger, July 2000). (29)

Feedback collected during implementation of the regional programme led to a series of policy recommendations and proposals to which attention needs to be paid in further follow-up action. It was in particular proposed that:

- emphasis be laid on 'science for development' rather than on 'science for the sake of knowledge only';
- support be enhanced for courses and conferences in Africa (and grants to enable African scientists to attend them), since these make a vital contribution to capacity-building; and that evaluation tools or indicators be developed to measure the impact of these activities;
- in-service courses and summer colleges at local universities be supported to improve the skills and knowledge of teachers and lecturers;
- the introduction of new information and communication technologies be reinforced, since poor communication infrastructure constitutes one of the limiting factors in the region;

- the activity of regional NGOs and networks in human capacity-building for research on, and data collection for, policy formulation be supported during the 2002-2003 biennium;
- new projects be developed in Africa within the framework of the International Geological Correlation Programme (IGCP); that these projects encompass areas such as sound mineral extraction, geological heritage and the origin and genesis of the earth's crust, in order to understand global changes associated with interactions between the geosphere and biosphere;
- access to the global pool of earth sciences in the region be enhanced through training and capacity-building within an international exchange programme of lectures at African universities and through publication of a textbook series on the geology of the African continent;
- the popularization of the earth sciences in the context of international action to protect unique geological monuments and landscapes in Africa be encouraged to develop local economies by generating employment and new economic approaches linked to orientations such as tourism ("geotourism") and trades and crafts ("geoproducts");
- the African component of the Coastal Region and Small Islands programme highlight the Small Islands Voice project, which will promote the use of new information and communication technologies and the Environmental Action Learning and Eco-school approach addressing environmental issues in a holistic way in island schools.

When addressing strategic aspects of the regional programme, it should be emphasized that one of the major priorities of UNESCO's regional and sub-regional strategies in its Medium-Term Strategy for 2002-2007 is its response to the needs of Africa. As reflected in Part II of this document devoted to UNESCO's mission, this response entails three principal orientations, namely least developed countries (LDCs), women and youth.

These orientations have a bearing on the Organization's programme as a whole; within the science programme, they are translated into action through:

- assistance to LDCs, two-thirds of which are in Africa, in capacity-building in science by way of promoting science education and training, enhancing research facilities and fostering the use of S&T to improve living conditions in these countries;

- facilitating access to, and participation in, science by women and young people with a view to ensuring their involvement in the planning, conduct and evaluation of research, fostering their empowerment and gender equality;
 - help to African countries to build capacity and promote a strategy for the prevention of HIV/AIDS and other infectious diseases by providing the required scientific expertise and training, as well as by promoting preventive education;
 - fostering access to, and introduction of, information and communication technology in science education and sharing of scientific information and knowledge.
- pilot projects in renewable energies in rural areas of North Africa, with emphasis on increasing awareness of the usefulness of renewable energies (35);
 - development of the ArabMAB network, including promotion of biosphere reserves in oases to combat desertification (29);
 - development of the knowledge base for, and approaches to, water resources management in arid and semi-arid zones (wadi hydrology, ground water protection) (23, 29, 31); and
 - interdisciplinary pilot projects on sustainable human development in historic coastal towns (25, 67).

Another important aspect of the agenda in the African region is the need to improve the efficiency of investment in the regional programmes. Several delegates from African countries raised this issue at the 31st session of UNESCO's General Conference in the course of the debate on the Medium-Term Strategy for 2002-2007. This issue needs to be the subject of thorough examination at any forthcoming science policy meetings in the region.

The orientations of the regional programme are consonant with recommendations in the *Science Agenda*, in particular those in paragraphs: 12, 17, 20, 23, 26, 28, 29, 41, 43, 78, and 82. The establishment of a coordinating working group in Africa to oversee the WCS process is recommended. Such a group could be an autonomous body consisting of representatives of principal institutions involved in the follow-up and using essentially modern means of communication. It may be useful to consider setting up a similar group in other regions so that they, too, may benefit from a practical mechanism for monitoring follow-up during the forthcoming medium-term period (2002-2007).

4.2 Arab States

The strategy pursued in the region during the 2000-2001 biennium highlighted a number of lines of action consistent with the *Science Agenda*:

- upgrading science and engineering education in Arab universities through the use of modern computer and networking technologies (the USEE programme) (20, 41, 43, 45);
- training in S&T management and assistance in promoting science policies and legislation within the framework of the Arab Regional Network for Science and Technology Management (STEMARN) (55, 64);

In response to the recommendations of the 160th session of the Executive Board, UNESCO's office in Cairo reviewed its programme and prepared a comprehensive regional follow-up report that evaluates over 50 activities or projects.

One of these is the project on course development being undertaken within the USEE programme. Around 50 faculties in 17 universities of the region are presently developing courses originating from the USEE project in such disciplines as physics, chemistry, biology, engineering graphics and mechanics, computer programming, etc. Three of these courses have already been put on the website (<http://unesco.uaeu.ac.ae>); four others are available on CD-ROMs. Nine on-going projects will be completed in 2002. The USEE programme offers an example of wise practice in modernizing university teaching through the investigative and dynamic use of recent information and communication technologies.

The regional effort undertaken in S&T management and in the promotion of a dialogue between science and industry is illustrated by the STEMARN Regional Workshop on *Product Development Management in the Arab Region* hosted by the Arabian Gulf University (Manama, Bahrain, October 2000). Senior representatives from industrial, business and academic sectors in twelve Arab countries attended the Workshop. The meeting reviewed world experiences and trends, both in industrialized and developing countries, in the product development field and considered measures to be taken for promoting the product development culture in the Arab academic, industrial and business sectors.

In the environmental sciences, a project document "Management of Sand Encroachment on the Nile" was prepared during 2000. Directors of Biosphere Reserves in the Arab countries received training at the workshop on the *Ecosystem Approach to Biosphere Reserve Management* (Sharm El Sheikh, November 2000). Some 15 activities in 2000 addressed the issue of hydrology and water development in a vulnerable environment. The International Conference on

Wadi Hydrology (Sharm El Sheikh, Egypt) was one such activity. This major event of the Arab Network on Wadi Hydrology considered the use of new technologies to combat the scarcity of fresh water resources and help ensure sustainable development of wadi communities.

A number of meetings held in the region made it possible to heighten reflection on science in pursuance of the WCS goals. Among these were the International Conference on *Mathematics and the 21st Century* (Cairo, Egypt, January 2000), the International Conference on *Basic Sciences and Advanced Technologies* (Assiut, Egypt, November 2000) and the 11th *Arab Chemical Conference* (Aden, Yemen, November, 2000). The current status of research in mathematical sciences, physics, botany, zoology, geology and pure, applied and environmental chemistry was reviewed at these meetings in the context of regional needs and priorities.

In line with WCS recommendations on science popularization, the Field Office launched a project on “Upgrading Awareness of Science, Environment and Health”. In April 2001, young journalists from Arab countries were able to benefit from the expertise and experience of prominent editors, scientists and journalists at the Second training workshop, *Tools and Methodologies of Simplified Scientific Writing* held in Cairo.

The *Science Agenda* appealed for the furthering of international co-operation on issues of universal concern through professional organizations of scientists such as international academies, scientific unions and learned societies (13). It was in this context that the Budapest Conference gave rise to the idea of setting up an Arab Academy of Sciences (AAS) as a tool for promoting science and co-operation in the region. Since then the project has advanced well and AAS was officially launched at UNESCO Headquarters in May 2001 as part of an extra-budgetary project. Beirut has been chosen to host the headquarters of the Academy.

Another noteworthy event in the region is the establishment, under the auspices of UNESCO, of an International Centre for Synchrotron-light for Experimental Science and Applications in the Middle East (SESAME). A consultative meeting of representatives of governments interested in the Middle East Synchrotron Light Facility (Paris, June 1999) asked the Director-General of UNESCO to include the proposal for the establishment of the Centre in follow-up to the WCS. The proposal was well received by delegates at the Conference.

The project aims to create a major international centre of excellence to promote training, research and peace-building in the region. A broad range of scientists, engineers and technical experts from various fields of S&T are interested in working with synchrotron light. The centre’s programme of basic and applied research would embrace structural

molecular biology, molecular environmental science, surface and interface science, materials characterization, X-ray imaging, archaeology, medical applications and other fields. The German Government declared its readiness to donate the BESSY I synchrotron light source (valued at over US\$25 million) as the basis for the major research facility. All eleven Member Countries of the project and the US Department of Energy pledged financial support.

An Interim Council consisting of two representatives of interested governments was set up in 1999. Its role is to investigate the policy, scientific, organizational, financial and technical aspects related to the establishment of the Centre. In pursuance of the preparatory work done by the Council at its six meetings, and in consultation with UNESCO’s Executive Board at its 162nd Session, the Director-General submitted a report on the proposal to establish the Centre to the 31st Session of UNESCO’s General Conference. The ensuing decision states that the General Conference:

- *supports the establishment of SESAME under the auspices of UNESCO, and*
- *delegates to the Executive Board authority for further examining and approving the creation of such a Centre in Jordan, including approval of any necessary agreements, in the light of a full feasibility study to be submitted to it by the Director-General.*

Once operational, the Centre will serve as a motor for the region’s scientific, technological and economic development. It will be open to scientists from the Middle East and elsewhere, and be operated by its member countries, with additional support from other partners. Interested countries or partners are invited to join the project.

4.3 Asia and the Pacific

A community of very divergent countries is located in the immense territory of this region. The most populated countries of the world are to be found here but so are small island states; prosperous industrialized countries exist alongside least developed ones; leading countries in basic research and high technology co-exist with those lacking proper infrastructure in science and science education but which are rich in local and traditional knowledge. Any WCS follow-up strategy in the region therefore needs to be specifically oriented towards the local situation in order to respond to pressing needs of the countries concerned and in so doing ensure that full benefit is derived from the opportunities offered by regional co-operation.

After the WCS, the main lines of action identified through the activity of UNESCO’s Field Offices and their co-operation with various partners in the region focused on:

- modernizing university science education through the introduction of information technologies and through co-operation with science networks (20, 43);
- promoting national science, engineering and technology policies through regional co-operation within the Science and Technology Policy Asian Network (STEPAN) (27, 55, 61-63);
- reviewing S&T systems in Central Asia through peer review and legislative measures (57);
- developing activities of regional and national science networks, including those in biosciences and biotechnologies linked to food security and the response to demographic growth (9, 17, 18, 23, 25, 27);
- promoting use of solar energy and other forms of renewable energy (35);
- assessment and mitigation of natural disasters (32, 34);
- participation by local communities in biosphere reserves and transboundary co-operation in biodiversity conservation (29, 32);
- building capacities in water resources management with particular attention paid to the Hindu-Kush Himalayas sub-region, the Aral Sea and fresh groundwater resources in small islands of the Pacific sub-region (29, 31);
- the impact of globalization on coastal communities and environments;
- enhancing the Global Ocean Observing System (GOOS) through IOC sub-commissions and regional offices (30);
- linkages and synergies between science and indigenous knowledge; and
- popularization of science.

UNESCO's Field Offices in Apia (Pacific region), Beijing (China), Jakarta (South-East Asia) and New Delhi (South and Central Asia) are closely involved in the implementation of regional science programmes and open for co-operation with interested partners. The product being brought about by regional co-operation can best be illustrated by describing a number of activities carried out during the 2000-2001 biennium.

In co-operation with the ASEAN Secretariat, UNESCO's Jakarta Office developed a project proposal for an ASEAN Virtual University in Science and Technology. The project document has now been submitted for examination by the ASEAN member countries. In 2001, innovations in physics teaching relevant to the Asian context have been introduced in co-operation with ASPEN through the organization, in the Philippines, Sri Lanka and Malaysia, of three Active Learning Workshops. Preparation of instructional materials in electronic format is under way at Swinburne University of Technology (Australia) and Ateneo de Manila University (Philippines) within the projects on Active Learning Web Modules in Physics.

The STEPAN Board Meeting (Seoul, June 2000) analysed the needs of science and technology policy in LDCs. In pursuance of the Board's recommendation, a survey mission was undertaken to assist the Lao PDR in establishing a national science and technology policy. An expert team undertook a consultative mission to evaluate S&T in the DPR of Korea. The team's report proposes a three-level programme of action to strengthen Korean capacities in science and better involve national science in international co-operation.

Within the framework of MAB, an initiative on "Asia-Pacific Co-operation for the Sustainable Use of Renewable Natural Resources in Biosphere Reserves and Similar Managed Areas" (ASPACO) was launched as a major regional WCS follow-up action with the support of the Government of Japan. The first ASPACO meeting was held in February 2001 in Bali, Indonesia. The meeting elaborated strategies for the identification of new projects and guidelines for preparing and executing these. Pacific island approaches to integrated coastal conservation and sustainable development came under consideration at the Pacific ASPACO meeting (Apia, Samoa, November 2001) that geared UNESCO's World Network of Biosphere Reserves to biodiversity conservation and integrated management of natural resources in the Pacific region. Over 700 people now have easy access to clean water thanks to the implementation, in 2000, of a project on water supply and sanitation in the Siberut Island Biosphere Reserve.

A pilot research project on a centre for natural dyes in the Himalayan region of India was initiated under WCS follow-up by UNESCO's New Delhi office, in co-operation with the Government of India and the Himalayan Environmental Studies and Conservation Organization (HESCO). UNESCO's office in Beijing focused on training DPR Korean scientists in physics, water sciences and marine biotechnology in Chinese institutions.

A noteworthy effort in the region has been made in science popularization. In February 2001, an intensive training course targeting science writers from Pacific media institutions was held in Canberra (Australia) and, in August 2001, a Science Communication Workshop took place in

Apia (Samoa). Within the framework of the MAB Young Scientists Awards Programme, an initiative for a MAB Certificate for Young Researchers and Environmental Managers was launched in Indonesia to increase awareness and participation of young people in the sustainable use of biological diversity, natural resources and environmental conservation. In co-operation with COSTED, a “Science Communication Network for Small States in the Global Society” is being developed by UNESCO’s New Delhi Office with the participation of Bangladesh, Bhutan, Maldives, Nepal and Sri Lanka, using expertise available in India.

4.4 Latin America and the Caribbean

Reflection on regional follow-up to the WCS was initiated at the Latin American and the Caribbean Regional Consultation Meeting held prior to the Conference (Santo Domingo, Dominican Republic, March 1999). The appraisal and recommendations of the Santo Domingo Declaration issued by the meeting, together with those in the *Science Agenda*, constitute a symbiotic basis for regional follow-up action. There are two groups of follow-up activities in Latin America and the Caribbean: one aims to diffuse documentation and/or develop an institutional basis for specific follow-up to the Budapest Conference, while the other embraces those activities which bring a noticeable contribution to WCS follow-up across the regional science programme.

Within the first group of activities, the policy presentation *Budapest World Conference on Science: Vision of Latin America* was widely distributed by e-mail and in 2001 was prepared for publication in paper form by the Federal University of Allegro. The presentation emanated from the seminar organized by the universities of the Montevideo Group Association. A Round Table on WCS and its follow-up was conducted at the first Ibero-American Congress of Philosophy on Science and Technology (Morelia, Mexico, September 2000). The MERCOSUR Science, Technology and Innovation Meeting was held in Montevideo (Uruguay, October/November 2001), gathering representatives of governments, universities, the private sector and leading S&T agencies fostering co-operation such as CYTED, IDRC, OAS, OEI and UNIDO. MERCOSUR’s participation in follow-up to the WCS is an important factor for the development of regional co-operation in sharing scientific information and knowledge (17, 18).

The UNESCO Office in Montevideo launched an initiative to prepare a Technical and Financial Guide for Science and Technology Projects in Latin America to assist institutions involved in the planning, promotion, financing or execution of S&T activities who were interested in WCS follow-up. This initiative follows the recommendation in the *Science Agenda* that a close dialogue be developed between donors and recipients of S&T funding, and between

universities, research institutes and industry (16). A Guide has been prepared in compact disk format offering continual support to the region by providing up-to-date information about programmes, projects, technical and financial co-operation, scholarships, networks and other topics.

In response to the WCS call for enhanced regional co-operation (92), the Academies of Sciences of the Caribbean decided to federate. To this end, the Caribbean Scientific Union was launched in Cartagena (Colombia) in November 2000. The Union’s goal is to coordinate and consolidate action by the Academy of Sciences and equivalent institutions of the Greater Caribbean area. The implementation of this task has been facilitated by the First Convention of Academies and Scientific Institutions of the Caribbean originating from the Joint meeting of the Caribbean Academies of Sciences and the Cuban Academy of Sciences (Havana, April 2000).

Within the second group of activities, the WCS recommendations are being addressed through various programmes in basic, engineering and environmental sciences. Recent examples of activities undertaken are: development of networks for R&D postgraduate programmes in Science in Central America (Red-Ciencia) and the Caribbean (CARISCIENCE) (April 2001) (45); the International Symposium on *Manu and other experiences on research and management of Neotropical forests* (Peru, June 2001); and the Seminar on *Anthropogenic changes in the Amazonian estuary: a comparative analysis at the regional and international levels* (Brazil, December 2001) (29). In geology, training courses were conducted on geology applied to environmental protection (Brazil, June 2000) and metallogeny (Ecuador, June 2000). Member States were provided with advisory services for the reinforcement of national capacities in water resources management. The Intergovernmental Council of UNESCO’s International Hydrological Programme is providing support for the establishment in Chile of a Water Centre for Arid and Semi-arid Regions of Latin America and the Caribbean. The project proposal has been submitted to the Flemish Government for funding (29).

As far as one can judge from information received from the region, the initial phase of follow-up has satisfied the basic prerequisites for launching a well developed programme. There exists a considerable potential and political backbone for such an action. However, there remains a need for the programme to be more clearly articulated and made better known to national and regional institutions.

4.5 Europe

There are certain distinctive features of the European region which need to be borne in mind when appraising the regional approach to development of follow-up to WCS. For some two decades, the region has been undergoing a process

of profound transformation which has offered new opportunities for national development and international co-operation; at the same time, this transformation has engendered problems that make it necessary to modify the region's approach to S&T in major spheres of societal activity. A review of the role of S&T and its better integration in society is a pressing need, particularly in Central and Eastern Europe. Another priority is the interface between society and the environment in one of the most industrialized regions in the world. The region is well-known for its excellence in science and has a special role to play on the international scene. The European scientific community's participation in international co-operation is an indispensable prerequisite for the sharing of scientific information and knowledge and the strengthening of national capacities in science worldwide. It is in this context that, when addressing follow-up to the WCS, the Executive Board of UNESCO at its 160th Session highlighted the role of UNESCO's Office in Venice (ROSTE), now renamed the Regional Bureau for Science in Europe, in promoting co-operation both among countries of the region and with developing countries (160 EX/Decision 3.3.2, 6c).

In line with these regional orientations, the modernization and restructuring of S&T systems in Central and Eastern Europe and in the region as a whole focused on WCS follow-up. During the Budapest Conference, UNESCO's Venice Office organized a meeting of Ministers and senior experts in science policies from Central and Eastern European countries (CEEC), in which representatives of Western Europe also took part. The meeting launched a process of regular consultation on science policy-making and stressed the need to bridge the research capacity gap between Eastern and Western Europe. The second meeting (Paris, November 1999), organized on the occasion of the 30th Session of UNESCO's General Conference addressed collaboration in science and science policies in Europe between all IGOs and NGOs in general and between UNESCO, the European Commission and the Council of Europe in particular (55, 61, 63, 64).

In pursuance of this effort, UNESCO was associated with the organization of the European Conference on *Science and Technology in Europe: Prospects for the 21st Century* (Gdansk, Poland, October 2000), convened by the Committee on S&T of the Parliamentary Assembly of the Council of Europe and the European Science Foundation. In conjunction with the Conference, UNESCO, in co-operation with the Marie Curie Fellowship Association, organized the European Forum of Young Scientists (EFYS). The Conference issued a declaration on prospects for S&T in the 21st century. The declaration addressed a warning to countries where scientific development is neglected of social problems and threats to economic independence. A report on the outcome of the Gdansk Conference was presented to the Parliamentary Assembly of the Council of Europe, as was a resolution originating from the EFYS calling for greater support within

the Council of Europe for young researchers in countries in transition (56, 62, 64, 82).

The catalytic and cultural role of the S&T system in the enlargement of the European Union was addressed at the Workshop of Experts from pre-accession Central and Eastern European countries and the EUROPOLIS Project Group (Venice, May 2000). Organized by UNESCO's Venice Office in co-operation with the European Union, the Workshop, made a series of suggestions that were taken into consideration in discussions on the Sixth Framework Programme of the European Union. The Workshop also made a case for involving South-East European countries lacking pre-accession status in European space research (62).

The situation in South-East Europe prompted the Academia Europaea, European Science Foundation and UNESCO's Venice Office to initiate further action in the sub-region. The Conference of Experts on *Reconstruction of Scientific Co-operation in South-East Europe* (Venice, March 2001) sought to involve international funding agencies and scientifically advanced countries from the European Union in large-scale sub-regional projects. It also strove to promote scientific co-operation as a means of stabilizing the sub-region. The Conference paved the way for a proposal to hold a Round Table of Ministers of Science on *Rebuilding Scientific Co-operation in South East Europe* on the occasion of the 31st Session of UNESCO's General Conference (UNESCO Headquarters, November 2001). The Round Table recommended specific measures with a view to mobilizing resources for research grants and equipment, promoting exchanges, developing electronic networks, upgrading National Research and Education Networks and linking them to pan-European networks, and supporting communication services. Collaborative projects were recommended to tackle sub-regional problems and revitalize research capacities. These projects encompass such areas as the life sciences, agriculture, environmental sciences, information technologies, material sciences, civil engineering and sustainable development. A cost-sharing principle was recommended for funding the projects (62, 64).

Last but not least in the sub-region was the International Conference on *Science for Peace and Development: Regional Scientific Co-operation of the Successor States of the Socialist Federal Republic of Yugoslavia in the Context of European Integration* (Maribor, Slovenia, October 2001) (51).

A pan-European policy debate on ways and means of boosting regional scientific co-operation was the focus of the International symposium on the *Role of international organizations in the development of a common European scientific-technological space* (Kiev, Ukraine, September 2001) (64).

Among other fruitful activities within follow-up to the WCS was the International Congress on *Science and Education* held in Minsk, (Belarus, October 2000), which attracted participants from Europe, USA, Asia and Latin America. The Congress proceedings were published and disseminated in June 2001 (41,43). A further example was an international gathering held in Moscow (Russian Federation, November 2000) on the subject of chemical education and sustainable development. During the same month and in the same city, the International Centre for Educational Systems in Moscow convened the Second International Conference on *Young scientists' contribution to industry, sciences, technologies and vocational education for sustainable development: problems and new solutions*. The Resolution drafted at the Conference, which was approved by participants hailing from Europe, Africa and the Arab States, recommends to governmental, managerial, educational and production sectors a number of measures for increasing the role of young scientists (43, 46, 82). A noteworthy event also took place in the Slovak Republic. The fourth in a series of Central European workshops initiated within the WCS process on the contribution of the basic sciences to development, the Smolenice workshop (June 2000) considered possible co-operative initiatives for implementing the recommendations of the WCS in the sub-region, as well as the prerequisites for this (92). It also advocated setting up a sub-regional monitoring mechanism to assess the process of implementation. A similar initiative may be worthy of consideration in other regions.

4.6 Looking at the regions from a global perspective

The activities overviewed in the preceding paragraphs serve to demonstrate the impact of the WCS and the type of follow-up undertaken in the regions. The regional programmes embracing these activities relate to the first two years of follow-up. Although all the programmes have in common that they implement items on the same *Science Agenda*, each programme has its own distinctive features. The information selected and presented in the present report should allow each region to learn from action being undertaken in other regions. A reciprocal assessment of regional programmes would stimulate an interregional exchange of experiences and pave the way for joint interregional action.

An example of an interregional initiative is provided by the Euro-Arab Research Network launched at Ajman University in the United Arab Emirates (March 2001). The prime goal of the Network, which brings together nine Arab universities and seven universities from Europe, is the strengthening of national capacities in strategic scientific disciplines by linking projects and programmes in the participating universities, fostering joint research, sharing

information and data and mobilizing essential funding. The Network's initial activity focuses on marine science and ecology, coastal zone management, water resources and energy, biotechnology and health (9, 26, 27, 29).

This example leads us to make some more general observations on the activity of science networks.

Implementation of follow-up to the WCS should be based on existing science networks around the world and on the centres of excellence involved in implementing UNESCO's programmes in various fields of the basic and environmental sciences, engineering and science education. These networks are a proven strength of UNESCO. Over the years, they have demonstrated their efficacy in fostering the broadest possible participation by national, regional and international institutions. Today, they number more than 60 and embrace thousands of national institutions.

As stated in the Report to the WCS from the thematic meeting I-3 *Science in Response to Basic Human Needs*, "Networking is an important instrument to implement international co-operation. Networks are also a most valuable proactive action to create local conditions for scientific research and consequently effectively avoid brain drain from developing countries". Action by networks was also highlighted at thematic meetings I-5, II-3 and II-7 and in the presentations national delegations made to Forum III. It is hardly surprising therefore to find that several clauses of the *Declaration* and *Science Agenda* contain concrete guidelines for networking.

Given the scale of their operations, the world's science networks constitute an important resource on which the Organization could rely in the implementation of the *Science Agenda*. Over 40 of these networks are of a regional nature. The Asian and Latin American regions have the most developed system of networks. Although some networks are already actively participating in follow-up to the WCS, the role of many others has not yet been clearly identified. Since networking is one of the most direct ways to meet the needs of national and regional institutions and widen participation in WCS follow-up, it is recommended that the participation of regional networks in implementing the *Science Agenda* be thoroughly reviewed in the regions and reinforced during the forthcoming phase of follow-up.

Promoting awareness of the regional follow-up programme is an essential factor for stimulating the interest of scientists, decision-makers and donors. Although, in each region, the follow-up programme was conceived, and is being carried out, by the UNESCO Field Offices and their partners, to date there would seem to be no easily available or widely circulated document which informs regional communities of this programme and of opportunities for participating in it. The preparation and dissemination of an information brochure on

the regional follow-up programme is therefore recommended. Mention might be made in the brochure of the work the science networks are doing; this would enable their role in follow-up to the WCS to be better appreciated at the regional level.

Greater recognition should also be given to regional input designed to promote the participation of women in science. However, this issue will be the subject of further consideration later in the document in the section more specially addressing women's place in science. In overviewing the regional actions considered so far, one can already assess their expediency and returns. Indeed, the regional programme has been, and will continue to be, an important means of meeting national needs. We must think how to increase the efficiency of regional programmes and better adapt them to regional priorities.

Such a reflection would be particularly timely as UNESCO begins putting into action the Organization's Medium-Term Strategy for 2002-2007. The document contains new strategic objectives in all areas of the Organization's competence including science. Moreover, in the Part entitled, *A road map for a revitalized UNESCO: principles of action and programming*, there is a principal guiding statement addressed to the regions. It indicates that "building upon ongoing regional integration processes and priorities and linked to the Organization's renewal and decentralization efforts, UNESCO will develop specific regional and sub-regional strategies; these strategies will be

formulated by the stakeholders themselves in consonance with their objectives, priorities and specific agendas."

With regard to the practical implementation of this guideline, the Medium-Term Strategy emphasizes that, in the decentralization reform launched by the Director-General, the pivot for the process is to be the new network of cluster offices, regional and country offices which will allow close and proactive consultations with all the parties concerned. Thus, is the Strategy sends a clear message to regional communities, Field Offices and interested partners.

In the Medium-Term Strategy 2002-2007, follow-up action to the Budapest Conference appears as an important component of the Organization's activity in science and allied areas. It would therefore be expedient for medium-term regional and sub-regional strategies to be conceived and streamlined in accordance with the strategic objectives of the Organization. Moreover, these strategies should be implemented through regional and sub-regional approaches in the biennial programmes of UNESCO. It should be recalled that these approaches need to be revised and finalized once the new UNESCO field network is in place and following consultations with all stakeholders concerned. It is proposed that, once regional strategies and approaches have been identified, they be made widely known in the regions and to current or potential partners. It would also be practical if the regional brochure on WCS follow-up referred to above incorporated information on these issues.

5. UNESCO's response to the WCS

UNESCO's vision for follow-up to the WCS was first outlined in the Draft Programme and Budget 2000-2001 prepared for consideration by the 30th Session of the General Conference. This document was circulated to Member States in the spring of 1999, that is to say, several months prior to the WCS. The provisional follow-up action foreseen in this draft document was based on the results of several rounds of preparatory consultations held with Member States and the scientific community both on the WCS programme and the draft *Declaration and Science Agenda* to be considered in Budapest. Subsequent to the WCS, the Director-General submitted to the UNESCO Executive Board (Paris, October 1999) his report on the *Reorientation of UNESCO's programmes in the sciences to take account of the conclusions of the World Conference on Science*.

The recommendations of the WCS were considered by the 30th Session of UNESCO's General Conference (Paris October-November 1999), which provided a number of further guidelines to orient better the Organization's programmes towards the WCS goals. These guidelines, together with those of the Executive Board, were respected in

the final version of UNESCO's Programme and Budget for 2000-2001 (document 30 C/5 Approved, final version). The Organization's 2000-2001 programmes in education, basic, engineering and environmental sciences, information technologies, as well as in social and human sciences, were duly reoriented to take account of the outcome of the WCS. The strategy identified by the Organization was to contribute to the implementation of the WCS recommendations through action across the full spectrum of its relevant programmes, while highlighting some selected priorities, among them:

- the forging of national, regional and international partnerships to address complex interdisciplinary issues of sustainable development ;
- co-operation in capacity-building and human resources development;
- renewal and expansion of education and training programmes in S&T at all levels of education, both formal and informal, and promoting public awareness of science;

- relaunching the Organization's action in the area of science and technology policy, planning and management, paying due attention to new mechanisms of science funding;
- fostering the use of information and communication technologies in science;
- promoting international reflection on ethical issues related to advances in S&T and encouraging application of the principles set out in the Universal Declaration on the Human Genome and Human rights;
- promoting the participation of women and girls in all aspects of S&T;
- encouraging the involvement of young scientists in WCS follow-up, in particular through support to the International Forum of Young Scientists;
- developing region-specific approaches, co-operative networks and the mobility of scientists for the purposes of research and training, in order to counteract brain-drain;
- developing an intersectoral project on indigenous and local knowledge involving MAB, MOST, CSI and other relevant programmes and sectors.

These priorities constituted the core of the Organization's follow-up to the WCS during the 2000-2001 biennium. Attaining the Conference goals will entail sustaining momentum beyond the span of a single biennium into the medium term.

Issues relating to region-specific approaches and the development of networks were considered earlier and will therefore not be dwelt upon further. However, more needs to be said about the other UNESCO priorities listed above. These are covered below.

5.1 Addressing complex issues of sustainable development

UNESCO's five intergovernmental scientific programmes¹ are playing a leading role in WCS follow-up. As stipulated in the *Joint Statement* by the Chairpersons of these programmes to the 30th Session of the General Conference, they identify with the new contract between science and society called for by the WCS and have drawn inspiration from this. Particular mention should be made of the decision by the five programmes to develop activities in new thematic areas referred to in the *Statement*, namely:

- Strategy for the development of sustainable tourism in the Sahara.

IHP was particularly responsive to the recommendations of the WCS. The 14th session of IHP's Intergovernmental Council (Paris, June 2000) considered an ad-hoc Report on the WCS proposing a set of follow-up measures. Resolutions XIV-2, 4-8, 10, and 11 of the Council envisaged the reinforcement of IHP through a number of important initiatives now under way and contributing to the implementation of *Agenda 21* and the recommendations of the *Science Agenda*.

The first of these initiatives is the Hydrology for Environment, Life and Policy (HELP) Programme; it aims to strengthen field-oriented experimental hydrology using the drainage basin as a framework. In the long term, the programme seeks to promote progress in providing the hydrological information required to address water-related environmental issues of the third millennium (27, 29).

The second initiative addresses ethics of the use of freshwater resources and seeks to identify the ethical principles which may help to avoid conflicts and promote co-operation in water related issues in the context of diverse cultural backgrounds and an interdisciplinary approach (65, 71).

The third important IHP initiative addresses capacity-building and networking in the water sciences. This initiative is considered in 5.2.

Within the framework of the MAB programme, initiatives to implement the *Science Agenda* were the subject of in-depth discussion at the 16th session of the MAB International Coordinating Council (Paris, November 2000). The strategy identified by the Council highlighted the action MAB was to undertake through its World Network of Biosphere Reserves. This network embraces 406 sites in 94 countries, fostering the conservation of biological diversity, the understanding and use of traditional ecological knowledge, and South-South co-operation on environmentally sustainable economic development in the humid tropics. Emphasis is being put on collaborative work with a range of regional and international organizations for the implementation of paragraphs 29-34, 84 and 86 of the *Science Agenda*. Activities being carried out or envisaged encompass environmental education, training, public awareness, the use of information technologies and the promotion of women's participation in the ecological sciences.

A new global initiative in biological diversity education, training and public awareness-building is taking shape as a joint effort of the Convention on Biological Diversity and UNESCO. The most recent of several meetings on this project was held in Bergen (November 2000); it identified strategic options for the initiative in terms of a

- developing scientific tools for conflict resolution management (51, 52);
- environmental ethics (in collaboration with the World Commission on Ethics of Science and Technology) (71-73);
- traditional and indigenous knowledge systems involving local communities, natural and social scientists, and specialists in culture (32, 33, 84-86); and
- science education in the environmental sciences (33, 45).

The *Joint Communication of the Chairpersons of the Five Scientific Programmes to the Director-General presented at the 31st session of the General Conference* (Paris, October-November 2001) confirmed the continuing relevance of the recommendations made in their *Joint Statement* to the 30th Session of the Conference. Their relevance is particularly appreciated within the framework of strategic objectives 4 and 5 in the Medium-Term Strategy 2002-2007.

The commitment of the intergovernmental scientific programmes to WCS follow-up action is in fact twofold. It implies joint interdisciplinary action and, at the same time, autonomous action by each programme.

The *Science Agenda* called for a vigorous enhancement of interdisciplinary action involving both the natural and social sciences (31, 32). These paragraphs of the *Agenda* made particular reference to global environmental change, understanding of sustainability, the conservation of biological diversity and management of natural resources. To this end, and as planned in the *Joint Statement*, the five intergovernmental scientific programmes are developing joint demonstration projects in specific locations which lend themselves to an integrated approach in areas which range from research and training to policy implementation. Possible locations include large river basins and extensive wetlands, biosphere reserves, world heritage sites and coastal megacities. In this context, three interdisciplinary cross-cutting projects have been prepared for execution in the 2002-2003 biennium through co-operation between programmes in the natural and social sciences. These projects are:

- Enhancing disaster prevention and preparedness in selected poor communities at risk through the development and dissemination of wise disaster reduction practices;
- Promotion via new information and communication technologies of earthen construction systems and traditional know-how for sustainable housing;

communication strategy and future programme of work (33). A revised version of the map of the World Network of Biosphere reserves was issued to increase public awareness of biodiversity and environmental issues and a new ecotechnie Chair was set up at the Environmental Resource Centre in Bahrain (48). The revamping and upgrading of MABNet has been accompanied by a ten-fold increase in monthly "visitor-hits" to the MABNet website over 2000-2001.

The International Conference on Biodiversity and Society (New York, May 2001), organized by UNESCO and Columbia University, built on pilot projects being carried out in Biosphere Reserves for the development of viable strategies for the long-term stewardship of the Earth. New activities have taken shape within the People and Plants initiative promoting ethnobotany and the equitable, sustainable use of plant resources. Over the coming two years, priority will be given to the development and advocacy of "best practice" approaches and methods in wood carving, sustainable use of Himalayan medicinal plants and people/park relations. MAB's Biosphere Reserves Integrated Monitoring (BRIM, <http://www.ice.ucdavis.edu/mab/>) programme uses modern information and communication technologies to compile species inventories of plants and animals in Biosphere Reserves. During the last two years, MAB and the Information Centre for the Environment of the University of California in Davis (USA) have successfully co-operated on MABFlora and MABFauna (29-34), a component of BRIM which uses PC-based microcomputer applications to create standardized databases on species occurrence in EuroMAB Biosphere Reserves.

IGCP's principal contribution to the implementation of the *Science Agenda* has been through its activities in the Earth sciences, Earth system management and natural disaster reduction (29-34). In the latter area, emphasis is being laid on capacity building in risk assessment, early warning of natural disasters and mitigation of their effects. IGCP is contributing to fundamental and problem-oriented research, and is promoting science education and public awareness. One important area of this research is the study of crustal movements and deformations, which pose a threat to life, property, societies and industry in many areas of the world; the study is providing precious information on geophysical phenomena in the Earth's interior. Both scientists and society stand to gain a great deal from a better understanding of the Earth. As part of its national input to WCS follow-up, Finland hosted the IAG International Symposium on *Recent Crustal Movements* (Helsinki, August 2001). Since November 2000, over 30 training courses, workshops, meetings and conferences have been conducted around the world to provide geoscientific underpinning for the wise management of the Earth's environment and reduce humankind's vulnerability to natural disasters. Three regional extrabudgetary projects on disaster/risk reduction are being implemented by UNESCO in the Arab region, Central America and the Eastern Mediterranean.

5.2 Strengthening scientific, technical and human capacities

Building scientific, technical and human capacities has long been one of the priority components of UNESCO's science programmes. In the Medium-Term Strategy 2002-2007, this action appears as Strategic Objective 6.

Scientific training is central to capacity-building in science and the use of science. The Abdus Salam International Centre for Theoretical Physics (ICTP) and other international institutions in Trieste are contributing much to the international effort to train specialists, particularly those from developing countries and countries in transition. Tribute should be paid to the very generous on-going support being provided to the work of the ICTP by the Italian Government. ICTP and the International School for Advanced Studies (SISSA) in Trieste have launched a two-year Master's Degree Programme on Modelling and Simulation of Complex Realities in response to the discussions in Budapest. It should be recalled that Forum I of the WCS highlighted the need for new scientific approaches to understand the phenomenon of complexity. In this context, the Programme will explore the growing number of ways in which methods of applied mathematics and statistical physics are being used to address real-world problems related to complexity and uncertainty. Course work will be followed by internships in governmental agencies and industrial firms in order to expose students to problem-solving (9, 12, 31). Other noteworthy initiatives in capacity-building in the basic sciences and their applications are the reinforcement, with support from France, of training activities of the International Centre for Pure and Applied Mathematics (ICPAM) and the establishment of the International Centre for Synchrotron Light for Experimental Science and Applications in the Middle East (SESAME). These activities have already been discussed earlier. This year, a promising follow-up initiative in scientific training was undertaken by Israel, which launched a post-doctoral fellowship programme under the auspices of UNESCO. Fourteen candidates from Africa, Asia and countries in transition are spending twelve months at one of seven top Israeli universities (18, 33).

A series of significant moves to address capacity-building and networking is being undertaken by the IHP. Following the proposal made by the Government of the Netherlands at the Second World Water Forum, an International Institute for Water Education is being established on the basis of the International Institute for Infrastructural Hydraulic and Environmental Engineering (IHE) in Delft (Netherlands). The Dutch Government has generously pledged sustained financial support for the new Institute. The Director-General reported to the Executive Board at its 160th session (Paris, October 1999), on consultations concerning creation of the Institute as a follow-up activity to the WCS. Since then, the 31st session of the General Conference approved establishment of the Institute.

Moreover, it invited Member States, international organizations, development and donor agencies, and the private sector to contribute financially or by other appropriate means to the Delft Institute's implementation and expansion. The Institute aims to become an international reference for the provision of high-quality education, training and research, a centre of excellence for water-related education which contributes to the implementation of *Agenda 21* and the *Science Agenda* (11, 27, 29, 30, 33, 52). The setting-up of the Institute for Water Education is complemented by other important actions; these embrace the development of the Hydrology for Environment, Life and Policy (HELP) Programme and the UNESCO-IAEA Joint International Isotopes in Hydrology Programme (JIIHP). They also include the establishment of institutions such as a Regional Centre for Water Studies of Arid and Semi-arid Zones in Egypt, a Regional Centre for Urban Water Management in Iran (29, 33, 52) and an International Groundwater Resources Assessment Centre (IGRAC), the site of which has yet to be determined.

5.3 Promoting S&T education and public awareness of science

One of the major thrusts of discussions at the WCS and the resultant recommendations in the *Science Agenda* was the call for determined action at national, regional and international levels to improve and expand S&T education and to increase public awareness of S&T (41-49). The motivation behind this call was the pressing need to equip all young people and adults, male and female alike, with the scientific knowledge and skills required for the world of the 21st century. The provision of modern S&T education is an indispensable prerequisite to combating disparities between developed and developing countries and to paving the way for all countries to build prosperous knowledge-based societies.

In response to the WCS and in pursuance of their sustained efforts to promote science education, UNESCO's Sectors of Education and Natural Sciences have joined forces to develop a new long-term follow-up project on science education at all levels and in both the formal and informal spheres. During the 2000-2001 biennium, an Integrated Plan of Action for Science and Technology Education was conceived, the first phase of which is to be put into action during the 2002-2003 biennium. The Plan will be further pursued within the framework of the Medium-Term Strategy 2002-2007, in which it appears as an integral element of the Organization's efforts to achieve Strategic Objective 2: *Improving the quality of education through diversification of contents and methods and the promotion of universally-shared values*.

The Plan concentrates on building national capacities, notably by developing policy guidelines, implementing teacher training programmes and improving teaching

materials. It also places strong emphasis on facilitating access of girls and women to all forms of education, taking due account of the cultural context, and on assisting Member States to develop coherent programmes which follow through from basic education to secondary and higher levels of education. Particular attention will also be given to increasing links between higher education institutions and research institutes. This action will be complemented by the promotion of preventive education to tackle the HIV/AIDS pandemic and by the use of information and communication technologies in education. Additional staff support is envisaged for the Plan's implementation, one of several concrete steps taken by the Organization to revitalize its programme in science education, which is focusing in particular on innovative science and technology teaching. Intergovernmental and non-governmental scientific and educational organizations are invited to join in these efforts, which may have a far-reaching impact.

Recent action has encompassed major conferences such as the International Symposium on *Science Education of Asian Countries in the 21st Century* (Kariya City, Japan, September 1999), the International Conference on *Science and Technology and Mathematics Education for Human Development* (Goa, India, February 2001) and the *European Conference for Chemistry Teachers* (Vienna, Austria, April 2001). It has also included practical activities such as the dissemination of the new UNESCO Resource Kit on Science and Technology Education, training courses on "Microscience Experiments and DIDAC" in the Caribbean region (Trinidad, Jamaica and Guyana, December 2001), and the Evaluation Workshop on *Science Education Projects in Chad* (April 2001). The follow-up processes of both the WCS and the World Conference on Higher Education (WCHE - Paris, 1998) were brought together in the convening, at UNESCO Headquarters on 28-29 June 2001, of an Expert Meeting on strengthening research capacities and management in universities. This event marked the first phase in the creation of a UNESCO Research Management Forum, which will aim to strengthen national capacities in higher education and undertake analysis of the research mission of the higher education sector. With support from the Swedish International Cooperation Development Agency (SIDA), the initiative will inventory research capacities in higher education in Member States, as well as in IGOs and NGOs (41-46).

The introduction of new methodologies and information and communication technologies into distance learning at tertiary level is a goal of the project proposal elaborated for the EUMEDIS programme of the European Commission (49). The project is being implemented over the three years 2001-2003 and involves major institutions in distance education and training of the European Union and 11 Mediterranean countries. It focuses on training teachers in higher education, on setting up a network of production centres for distance training and on the elaboration of a large

collection of distance training modules. UNESCO's Sector of Communication and Information is currently preparing interdisciplinary project proposals to develop a virtual Mediterranean campus within the EUMEDIS programme, in co-operation with the Sectors for Education and Natural Sciences.

Examples of virtual campuses supported by UNESCO are the Avicenna campus and Arab Open University (Arab States), UNESCO Centre for IT-based Science Education and the ASEAN Virtual University of S&T (Asia-Pacific).

The impact of science on people's daily life and its profound societal implications, including those of an ethical nature, make scientific literacy a prerequisite for a democratic way of life. At the WCS, many voiced support for determined action to increase public awareness of science. The delegations of Ethiopia and Malawi, together with the British Association for the Advancement of Science, proposed that a World Science Day or World Science Week be created. The *Science Agenda* called for an international programme to promote broad-based scientific literacy and culture (49). UNESCO's Executive Board was responsive to these calls, recommending at its 160th session (Paris, October 1999) that a feasibility study be undertaken on a Science Day for Peace and Development (WSD). The feasibility study, which encompassed a broad consultation with stakeholders, was approved by the Board at its 162nd Session and subsequently endorsed by the 31st Session of the UNESCO General Conference (Paris, October-November 2001). Thus, a decision was taken to proclaim 10 November of each year World Science Day for Peace and Development and to encourage Member States, IGOs and NGOs, universities, research institutions, learned societies, professional associations and schools to take an active part in the event. All partners in the follow-up to the WCS were invited to participate in the preparation and celebration of the first World Science Day for Peace and Development in November 2002.

5.4 Streamlining S&T policies

The *Science Agenda* recommended a comprehensive programme of action to promote innovation in national science and technology policies and enhance scientific expertise (55-65). At the crossroads of the natural, engineering, environmental and social sciences, UNESCO reoriented its 2000-2001 activity towards developing guidelines for decision-makers and legislators in the conduct of policy reviews, in addition to enhancing national capacities in science and technology policy formulation and management. Exchange of experiences and best practices in science and technology innovation was encouraged through upstream advisory services and training activities, as well as through provision of technical assistance to some 15 countries

to revitalize their national science and technology systems. As illustrated earlier, regional follow-up action propagated the strengthening of science and technology policy networks in the Arab region, Asia and Latin America, and the creation of innovative sub-regional networks in Africa.

The funding of science is one of the basic components of any science and technology policy. The *Science Agenda* fosters the search for innovative and cost-effective mechanisms for funding science and the pooling of S&T resources and efforts of different nations (14, 15, 27). This particularly concerns poor countries in which insufficient financial resources makes it difficult to benefit properly from the service S&T can offer their development. It was in this context that the document on *Debt Relief for Science and Technology* was prepared; this document is now available on the science policy website (<http://www.unesco.org/science/pao/init.htm>). The proposal contained in this document follows recommendations in the *Science Agenda* and represents a first step in promoting the use of debt relief for science activities, in particular in the case of heavily indebted poor countries. This important initiative was proposed at the WCS by the Delegates of Mali and Senegal. It was supported by a concurrent meeting of Ministers of Science and other high-level officials from Africa.

In seeking to reinforce the momentum of UNESCO's action in science and technology policy, the Organization's Medium-Term Strategy for 2002-2007 highlighted the adaptation of science and technology policy to societal needs as one of the major means of achieving Strategic Objective 6. As in the case of science education, policy-making became one of the thrusts of WCS follow-up in the Organization's Programme and Budget for 2002-2003. In so doing, UNESCO intends to forge co-operation in standard-setting in the field of science and technology and innovation policy. The overall goal is to build expertise for managing science and technology for development, with emphasis on the participation of women and young scientists.

5.5 Fostering the use of information and communication technologies

The new information and communication technologies have become a fundamental factor of change, providing unprecedented opportunities for sharing scientific information and knowledge. The vital importance of this factor prompted the WCS to recommend and highlight specific lines of action promoting the use of information and communication technologies in the *Science Agenda*. Particular reference was made to electronic publishing, the establishment of virtual research and teaching environments or digital libraries, modernization of science curricula and delivery of high-quality science education to remote locations (20, 21, 35, 41).

Considering the huge potential of the electronic dissemination of scientific literature for the advancement of science, UNESCO and ICSU organized the Second International Conference on *Electronic Publishing in Science* in Paris, in February 2001. The Conference, convened in the face of pressing economic, legal and ethical concerns, brought together representatives of all links in the information chain to examine such issues as widening access to electronic literature, the impact of new legislation governing copyright and data bases on science, economic models for the electronic publishing of scientific journals, referencing and retrieval of scientific articles, ethical and privacy issues, etc. Representatives of the community of commercial publishers present at the Conference recognized that differential pricing for scientific electronic journals may be an effective way of combining a broader circulation in the Third World with an acceptable profit margin. The Conference constituted a real step forward in identifying a new paradigm to meet the needs of science in the North and South.

As mentioned in Section 5.3, the Sector of Communication and Information is currently preparing interdisciplinary project proposals to develop a virtual Mediterranean campus within the EUMEDIS programme of the European Commission, in co-operation with the Sectors for Education and Natural Sciences.. UNESCO is also launching pilot projects on virtual laboratories and campuses within cross-cutting activity in Africa, the Arab States and the Asia-Pacific region (see 5.3 for examples). The creation of a South-east European Network for Education and Research is also under consideration.

A new vista for action is provided by the Medium-Term Strategy for 2002-2007, which introduces a cross-cutting theme into UNESCO's programme, namely: *The contribution of information and communication technologies to the development of education, science and culture and the construction of a knowledge society*. In 2002-2003, the projects on virtual universities, electronic thesis and dissertations, and the UNESCO knowledge portal will, by their very nature, bring substantial responses to issues high on the Budapest agenda by (20).

5.6 Promoting ethical reflection

Recognizing the significance and growth of the ethical issues being raised by the progress of S&T, the WCS called for national and international responses involving expertise from both the natural and social sciences, and the participation of the scientific community, decision-makers and the public at large (58, 61-63, 71-77).

Accordingly, in 2000-2001, the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST), established by UNESCO, carried out a series of integrated multidisciplinary and multicultural analyses on the

ethics of energy, fresh water, outer space and the information society. COMEST's findings have been published in reports and publications such as *The Ethics of Freshwater Use*; *The Ethics of Space Policy*; and *The Ethics of Energy: Framework for Action*. COMEST helped create the Research and Ethical Network Embracing Water (RENEW), an international network designed to promote best ethical practices in the use of freshwater. While fostering public awareness of ethical issues in science, COMEST has contributed towards promoting a dialogue between the scientific community, decision-makers, youth and civil society at large. An international survey was carried out electronically by the American Association for the Advancement of Science (AAAS) in co-operation with COMEST (Washington, December 2000) with a view to identifying key ethical issues scientists are likely to encounter as the world enters the 21st century. Complex ethical issues stemming from advances in molecular biology and biotechnology were addressed by the International Bioethics Committee and Intergovernmental Bioethics Committee in pursuance of the work carried out in the field of human genome research.

UNESCO plans to amplify the current momentum of ethical reflection, in line with the recommendations of the WCS. To this end, the Medium-Term Strategy 2002-2007 incorporated a strategic objective devoted to ethics in the science programme, namely Strategic Objective 4: *Promoting principles and ethical norms to guide scientific and technological development and social transformation*.

In this context, the Programme and Budget for 2002-2003 envisages pursuing four main paths:

- developing a transdisciplinary, multicultural intellectual forum for ethical reflection;
- promoting standard-setting action;
- fostering education in, and public awareness of, ethical issues of science; and
- building national capacity in, and providing advice on, science ethics.

This programme's orientation opens up new ways of involving partners at the interface between the natural and social sciences.

5.7 Heightening the participation of women

Efforts being made to promote the participation of women in science and technology go beyond those already mentioned in Chapter 3. Within the framework of the 2000-2001 biennium, the special project: Women, Science and Technology was reoriented towards four lines of action,

namely: promoting lifelong science education of girls and women; gender mainstreaming in science and technology policy; development of networks for women scientists in Africa, the Arab region and Latin America; and creation of UNESCO Chairs and the training of teachers (78, 80, 81). In October 2001, a UNESCO Chair *Women: Science and Technology* was set up in Argentina and a Chair *Women and Development* is in the process of being set up in Burkina Faso. The project is also complemented by the development of a UNISPAR Toolkit project on Gender Indicators for engineering, science and technology, and a wide range of activities involving women in programmes in basic, engineering and environmental sciences (90). The Toolkit project provides an information package for planners and policy-makers on promoting women's access to and participation in engineering, science and technology.

It is noteworthy that, in the wake of the WCS, gender issues were further addressed at both national and regional levels. For instance, at its 132nd General Assembly, the Science Council of Japan (SCJ) adopted a proposal on "Concrete Measures for the Improvement of a Working Environment for Women Scientists", plus a Statement on "Encouragement of Gender Equal Participation at SCJ". The SCJ submitted the proposal to the government and to national universities with the aim of raising the ratio of women in Japanese universities and research institutions, enhancing child-care support systems and generating support from the research-aid fund (see also Section 3).

An important action-oriented declaration inspired by the *Science Agenda* was issued by the African Congress on Scientific Education for Girls (Lusaka, Zambia, June 2001). Participants in the Lusaka Congress committed themselves to working towards an international development target of eliminating, by 2005, gender disparities in Africa in primary and secondary education in general, and in mathematics, science and technology education in particular (90). The Congress declaration specifically called upon UNESCO to maintain priority focus on girls and science education, and women in science and technology.

In line with the recommendations of the *Science Agenda* and the Lusaka Declaration, the Organization envisages in its Medium-Term Strategy 2002-2007 and Programme and Budget for 2002-2003 promoting the access of women to science education, training and policy-making through the development of networks of women scientists, the establishment of UNESCO Chairs, the promotion of regional and global campaigns to facilitate women's careers in science, as well as other activities across the entire science programme. In this context, the creation, in 2002, of the International Network of Women Scientists and Engineers (INWES) at the meeting in Ottawa (Canada) is under preparation in co-operation with IBM, NORTEL of PETROCANADA, General Electric and many universities.

5.8 Encouraging the participation of young scientists

The WCS called for measures to facilitate the access of young scientists to careers in science and their greater involvement in the identification of priorities and policy-making in science (44, 82). The first step towards promoting the role of young scientists was made during the Conference itself through the establishment of an International Forum of Young Scientists (IFIS), the Secretariat of which is now located in Budapest. The IFIS constitutes a platform for a continual dialogue between young scientists reflects their views on science policy issues and the science–society interface. As reported in Chapters 3 and 4, during the 2000-2001 biennium, UNESCO encouraged the activity of young scientists and that of the IFIS by convening the European Forum of Young Scientists in Gdansk, Poland, and the Second International Conference of Young scientists in Moscow, Russian Federation. Young scientists have also received support through numerous training courses, workshops and fellowships within the framework of the UNESCO science programmes. In retaining these more traditional means of supporting young scientists in the Programme and Budget for 2002-2003, the Organization is placing emphasis on promoting an active role for young scientists and their networks in science-policy making and decision-making.

5.9 Cultivating values of traditional and local knowledge

The WCS advocated ‘enhanced support for activities on traditional and local knowledge systems’ at both the national and international levels (84). This recommendation is a form of recognition of the solutions traditional knowledge used to bring, and still bring, to problems encountered by local communities in combating marginalization and impoverishment and in conserving and managing local natural resources.

Traditional ecological knowledge was addressed within the framework of the MAB programme. The comparison of traditional and scientific knowledge of limnological processes and the revival of practices in traditional land usage and their application to generate employment for young people were the subject of studies in such sites as Pozuelos (Argentina), Pantanal (Brazil), Dja (Cameroon), Xishuangbanna (China), Cevennes (France) and Nilgiri (India). A seminar on *Innovative wisdom: the impact of traditional knowledge on science, conservation and development* (Yulee, Florida, USA, October 2000) was held to discuss the response from the non-governmental scientific community to the conclusions of the WCS with respect to traditional ecological knowledge.

A Pacific workshop on *Indigenous Science and Traditional Knowledge* (Wellington, New Zealand, September 2001), organized by the New Zealand National Commission for UNESCO, produced a sub-regional overview of indigenous knowledge and emphasized that protection of indigenous knowledge should be accompanied by action to sustain it. To this end, the Draft Model Law was presented. (see also Section 3)

An interdisciplinary initiative was launched by the Sector of Culture and the Sector for Natural Sciences to promote resource use sustainability through the articulation of the ecological knowledge of indigenous Moken people and marine scientists along Thailand’s Andaman Sea coast. The two Sectors are establishing an interdisciplinary UNESCO Chair on Indigenous Knowledge at the University of Papua New Guinea to guide field activities and train students in this area. In the *Best Practices Database on Indigenous Knowledge* established by the MOST programme, information is being updated on the use of indigenous knowledge in cost-effective and sustainable survival strategies covering Africa, Asia, Europe and Latin America. Linkages are also being strengthened between Indigenous Knowledge Resource Centres using information technology.

During 2002-2003, the project on *Local and Indigenous Knowledge Systems* (LINKS) in a global society is bringing a new dimension to current action. Conceived as a joint activity of MAB, CSI and MOST, the project constitutes an integral part of the second cross-cutting theme: *Eradication of poverty, especially extreme poverty* in the Medium-Term Plan 2002-2007. The LINKS project seeks to empower local and indigenous communities by reinforcing their capacity to create linkages and synergies between endogenous and exogenous knowledge and make informed choices for a sustainable future.

5.10 New framework for action

The re-orientation of UNESCO’s programmes in the sciences introduced by the Director-General (October 1999) to take account of the conclusions of the WCS constituted the first framework for action for the 2000-2001 biennium. Although the strategy of follow-up action the Organization has been following remains relevant, it does need adapting and/or developing in the new context provided by the Medium-Term Strategy 2002-2007 (document 31 C/4).

In the chapter relating to the sciences, the Medium-Term Strategy states that UNESCO will address contemporary challenges within an integrated framework, responding to the new social contract between science and society for the 21st Century as defined by the results of the WCS. The repercussions of such an approach are visible in various parts of the 31 C/4.

Promoting empowerment and participation in the emerging knowledge society through equitable access, capacity-building and knowledge-sharing is one of the three main strategic thrusts of the Organization's activity for 2002-2007. Eight of the twelve strategic priorities set out in the 31 C/4 are consonant with the recommendations of the WCS as concerns education, management of the environment and social change, information technologies, enhancing capacities to participate in the emerging knowledge societies and dialogue between cultures and civilizations. The two cross-cutting themes evoked above, which encompass the entire programme, namely:

- eradication of poverty, especially extreme poverty; and
- the contribution of information and communication technologies to the development of education, science and culture and the construction of a knowledge society,

call for a new commitment from science and, as shown in the preceding paragraphs, this would contain a substantial science input. The same is true as regards the seven International Development Goals the Organization highlighted in the 31 C/4: reducing extreme poverty; universal primary education; gender equality; infant and child mortality; maternal mortality; and reproductive health and the environment.

As emphasized in the 31 C/4, over the last decade a set of global conferences has given rise to a worldwide consensus on key challenges to humankind. The World Conference on Science in 1999 was one such conference. The Medium-Term Strategy points out that this conference charted the path for UNESCO's future investment in supporting and promoting scientific co-operation at all levels, with the Organization drawing on its unique comparative advantage of combining natural and human sciences under one roof. Needless to say, another advantage which UNESCO can boast of, namely that of being at the crossroads of education, science,

culture and communication, also brings unique opportunities for action.

The response to the WCS over the six years covered by the Medium-Term Strategy combines a reorientation of the entire programme in science and allied areas with a particular focus on selected priorities identified at the WCS.

Strategic Objective 4 incites the Organization to promote principles and ethical norms to guide S&T development and social transformation. The Organization will be striving towards this goal within its programme on *Ethics of science and technology implemented* primarily through COMEST.

Strategic Objective 5 seeks to improve human security by better management of the environment and social change. In this area, UNESCO's five intergovernmental scientific programmes will be the preferred tool for addressing major challenges posed by sustainable development. Freshwater resources and supporting ecosystems will be accorded the highest priority in science between 2002 and 2007 because they have become central to providing a scientific basis for environmental security.

Strategic Objective 6, which highlights the enhancement of scientific, technical and human capacities as a prerequisite to full participation in the emerging knowledge societies, forms the basis of the Organization's programmes dealing with the basic and engineering sciences, science policies, science education, as well as the use of information and communication technologies in research and science education, and the environment.

It is obviously important for UNESCO's partners in follow-up to WCS to be aware of the Organization's newly established Medium-Term Strategy, since the 31 C/4 foresees the conduct of an analysis of regional and sub-regional strategies to identify ongoing regional integration processes and priorities. UNESCO will undertake this analysis with relevant stakeholders.

6 Partnership involving international organizations: highlights

Many international organizations are implementing WCS recommendations. As stated in the *Science Agenda*, each international organization naturally retains responsibility for its own action and, consequently, for the reporting and assessing of its action in line with its specific priority. Notwithstanding this, it is fitting for UNESCO to overview WCS follow-up by international organizations on the basis of information received in its capacity as clearing house for follow-up to the WCS. As co-organizer of the WCS, the International Council for Science (ICSU) heads the list.

6.1 Follow-up by the International Council for Science

Like UNESCO, its partner in the WCS process, the International Council for Science (ICSU) has a special responsibility for follow-up to the Budapest Conference. As an international non-governmental umbrella organization embracing scientific unions and national members, ICSU has a particular mandate for promoting international scientific co-operation.

Subsequent to the endorsement of the *Declaration and Science Agenda* by the 26th Session of the General Assembly of ICSU (Cairo, September 1999), the ICSU Executive Board set up a special Working Group for the purpose of promoting and monitoring ICSU's follow-up action and, in particular, catalysing initiatives/projects within its community members. Examples of such initiatives are:

- Fostering greater access to data and information (ICSU Press, CODATA, INASP, SCFCS) and the active participation, with UNESCO, in the preparations for the World Summit on the Information Society;
- Promoting good practices in electronic publishing (Second ICSU/UNESCO Conference on Electronic Publishing and its follow-up);
- Primary education in science and mathematics (CCBS International Conferences in Beijing and Rio de Janeiro and their follow-up);
- Standards for ethics and responsibility in science: an analysis and evaluation of their content, background and function (SCRES);
- Global environmental change activities, including the convening of a Global Change Open Science Conference on Challenges of a Changing Earth (IGBP, WCRP, IHDP, DIVERSITAS) and follow-up meetings on the contributions of the global change programmes to science for sustainable development;
- An analysis of the political, social and economic changes of the past ten years and their impact on environmental research (SCOPE);
- Scientific and technical advice and support on Disaster Reduction in connection with follow-up to the UN-IDNDR (ICSU-CDR);
- Action on behalf of the international scientific community for the Commission on Sustainable Development's Multi-Stakeholder Dialogue at its 9th Session on energy and transport (April 2001);
- Review of Chapter 31 of Agenda 21 for the World Summit on Sustainable Development (WSSD) Process. Together with the World Federation of Engineering Organizations (WFEO), ICSU assumed responsibility for providing the Scientific and Technological Community's input to the Multistakeholder Dialogues during the WSSD process. In this process, the implementation of the WCS Declaration and its Science Agenda was highlighted;
- Initiative to help frame international scientific research priorities on genetically modified organisms (GMO) through a study of the scientific basis for benefit/risk assessment of GM-foods (IUNS/IUTOX), a state of the art assessment of recent publications on GM plants (ACOGEB) and a Science policy dialogue on GMOs;
- Strengthening of capacities to increase the involvement of women in science, e.g., through the IUPAP conference on women in science;
- A critical study to investigate the relationship between modern science and traditional knowledge in the context of the concern shown by the 26th Session of the General Assembly of ICSU with regard to the use of the expression 'traditional and local systems of knowledge' in the WCS documents [while appreciating the value of empirical knowledge built up over the generations, the study sought to help avoid approaches that may seek to promote anti-science or pseudo-science and degrade the values of science]. Collaboration with UNESCO in developing a collaborative partnership of Indigenous People, Business & Industry and UNESCO as part of the commitments submitted to the WSSD;
- Review of the activities of the ICSU Committee on Science and Technology in Developing Countries (COSTED) as part of WCS follow-up in relation to strengthening scientific and technological capacities of developing countries;
- Reviewing ICSU's ongoing activities and those of its Committees, scientific unions and national scientific members relevant to WCS follow-up and identifying new scientific initiatives for the future.
- Establishment of a competitive grants scheme in support of WCS follow-up activities implemented by the ICSU bodies .
- Development, together with UNESCO, of a science plan for biodiversity under the joint DIVERSITAS programme.

It should, however, be stressed that ICSU's follow-up action is not limited to the areas summarized above since, in general terms, the follow-up strategy pursued by this NGO is to contribute to the implementation of the WCS recommendations through the whole range of activities in science and allied areas within ICSU programmes.

Reference should also be made to ICSU/UNESCO collaboration within follow-up to the WCS. Co-operation

between the two Organizations began over 50 years ago; since 1996 this co-operation has been carried out on the basis of a Framework Agreement under the terms of which ICSU agreed to pursue certain objectives which are common to both organizations. In this context, the new Framework Agreement for 2002-2007 has been oriented towards major projects contributing to WCS follow-up. This Agreement highlights the development of international partnerships for strengthening national capacities in science, promoting science education and reinforcing co-ordination and collaboration between UNESCO's intergovernmental scientific programmes (IGCP, IHP, IOC, MAB, MOST) and ICSU's interdisciplinary bodies and other joint initiatives addressing global environmental issues. The further development of co-operation between the ICSU Committee on Responsibility and Ethics in Science and the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST) established by UNESCO is also foreseen.

6.2 Follow-up by intergovernmental organizations

Like other partners, intergovernmental bodies were expected to convey details of their WCS follow-up to UNESCO in its clearing house capacity. The following account is based on the information made available to UNESCO.

At the invitation of UNESCO, a group of intergovernmental partners in WCS follow-up met to develop informal consultations on the orientation of planned or implemented actions (Paris, November 2000). Represented in this round of consultations were the United Nations University (UNU), World Bank, World Health Organization (WHO), World Meteorological Organization (WMO), UNESCO and the Organisation for Economic Co-operation and Development (OECD). ICSU and the International Social Sciences Council (ISSC) were also present in their capacities as NGOs representing the scientific community of the natural and social sciences respectively. When addressing follow-up to the WCS, the meeting took into consideration co-operation within the WSSD process and international co-operation in science for development.

At the meeting, the partner organizations identified specific priority orientations for their action, namely:

- science for the alleviation of poverty and sustainable development; developing the Millennium Science Initiative as a new umbrella for lending support in the form of human resource training, research excellence and linkages to partners in the international scientific community and private sector (World Bank) (23-25, 28);

- generation of knowledge and its translation into practical applications in health-related areas, issues such as tobacco, malaria, health policy and health sector development, new genetics, ethical implications of biomedical research (WHO) (26, 28);
- scientific approach to complex systems relating to weather forecasting and long-range climate change; customer training in the use of scientific information (WMO) (30);
- promotion of an alliance between social and natural sciences in addressing issues of human life, the relationship between science and society and the environment (UNU, IHP, ISSC) (31);
- promotion of science policy in industrialized countries and development of co-operation in science policy with developing countries (OECD) (64);
- higher education and research in universities; innovation and specific aspects of science policy; societal aspects of environmental programmes? (UNU) (10, 31, 64).

Although the Food and Agricultural Organization of the United Nations (**FAO**) was unable to take part in the November 2000 consultation, it has paid considerable attention to WCS follow-up. Its programme of action incorporates five main actions that can be illustrated here.

In 2000, FAO action relating to science and technology policy and scientific advice to policy-makers and the public sector embraced a series of electronic conferences on biotechnology, integration of food security dimensions into national agricultural research policies and agendas and a workshop on biosafety policies and regulations in the Middle East (28, 62, 64). FAO is supporting national research systems in developing countries through action that includes development of a Master Plan for National Agricultural Research in Vietnam and Mali, and the launching of projects in the Central African Republic, Guinea Bissau, and Eritrea, as well as in Latin America (12). Its action to promote international co-operation is focused on support, through the Secretariat of the Global Forum on Agricultural Research, to regional and sub-regional forums and interregional co-operation in research and technology in agriculture, animal production and the agriculture-environment interface (23, 28). Knowledge sharing and access to scientific information are being promoted, including activities such as the exchange of information through web sites, case studies on the possible implementation of Agricultural Knowledge and Information Systems (AKIS) and pilot projects on a Virtual Extension and Research Communication Network in Egypt (20).

The Global Environmental Facility (**GEF**) has focused on issues of environmental degradation of global relevance. Over the years, GEF has funded 833 projects with a GEF investment of US\$3.2 billion along with a further leveraged investment of US\$10 billion. GEF's current activity addresses many of the important concerns voiced by the WCS. To cite but a few: the Rural Biomass Energy project (India) is adapting indigenously developed biomass gasification systems to locally available wood fuels (35), the Priority Protected Areas project (Philippines) involves holders of traditional ecological knowledge in the Protected Area Management Boards and builds bridges between traditional knowledge and modern science (29, 84, 87). GEF is instrumental in supporting major environmental assessments such as the Global International Waters assessment, the Millennium Ecosystem Assessment and the Intergovernmental Panel on Climate Change (29). It supports national communication systems dealing with biodiversity and climate change (20) and is increasingly building scientific capacities to address environmental needs in developing countries. Examples are a project on the Biodiversity of Semi-arid and Arid Tracts carried out in co-operation with the Third World Academy of Sciences (TWAS) and a Capacity Development Initiative currently being elaborated (29).

There is a paragraph of the *Science Agenda* that addresses clean and sustainable technologies, efficient use of energy, science and technology research, and the use of information and communication technologies for promoting sustainable technologies (35). These areas constitute major focuses of **UNIDO** action in WCS follow-up. This is also true of technology transfer to developing countries and technological and industrial policies, which has involved the establishment of national cleaner production centres, the promotion of energy efficiency through innovative, efficient processes in energy-intensive industries, support to projects which cut industrial emissions of greenhouse gases and laying of the foundations for a Digital Information and Service Infrastructure for small and medium-sized enterprises. Technology transfer to developing countries is facilitated through improved national strategies for technology promotion and projects on the Clean Development Mechanism in developing countries. A Technology Foresight for Latin America programme is under way and will be followed by a similar programme for Eastern Europe. UNIDO is undertaking both initiatives in co-operation with the International Centre for Science and High Technology (Trieste, Italy).

Follow-up to the WCS by the **UNU** encompasses such areas as environment and sustainable development, traditional knowledge and modern science and technology, science policy, information and communication technologies, and the setting up of UNESCO-UNITWIN chairs (20, 29, 64, 84). The University is interested in identifying and implementing joint co-operative projects in the field of water and the environment through PLEC, INWHEH and the

Environment and Sustainable Development Programme. The projects carried out at UNU/INTECH and UNU/INRA create a platform for links between traditional knowledge and science. The UNU is inviting FAO and UNIDO to co-operate in gene technology and agriculture. As a United Nations institution of higher education, the UNU is particularly interested in policy issues relating to higher education in science and the role of universities in scientific research. It is prepared to co-finance specific follow-up activities and recommends that a better definition of new collaborative perspectives for IGOs and NGOs be sought.

The action of the International Labour Office (**ILO**) has focused on the 2001 edition of the World Employment Report *Life at work in the information economy*, the content of which is highly relevant to Chapter II : *Science for peace and development* of the *Science Agenda*. The report urges the involvement of highly skilled people worldwide in the information and communication technologies and their connected underlining sciences.

A number of regional intergovernmental organizations have also declared their interest and signified their involvement in follow-up to the WCS.

The African Development Bank (**ADB**) has concentrated on the construction of science laboratories and technical workshops, support to computer science and information technology and promotion of science innovations. In line with this policy, the Bank funded education projects on quality and content of learning, and those aimed at promoting the dissemination of learning and scientific knowledge (20, 41, 43, 45). It also financed projects on the introduction into industry of advances in science (36-38). These projects were undertaken in the following African countries: Benin, Botswana, Burkina Faso, Guinea, Lesotho, Mozambique, Namibia, Niger and Senegal. Based on its experience and assessment, the Bank recommends that partners in follow-up to the WCS pay greater attention to:

- the cross-fertilization between the physical environment and social issues;
- projects financing transparency and management of science; and
- HIV/AIDS as a development issue at the top of the scientific agenda.

In 2000-2001, the Islamic Educational, Scientific and Cultural Organization (**ISESCO**), in co-operation with UNESCO, was instrumental in promoting the International Training Programme on Microscience Experiments and DIDAC in Benin, Gabon, Gambia, Guinea and Senegal.

The Latin American Centre for Physics (**CLAF**), an intergovernmental organization having 13 Member States,

reviewed its programme and elaborated future proposals in the spirit of the WCS. Its activity, which concentrates on promoting collaboration among Latin American countries, embraces post-graduate and post-doctoral fellowships and co-operative Ph.D. programmes, stimulation, in co-operation with the International Centre for Theoretical Physics, of research in less developed countries, the use of Latin American experimental facilities and collaboration with international centres of excellence such as the European Organization for Nuclear Research (CERN, Geneva, Switzerland) and Joint Institute for Nuclear Research (JINR, Dubna, Russian Federation). CLAF's proposals target the elimination of constraints impeding the mobility of scientists, higher education in physics in less developed countries, new regional experiments, South–South co-operation, science for the environment and society, and modernization of the funding mechanism.

In January 2000, the European Commission (EC) presented its related policy initiative entitled “*Towards a European Research Area*”, which addresses many issues of the *Science Agenda*. In February 2001, the Commission adopted the proposal for the European Union's new Research and Technological Development Framework Programme for 2002-2006, which is the main tool for implementing the European Research Area initiative. Within the European Research Area vision, science and society issues were grouped into the following priorities: governance, scientific advice, ethics, science and technology awareness, and women and science. For further information, the EC web sites: www.cordis.lu/rtd2002/ and www.cordis.lu/rtd2002/science-society/home.htm may be consulted.

In the context of WCS follow-up, the European Space Agency (ESA) draws attention to the initiative within which leading European international research organizations (EIROs) have joined forces in EIROFORUM, a co-ordinating and collaborative group whose membership comprises (SOLELY?) top executives (Directors-General or equivalent). This group includes CERN (particle physics), EMBL (molecular biology), ESA (space activities), ESO (astronomy and astrophysics), ESFR (synchrotron radiation) ILL (neutron source) and EFDA (fusion technology). Item 3 of the EIROFORUM Charter highlights co-ordination of the education and outreach activities of the organizations, including technology transfer and public understanding. EIROFORUM acts as a “facilitator of science”. The activity being carried out under its umbrella to promote science education is already producing results in Europe-wide. *Physics on Stage* (CERN, November 2000) and its follow-up event held at the European Space Research and Technology Centre in the Spring of 2002 is just one such example.

6.3 Non-governmental organizations: leadership of major actors

Many items of the *Science Agenda* call for action by NGOs (13, 28, 43, 46, 48, 67, 75, 76, 78, 86). These items concern the promotion of fundamental research, the involvement of scientific NGOs in solving problems linked to development, curricula design, the sharing of experiences in science teaching and education, building public awareness of science and the promotion of interdisciplinary research. The *Science Agenda* calls upon NGOs to participate in the public debate on the ethical implications of scientific work and the establishment of ethics committees in their field of competence. It also seeks their participation in promoting women in science and sustaining traditional knowledge systems. In short, the role with which they have been entrusted in WCS follow-up is considerable.

As stated above, an evident thrust of the *Science Agenda* is the solving of problems linked to development. The lion's share of items in the *Science Agenda* refers to various forms of co-operation with developing countries and their scientific communities (9, 11, 12, 17, 18, 19, 23, 25, 33, 40, 41, 45, 59, 84). In this context, the Third World Academy of Sciences (TWAS) plays a major role in follow-up. TWAS is the principal NGO uniting distinguished scientists from developing countries for the purpose of promoting scientific capacity and excellence for sustainable development in the South.

TWAS involvement in the preparation and holding of the WCS began at the meeting of the TWAS/UNESCO/ICSU Task Force for the WCS (March 1999). In co-operation with COSTED and UNESCO, TWAS prepared the WCS background paper on *Science for Development in the South* and organized the WCS Thematic meeting II.2 – Science for development. Members of TWAS made a significant input to discussions at the WCS and to the elaboration of the *Declaration* and *Science Agenda*. Following the Conference in Budapest, TWAS set out the principal orientations of its follow-up action, namely to:

- promote excellence in, and recognition of, scientific research in the South;
- assist in providing promising scientists from the South with research and training facilities;
- foster co-operation between scientists and research and training institutions in the South, and between these and their opposite members in the North;
- encourage research on Third World problems;
- promote scientific awareness and understanding of science in the Third World.

In practice, the activity of TWAS embraces:

- the awarding of research grants to specific scientific projects in developing countries, in particular those carried out by young scientists from least developed countries (LDCs);
- the awarding of fellowships and associateships to young scientists in the South for their training and research in centres of excellence in the South and North, in particular within the programme of training in Italian institutions;
- donation programmes for providing spare parts and scientific literature to institutions in need in the South;
- the awarding of TWAS Prizes in the Basic Sciences, the TWNSO Prizes in Applied Sciences, and Prizes to Young Scientists, as well as TWAS Medals;
- co-operation with TWOWS in providing fellowships to young female scientists from LDCs to pursue Ph.D. training at centres of excellence in the South;
- co-operation with TWNSO, UNDP, UNEP and WMO in developing thematic networks in the South for biodiversity, dry lands, fresh water management, medicine and food plants and climate change;
- fostering co-operation with regional Academies of Sciences, namely the African Academy of Sciences, the Latin American Academy of Sciences and the recently-established Arab Academy of Sciences, as well as the InterAcademy Panel;
- Assistance to the G-77 Secretariat in the implementation of the recommendations of the first G-77 South Summit (Havana, Cuba, April 2000);
- the development of co-operation with WMO in South-South fellowship programmes involving centres of excellence in such areas as climate, fresh water and oceans.

TWAS has also accorded priority to its partnership with UNESCO and ICSU on joint programmes or projects such as the *ICSU/TWAS/UNESCO Lectureship and Professorship programmes*, the *UNESCO/ICSU/TWAS Short-term Fellowship programme in the basic sciences* and the *TWAS/UNESCO Associate Membership Scheme at Centres of Excellence in the South*. A project proposal to launch a major fellowship programme in support of graduate and post-graduate education at centres of excellence in the South is being prepared in co-operation with UNESCO for submission to UNDP. Also under preparation is a feasibility

study for holding a series of regional or international workshops on an *Exchange of experiences in higher education and science and technology policies*.

A significant part of TWAS's efforts has been consolidated into WCS follow-up action targeting the least developed countries. Entitled *Strategic Programmes for the Least Developed Countries*, it provides research grants to individuals, research groups and institutions in the South, fellowships for post-graduate studies, advanced training, as well as associateships at centres of excellence in the South, and prizes to young scientists.

Given the orientation and scope of its activity, TWAS can, without a doubt, generate a considerable return on its investment in promoting scientific capacities of Third World countries. It provides ample opportunities for South-South co-operation and for co-operation with all partners interested in undertaking scientific ventures with the scientific community from the South.

The implementation of many *Science Agenda* items necessitates an interdisciplinary approach involving both the natural and social sciences. The International Social Sciences Council (**ISSC**), an umbrella body, is a major partner for UNESCO in the social sciences. As ISSC has given UNESCO to understand, a wide range of activities relating to WCS follow-up form part of the programmes and action plans of social sciences organizations. These activities highlight social aspects of the interface between science, society and the environment. In so doing, they address issues of science and technology policy, including scientific advice for policy-makers and the public sector, the participation of women and disadvantaged groups in science and the involvement of students in decision-making, new ways of funding research, protection of intellectual property rights, ethical norms in science and science for peace. Another group of issues that relates to research and education seeks a better understanding of societal needs and the impact of S&T on society. It also aims to solve environmental problems, reduce avoidable ill-health throughout the world and promote national research systems in developing countries while preserving the values of traditional knowledge.

One of the focuses of ISSC's action is the Comparative Research Programme on Poverty (CROP). CROP project address the best practices in poverty reduction, its ethical aspects, the role of a state and the interface between poverty reduction, law and human rights. In this context, a CROP/ISSER Workshop on *State and Society: Partnership in Poverty Reduction; The Role of the State in Poverty Reduction IV* took place in Accra (Ghana, October 2000) to extend the effort undertaken at earlier workshops in Botswana, Cape Town and Amman. The demography of poverty in Latin America was addressed at a workshop held in Buenos Aires (Argentina, November 2000). In Europe, a

national conference on *Partners in Research: Setting an Agenda for Norwegian Poverty Research in Collaboration with Researchers from the South* was organized in Oslo (August 2000). The World Federation for Mental Health (WFMH) developed an activity in multicultural, refugee and related issues. A Conference on Discrimination (Maryland, USA, March 2001), the World Health Day meeting (WHO office in Cairo, Egypt) and the meeting of the African Regional Council for Mental Health (Harare, Zimbabwe, February 2001) were main events within this line of action.

The 66th Session of the Executive Board of the World Federation of Scientific Workers (WFSW) (Courcelle-sur-Yvette, France, September 1999) gave rise to thoughtful discussions on the outcome of the WCS and desirable follow-up. The meeting highlighted, in particular, the need to take a stance on intellectual property (i.e. who owns knowledge?) and the social responsibility of scientists along the lines of discussions at the WCS. The Organization identified principal areas for its follow-up, including:

- ✓ science ethics;
- ✓ North-South co-operation;
- ✓ human dignity and urgent social requirements;
- ✓ human rights;
- ✓ gender equality in science;
- ✓ intellectual property;
- ✓ science for peace.

In this context, the WFSW is participating in the NGO/UNESCO Joint Programme Commission on Science and Ethics, which involves its affiliated organizations in the promotion of ethical norms in science. The WFSW is supporting contacts between scientists of the North and South through cash grants and gifts from publishing houses; it is also stimulating efforts by the institutions co-operating with the Federation. An International symposium on *Science, Society and Human Rights - Implementation of the UNESCO Declaration on Science and the Use of Scientific Knowledge for the 21st Century* was held in Regina, Canada (August 2000). Women scientists organized in specific committees in WFSW-affiliated national organizations are active in Argentina, Canada, France, Jamaica, Japan, Madagascar, Portugal and Senegal. The WFSW is launching a programme on intellectual property, in particular vis-à-vis the situation in developing countries. The use of embryonic stem cells prompted the WFSW to issue a caution on the gap that separates the knowledge of scientists from that of the public as a whole, which may result in the emergence of an irrational public perception of progress in science. In response to this and other similar concerns, the International Cell Research Organization (ICRO) has indicated its willingness to organize a series of specific training courses for science journalists on the meaning and potential of the new knowledge and technologies resulting from advances in biology.

When conceiving its follow-up action, the International Network of Engineers and Scientists for Global Responsibility (INES) sought responses to each chapter of the *Science Agenda*. With a view to promoting knowledge for progress, INES established the European Databank for Sustainable Development in co-operation with the Institute for Sustainable Projects. This databank lists European institutions, associations and experts, and can be reached through Internet. The INES Nepal project provides the University of Kathmandu with financial support, books, computers and laboratory equipment. The International Conference on *Challenges to Science and Engineering in the 21st Century* (Stockholm, Sweden, June 2000) was held as WCS follow-up and as a flagship event for the Year for a Culture of Peace.

The contribution of students to decision-making is being promoted within the framework of a project entitled, *Students Exchanging Environmental and Development Solutions*. The project brings together students from Sweden, Canada and Zambia who are involved in preparing the students' conference in Lusaka. Within the project, an interdisciplinary environment and development centre will be established in Zambia after the model of the CEMUS Centre already set up at Uppsala University. Some of the INES projects relate to the science and society relationship; to cite just two: the *Ethics Protection Initiative* provides support to persons suffering or fearing reprisals because of their ethically motivated efforts; the project *Science, Peace and Global Ethics for a Responsible Civil Society* strives to develop responsible citizenship.

In response to the WCS, the World Association of Industrial and Technological Research Organizations (WAITRO) incorporated in its Medium-Term Plan for 1998-2002 a number of activities in the following areas of relevance to WCS follow-up:

- knowledge management for research and technology organizations (RTOs);
- best practices for the management of RTOs;
- capacity-building in research and development of fermentation technology for African food products;
- connectivity and use of Internet resources in developing countries; and
- promotion and dissemination of cleaner production technologies.

It was proposed, for example, that in Africa the coverage of WAITRO's food quality programme be widened during 1999-2002 and that the experience gained be replicated in other regions. In 2000 within its action on Internet resources, WAITRO launched a programme for the

donation of used hardware to 10 research institutes and universities in Africa. It is planned to involve many private companies in Europe in the further development of this donation programme.

In its capacity as clearing house for WCS follow-up, UNESCO gratefully acknowledges the contribution from a number of other non-governmental organizations and foundations, namely: the Community of Mediterranean Universities, the Conflict Early Warning Systems Research Programme, the Council for International Organizations of Medical Sciences, the European Academy of Arts, Sciences and Humanities, the European Science Foundation, the International Court of the Environment, the International Union Against Cancer, the International Sociological Association, the International Union for Vacuum Science, Techniques and Applications and the M.S. Swaminathan Research Foundation. These organizations all communicated with UNESCO to express their interest in WCS follow-up and pointed to the fact that the entire orientation of their programme was henceforward aligned with goals of the WCS process.

This overview of actions being carried out by some of the principal international scientific NGOs demonstrates the significant role NGOs are playing in follow-up to the WCS. The full extent of their operations goes, of course, far beyond

the examples considered above. It is useful to recall that 79 international NGOs participated in the Budapest Conference. Following the NGO consultation meeting held in conjunction with the WCS and the debate at Forum III, they collectively proclaimed themselves ready to act with determination and offered their expertise in further planning and in implementing the new commitment to science in the 21st century. Before preparing the present report, UNESCO contacted some 150 NGOs concerned with science and science education. Fifty-seven of these have official relations with UNESCO and in this capacity are close allies of the Organization in building up the new commitment to science sought by the WCS.

Although UNESCO only has limited information at its disposal, it would nonetheless seem that the NGO commitment to WCS follow-up has not yet fully taken shape and that an effort needs to be made towards a concerted strategy and co-ordinated action. This could, for example, be done through the Liaison Committee of NGOs in Official Relations with UNESCO. This Committee has already taken the important step of establishing the Joint NGO-UNESCO Programme Commission on Science and Ethics addressing ethical items of the *Science Agenda*. It could therefore be suggested that the Committee also set up a mechanism to stimulate, oversee and evaluate the contribution of NGOs to the implementation of follow-up to the WCS for 2002-2007.

7 Towards a new phase of follow-up: conclusions and recommendations

When examining activities carried out, initiated or planned within follow-up to the WCS, we may conclude that, during the first biennial phase, partners have made noticeable efforts at national, regional and international levels. These efforts have made it possible to create the initial momentum needed for a reciprocal commitment between science and society. Partners in follow-up have also provided a suitable launching pad for the main medium-term phase needed if the whole range of societal and environmental needs is to be addressed with the close involvement of science. It is now time to look to the horizon and in so doing take account of the first lessons learned by each partner during the initial phase of follow-up.

The Medium-Term Strategy 2002-2007 approved by Member States at the 31st Session of UNESCO's General Conference has set a six-year span for the major phase of WCS follow-up. In no way does this seek to fix a time limit for co-operation in harnessing science to society; it is merely a means of indicating the period during which it is hoped the move towards a new commitment to science will become most tangible. As emphasized earlier, the *Declaration* and *Science Agenda* adopted in Budapest identified the general strategy and main lines of action. It is now for each partner in the

follow-up process to assume responsibility for its action and consider introducing its own medium-term strategy.

Let us be clear: effective follow-up to the WCS involves not merely a combination of independent actions by various partners. On the contrary, it implies close co-operation across the borders separating countries and institutions; it necessitates coordination of effort, a collective evaluation of the actions undertaken and a joint exercise to identify further action. To this end, UNESCO's Programme and Budget for 2002-2003 envisages that, in its capacity as clearing house, the Organization launch an evaluation of follow-up to the WCS in 2004 (Budapest+5). Following the tradition established within the WCS process, this will be done in full consultation with partners. The 162nd Session of UNESCO's Executive Board recommended that, once the preparatory consultations have been terminated, a meeting of partners in follow-up be organized in 2004 so as to assess collectively the results achieved and identify major endeavours to be undertaken. It is proposed that such a meeting be of a much smaller scale than that of the WCS itself. It should, however, be sufficiently representative, involving all the regions of the world and major partner institutions. The Meeting could be considered a half-way mark in monitoring

and stimulating further implementation of the *Science Agenda*.

The follow-up currently being pursued by Member States and international and regional institutions addresses a wide spectrum of items in the *Science Agenda*. It was the WCS participants themselves who selected for the *Science Agenda* those issues of priority to them and which sought to respond to very real needs of society. Hence, this comprehensive approach to implementation of follow-up is amply justified. Notwithstanding this, the crystallization of actions taken by various partners in response to some of the incentives of the WCS shows that there has been a trend towards a consolidation of activities on distinct thematic issues. An example is provided by UNESCO's Programme and Budget for 2002-2003, which clearly highlights follow-up actions in science education, science policy and ethics of science. It is therefore tempting to call for consultation between interested partners in order for them to join forces on certain flagship initiatives. Needless to say, these initiatives will need to be well articulated in terms of planned activities and expected results. The incentives addressed in Sections 5.1-5.9 provide some possible options for consultation. In this context, it is suggested that background documents on possible initiatives be prepared in co-operation with partners and that these be considered at the proposed Consultative Meeting in 2004.

Both the *Declaration* and the *Science Agenda* called for increased co-operation between science and industry, as well as between the public and private sectors, in the promotion of scientific research for long-term goals. As pointed out in the *Declaration*, the two sectors should work in close collaboration and in a complementary manner in the financing of such research. However, when reviewing follow-up activities, stakeholders in science representing industry and the private sector do not yet seem to have articulated their participation in follow-up action, although these sectors of society are direct beneficiaries of scientific innovation, science education and public investment in these. However, industry also makes a major contribution to scientific research, an increasing proportion of which is being funded by the private sector. This observation conjures up once again the remark by *The Economist* in 1999 that science-based industrial firms did not bring something significant to the party (i.e. the WCS). It is proposed therefore that, during preparation for the Consultative Meeting of partners and Member States in 2004, efforts be made to establish an international mechanism to reinforce dialogue between science and industry as one of the priority initiatives within WCS follow-up.

The experience gained from implementing, planning, evaluating and coordinating follow-up in 1999-2001 prompts some further proposals and/or observations from a clearing-house standpoint. These proposals/observations are recapitulated below. A number of them make reference to the rationale and conclusions set out in some of the preceding sections.

There is a need to reinforce the ongoing dialogue with Member States within follow-up to the WCS. This implies a greater flow of information from Member States to UNESCO and vice versa, and through UNESCO to all partners, on needs, proposals for action and action undertaken (Section 3). It is in this way that we can avoid 'missing the boat' by identifying opportunities for co-operation. One effort in this direction would be the preparation in 2003 of national reports on follow-up to the WCS, to be made available to partners prior to the Consultative Meeting in 2004. It would be desirable for these reports to contain information on national needs, proposals for action and actions undertaken, in the form of a national report on follow-up, together with a succinct assessment of national science and its service to the nation. UNESCO plans to consult its Member States on a model format for such a report. The publication produced by the Canadian National Commission may provide inspiration in this respect (see Section 3). The participation of a given country in the dialogue with partners on follow-up could also be facilitated were a focal point to be designated in those countries that have not yet done so.

Within its programme, UNESCO invites Member States to use the Participation Programme and extra-budgetary sources to launch and/or develop national follow-up projects. The Organization is ready to give attention to such projects submitted under the Participation Programme and is more than willing to provide the necessary expertise for the preparation of project proposals for extra-budgetary funding.

As emphasized in Section 4.6, prompt action should be taken in the regions to elaborate regional and sub-regional strategies for follow-up to the WCS within the new framework established by the Medium-Term Strategy 2002-2007. Such action implies the participation of countries from the region or active on the regional arena, regional institutions and international bodies. In this context, a series of consultations will be conducted by UNESCO's Field Offices during the course of 2003. These consultations will be initiated by correspondence on the occasion of the circulation of the present report and may be pursued through ad hoc consultative regional meetings or meetings to be held in the course of programme implementation. Note should be taken that ICSU is establishing four Regional Offices. Such a step would facilitate UNESCO-ICSU collaboration in a regional context. Once regional strategies and approaches have been identified, these should be made widely known in the regions and to exterior partners. To this end, regional brochures on WCS follow-up should be prepared and circulated by the Field Offices of UNESCO.

It would also be important to review the strategy for follow-up at the international level. As pointed out in Section 6.3, the activity of NGOs is a considerable resource. This was particularly demonstrated by ICSU, a major partner of UNESCO in the WCS process. However apart from ICSU

action, when one considers the number of NGOs and their potential, it would be fair to say that feedback has so far been relatively limited. It might therefore be helpful for the commitment on the part of NGOs within the new phase of WCS follow-up to be identified through consultations conducted in co-operation with the Liaison Committee of NGOs having Official Relations with UNESCO. Solidarity on the part of these scientific and educational NGOs would be an important factor on which the Organization should be able to rely.

Part of UNESCO's clearing-house responsibility is to regularly consult its Member States and some 200 international organizations and donor agencies on their accomplishments, plans and proposals as regards WCS follow-up, and to circulate information to them. It was for this reason that the Organization did not establish a specific monitoring body during the initial period of follow-up that may in some way have limited the initiative and responsibility of its partners to launch and develop their own follow-up activity. As follow-up enters its major phase when more co-ordination and a more proactive policy may be required from the clearing house, the Organization intends to consult its partners on options for monitoring the follow-up process. In this regard, it is worth mentioning that bilateral memoranda on co-operation within the follow-up have been elaborated by the executive officers of ICSU, TWAS and UNESCO for the co-ordination of activities decided upon by their governing bodies. Other international or regional partners wishing to outline their commitments to follow-up in a similar manner are invited to do so.

Implementation of follow-up to the WCS necessitates a continual flow of information on the activities undertaken, being carried out or planned by a wide range of international, regional, intergovernmental and non-governmental partners and Member States. However, in the new phase of follow-up, it is not only dissemination of information that matters. The Budapest Conference was conceived to promote a reciprocal commitment between science and society through dialogue and co-operation between all stakeholders in science. Various measures now need to be taken to promote this. A dialogue will channel co-operation for implementing and directing follow-up actions.

In this context, it should be recalled that UNESCO established an electronic journal on follow-up in 2000, namely the *WCS Newsletter* (<http://www.unesco.org/science/wcs/newsletter>). The *Newsletter* relies heavily on contributions from all partners in follow-up, who need simply send a few lines on a given activity to wcs-newsletter@unesco.org; the electronic *Newsletter* is proving to be a useful source of information for any targeted audience. It offers partners an opportunity to communicate information on what they are doing and to seek feedback from others. In 2003, an international platform will be developed within the *Newsletter* for extended discussion on the principal issues

raised by the WCS and on what is being done to promote science and its service to society. This section of the *Newsletter* will serve as an antenna, receiving signals from the scientific community, decision-makers and the public at large and scattering these signals around the world. The electronic forum will be a particularly appropriate medium for discussion on interdisciplinary issues, such as those involving the natural and social sciences, the relationship between science, society and the environment, and science ethics.

Another means of developing contacts with and between stakeholders in the Budapest Conference is the list of participants. This list is in fact an instrument which favours contact and dialogue. One way of extending the current dialogue could be to circulate a questionnaire to participants in the WCS requesting their feedback on the impact of the Conference and actions they feel should be highlighted within the new phase of follow-up. The response to the questionnaire could be considered instructive input at the evaluation meeting in 2004.

As pointed out in the *Declaration*, the inherent function of the scientific endeavour is to carry out a comprehensive and thorough inquiry into nature and society, leading to new knowledge that in turn provides educational, cultural and intellectual enrichment and leads to technological advances and economic benefits. In this context, the Executive Board of UNESCO, at its 160th session, recommended the preparation of a feasibility study on the creation of an international programme in the basic sciences, which constitute the foundation of the science endeavour. This study is currently being undertaken in consultation with UNESCO's partners in the basic sciences, among them ICSU, its scientific unions and national members, and TWAS. The issues under consideration are:

- goals of a new international programme;
- recommendation of the Science Agenda that urges the agencies of the United Nations system to foster co-operation in order to improve the quality and efficiency of their support to research in developing countries (12);
- focus of a programme embracing basic scientific disciplines;
- regional dimensions of the programme;
- status of the new programme vis-à-vis the existing regular programme in basic sciences; and
- financial and administrative implications.

At this stage, it is planned that an ad hoc committee of experts representative of the different geographical areas will hold a meeting for consultations and preparation of the

preliminary draft of an International basic sciences programme in the framework of an option they will identify as the most expedient. Feedback from participants in WCS follow-up would constitute an important element of the examination of the proposal.

On the international stage, a series of World Conferences has addressed cardinal issues concerning education, science, society and the environment, namely:

- the United Nations Conference on Environment and Development (UNCED, Rio de Janeiro, June 1992);
- the World Conference on Higher Education (WCHE, Paris, October 1998);
- the World Education Forum (WEF, Dakar, April 2000).

The follow-up to the WCS is therefore not an isolated process but rather one that deserves to be interconnected and co-ordinated with the implementation of Agenda 21 and the follow-up to WCHE and WEF. Moreover, the World Summit on Sustainable Development held in Johannesburg in August/September 2002 served to reveal new vistas for co-operation and coordination of the follow-up to global conferences. This opportunity should therefore be taken into consideration in the strategy for follow-up to the WCS in 2002-2007.

The preceding observations outline a framework for the new phase of follow-up, a framework relying heavily on the initiative and responsibility assumed by individual or institutional partners and Member States. For its part, UNESCO is prepared to pursue its clearing house role for follow-up in co-operation with ICSU and to implement its commitment to promoting science and the use of scientific knowledge within its own mandate. Determined follow-up action by all stakeholders in science is indeed called for, in order for all nations to benefit from scientific progress. As Professor Werner Arber, Co-organizing President of the WCS and Nobel Laureate, put it: “We need to move towards a responsible, peaceful and sustainable co-existence between all members of human society. We should mobilize human intelligence to let our evolution thrive in a responsible way in a society living in peace with a well-preserved biosphere embedded in its natural substrate on that planet – Earth.”

Postscript

Although a relatively limited time has elapsed since the Conference in Budapest, a retrospective review of developments generated by this worldwide forum leads us to the conclusion that the WCS was a worthwhile exercise. The fruitful work of the Conference, recognized by both Member States of UNESCO and international partner bodies alike,

provided a consensus on what needed to be done to harness science to the needs of society; the Conference also inspired stakeholders in science to join forces to achieve their common goals within the *Science Agenda*. The Conference has put a valuable instrument in the hands of all partners; it has given impetus to action by the scientific community, policy- and decision-makers and society at large. As can be seen from the present report, this impetus has had a real impact. Now we must make sure that this impetus is not dissipated.

As follow-up enters the next phase, it will have the framework outlined in UNESCO's Medium-Term Strategy 2002-2007 to build on. With further effort on the part of all partners, we should be able to draw full benefit over the next six years from the exciting opportunities offered by the World Conference on Science. Whether or not follow-up lives up to expectations depends upon each and every one of us.