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on the Ethics  
of Scientific  
Knowledge and  
Technology*

# COMEST EXTRAORDINARY SESSION

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**OF**

**THE WORLD COMMISSION**

**ON THE**

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**AND TECHNOLOGY**

**(COMEST)**

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## INTRODUCTION BY THE ASSISTANT DIRECTOR GENERAL FOR SOCIAL AND HUMAN SCIENCES

After the President of COMEST, Mr Alain Pompidou, had opened the Extraordinary Session and welcomed the participants, he invited the Assistant Director General for Social and Human Sciences, Mr Pierre Sané to take the floor.

On behalf of the Director General, Mr Sané welcomed participants, and especially the new and reappointed members of COMEST. He noted that, in recent years, the work of COMEST had been less visible than the work of the International Bioethics Committee. He stressed however that the mandate of COMEST is of crucial importance to the international community and that the thematic priorities chosen for COMEST's work in 2008-09 are of profound significance. He emphasized that science and technology are global public goods as entailed by the Universal Declaration of Human Rights and asserted in both the 1974 Recommendation on the Status of Scientific Researchers and the 1999 Declaration on Science and the Uses of Scientific Knowledge. However, the institutional mechanisms to ensure that science and technology serve the needs of humankind remain inadequate. Mr Sané focused his remarks on science ethics, environmental ethics and emerging ethical challenges, three components of COMEST's work that intersect with key international concerns.

Concerning science ethics, he underlined the practical and ethical imperative to mobilize science and technology for peace and development, and in particular the importance of protecting and enhancing the integrity of science, dynamic international scientific cooperation and strengthening of national research systems.

With respect to environmental ethics, Mr Sané looked forward to COMEST's forthcoming report on the ethical implications of climate change in the context of the UNESCO strategy to address the challenge of global climate change as endorsed by the Executive Board in October 2008. He pointed out that the clari-

fication of ethical issues will not remove the political sensitivity of the balance between the "common" and "differentiated" responsibilities established by the Framework Convention on Climate Change. Ethical reflection will, however, make the political process more transparent to the underlying human needs and vulnerabilities. Mr Sané noted, furthermore, that while awareness of the implications of global climate change has increased significantly in recent years, it still remains at a generic level.

Referring to emerging ethical challenges, Mr Sané reminded participants that the key mission of UNESCO is to alert Member States to ethical issues that might arise and to consider proactive options to address them. Although COMEST is not called upon to report specifically in this area in 2009, its deliberations are of great importance in alerting UNESCO to concerns not currently addressed in its programme. Mr Sané noted that identification of issues needs to build on science and technology foresight, but must also be solidly rooted in ethics; ethical challenges need to be addressed by the development of ethical principles and mechanisms. When these exist and if they are adequate, relevant stakeholders must be aware of the full range of scientific, technological and ethical issues. Ethical objectives can be attained only if ethics is embedded both in strong institutions and in public consciousness. Mr Sané concluded by stressing the urgency and the importance of the task entrusted to COMEST and thanked the members of COMEST for their commitment to their mission.

## PRESENTATION OF UNESCO'S PROGRAMMES IN ETHICS OF SCIENCE AND TECHNOLOGY AND COMEST'S ROLE IN SUPPORTING THEM

The Executive Secretary of COMEST, Mr **Henk Ten Have**, briefly presented the history of UNESCO's work in ethics of science and technology and the organizational structure of the programme. He explained that the programme is divided into two clearly distinct areas: bioethics and ethics of science and technology. Some activities, however, are common to both. He further explained that the Division of Ethics of Science and Technology is divided into two sections: Bioethics and Ethics of Science and Technology. There are three statutory bodies (the International Bioethics Committee, the Intergovernmental Bioethics Committee and the Interagency Committee) that deal with bioethics, while COMEST focuses on ethics of science and technology.

The Executive Secretary then recalled the context, processes and methods of work that led to the creation of COMEST. He detailed the debate that took place between 1989 and 1998, starting with the creation of the Universal Ethics project, then the programme of Philosophy and Ethics and finally the establishment of the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST) during the 154th session of the Executive Board in 1998. He then described the mandate, task and composition of COMEST, stressing the fact that ex-officio members form an integral part of the Commission. COMEST's tasks are to formulate, on a scientific basis, ethical principles that can shed light on the various choices and impacts occasioned by new advances in scientific and technological fields, thus fostering a constructive ethical dialogue on the values at stake. It is an intellectual forum for the exchange of ideas and experiences, and its main roles include: the promotion of dialogue between scientific communities, decision-makers and the public at large; advising the Director General and the Member States on the orientation of UNESCO's programme in ethics of science and technology; and detecting early signs of risk situations.

The Executive Secretary gave an overview of activities of COMEST during the years 1999 to 2004 describing the various fields of action and working methods. During that period, COMEST focused on the ethics of energy, fresh water, the information society, outer space, and the teaching of ethics. He further stated that COMEST's priorities for the years 2004 to 2008 were environmental ethics, science ethics and technology ethics including outer space, nanotechnologies and information technologies. He also highlighted the Avicenna Prize, an initiative of the Islamic Republic of Iran, as the only international prize rewarding the activities of individuals and groups in the field of ethics of science and detailed the procedure for nomination for this prize. The Executive Secretary called attention to the common cross-cutting activities of the two sections: the Global Ethics Observatory (GEObs) and the Ethics Education Programme (EEP). GEObs is a system of six databases covering experts, institutions, ethics teaching programmes, legislation, codes of conduct and resources in ethics. The database is freely accessible and is available in 6 languages (Arabic, Chinese, English, French, Russian, Spanish). The Ethics Education Programme is engaged in mapping experts in ethics, sampling teaching programs, developing the bioethics core curriculum, training teachers in ethics and finally compiling ethics resources. The Executive Secretary noted that most areas covered under the ethics teaching programmes relate to bioethics and the medical field, with some programmes on environmental and engineering ethics. He suggested that there are still opportunities to further diversify the fields of ethics teaching programmes. He also showed the number of ethics teaching programmes per country and commented that it varies greatly from country to country, for a range of reasons.

Finally, the Executive Secretary formulated the rationale of COMEST's activities for the next six years,

as stated in the UNESCO Medium Term Strategy for 2008-2013: to ensure the monitoring and analysis of the impact of scientific and technological innovations on human rights through the strengthening of UNESCO action on the ethics of science and technology.

Questions were raised about the under-representation of Latin America in the ethics teaching programme and the apparently low participation of the region in ethics-related activities; the criteria used for the validation of ethics teaching programmes in GEObs and whether the programmes have UNESCO's patronage. The Executive Secretary responded that COMEST had met in Ordinary Session in Rio de Janeiro in 2003 with the explicit objective of enhancing the involvement of Latin American scientists. Several consultation meetings took place in Brazil on codes of conduct and there are national COMEST committees in the region, e.g. in Argentina. Regarding the criteria used for the validation of ethics teaching programmes, the Executive Secretary explained that these programmes do not have UNESCO's patronage. Experts in teaching of ethics are identified at university level and are invited to provide data, e.g. on their course content, number of students and hours of teaching. The quality of their course is not evaluated.

COMEST members voiced concerns that despite the amount of work carried out, it appears that it is not reaching relevant stakeholders. They requested

an explanation of the relevance of ex-officio members and inquired whether there are channels for collaboration between science academies, science societies and other relevant organizations. The Executive Secretary referred to the statutes of COMEST adopted by the Executive Board of UNESCO at its 154th Session in 1998. He pointed out that COMEST's ex-officio members are the Presidents of UNESCO's five intergovernmental scientific programmes (the Intergovernmental Oceanographic Commission, the Man and the Biosphere programme, the Management of Social Transformations programme, the International Geophysical Coordination Programme and the International Hydrological Programme); of the International Bioethics Committee and the Intergovernmental Bioethics Committee; and of the International Council of Philosophy and Human Sciences (ICPHS), the International Social Science Council (ISSC), the International Council for Science (ICSU) and the Pugwash Conferences on Science and World Affairs. The ex-officio members have contributed significantly to COMEST's work in the past. Concerning collaboration with science academies and societies, UNESCO works primarily with international bodies such as ICSU. Nevertheless, collaboration with national organizations may be envisaged as a contribution to raising awareness of COMEST's work, which is an ongoing process.

## PRESENTATION OF COMEST OBJECTIVES AND MODALITIES (2008-2009)

Opening his presentation of the COMEST work programme for 2008-09, the President, Mr. **Alain Pompidou**, first listed the thematic areas outlined in the Director General's letter convening the Extraordinary Session:

- review of COMEST's programme and activities including preparation and methods of work for the 2009 Ordinary Session;
- environmental ethics with a particular emphasis on the ethical implications of climate change;
- science ethics, focusing on the implementation of the 1974 Recommendation on the Status of Scientific Researchers;
- implementation of COMEST policy recommendations on nanotechnologies and ethics; and
- information ethics.

The President briefly presented COMEST's objectives, past and ongoing work and modalities for the years 2008-09. He reiterated the mandate, task and composition of COMEST and stressed the fact that COMEST's members form a geographically diverse and multidisciplinary team, which is an opportunity to build on experiences and to map new directions. He recalled that COMEST had held five ordinary sessions in Oslo (1999), Berlin (2001), Rio de Janeiro (2003), Bangkok (2005) and Dakar (2006). Furthermore, the President outlined the principal themes on which COMEST has worked: the teaching of ethics, fresh-water use, the precautionary principle, outer space, science ethics, environmental/energy ethics and nanotechnology ethics. He noted that the latter three topics would be discussed in more depth during this meeting.

Regarding the teaching of ethics, the aim was to provide advice on how to integrate ethics and responsibility into science training. A report was produced in 2003 surveying existing teaching programs, analyzing their structure and contents, and offering curriculum advice on how to integrate ethics into science education.

COMEST established a sub-commission on ethics of fresh water use to stimulate the implementation of ethical principles and to shape society so that best ethical practices are recognized and practiced. After several meetings in Paris, Oslo and Almeria, COMEST produced two publications: *The Ethics of Freshwater Use: A Survey* in 2000 and *Best Ethical Practice in Water Use* in 2004.

As far as the precautionary principle and ethics of outer space are concerned, COMEST produced a report on the precautionary principle in 2005 after a meeting in Bangkok and a publication on a *Legal and Ethical Framework for Astronauts in Space Sojourns* was released in 2004, followed by a conference held in Paris in 2006 on a legal and ethical framework for space exploration.

Referring to science ethics, the President noted that consultation meetings had been held in different regions and codes of conduct analyzed with the aim of pursuing reflection on the relevant questions.

Concerning environmental ethics, a book entitled *Environmental Ethics and International Policy* was released in 2006 with the aim of clarifying the state of the art of the topic. In addition, a policy document on environmental ethics was prepared by the working group, but not adopted by COMEST.

Regarding nanotechnology ethics, a book entitled *Nanotechnologies, Ethics and Politics* was published in 2007 to clarify the state of the art of the subject and, in the same year, COMEST released a policy document entitled *Nanotechnologies and Ethics: Policies and Actions*. The President noted that a presentation specifically on nanotechnologies would be made later by the Executive Secretary.

Finally, the President briefly spelled out the objectives of COMEST for the years 2008-09. COMEST is expected to report and produce recommenda-



tions to the Director General on science ethics, with particular reference to implementation of the 1974 Recommendation on the Status of Scientific Researchers, and on the ethical implications of climate change. In addition, in line with its overall mandate, COMEST should continue to review and assess new areas of concern. The President concluded by outlining the timeline of activities foreseen, including meetings at working group, UNESCO and international level.

Questions were raised about the timing and venue of the Ordinary Session and about the availability of reports from past sessions and of COMEST's past publications. The Executive Secretary responded that, ideally, the Ordinary Session should take place by July 2009 in order to give time for the translation and distri-

bution of the report to Member States, since COMEST has to report to the General Conference which will be held in October 2009. The meeting should take place in the Asia-Pacific region and invitations from Member States are being awaited. COMEST's reports and past publications of COMEST are freely available on the website of UNESCO in different official languages and, if need be, publications can be shipped on demand. Members of COMEST asked whether work was still being done on freshwater use. The Executive Secretary responded that the ethics of freshwater use fit within the broader topic of the ethical implications of climate change, which is at present the focus of COMEST. He added that, at national level, governments can still use reports produced by COMEST.

## ISSUES AND ONGOING ACTIVITIES IN ENVIRONMENTAL ETHICS

Mr **Johan Hattingh**, Rapporteur of COMEST, presented the aims, the conceptual issues and the methods of work of the working group on environmental ethics. He explained that the ethical implications of climate change, the draft report that will be considered by the Ordinary Session in 2009, fall under the broader rubric of environmental ethics, on which COMEST has already worked. In order to prepare the draft report, a working group on environmental ethics was established by the Bureau in May 2008, comprising himself, Mr Ruben Apressyan (Russian Federation) and Mrs Nadja Tollemache (New Zealand). The Rapporteur indicated that membership of the group should be expanded and invited interested members to join it.

The Rapporteur briefly outlined the work conducted to date, explaining that the working group had met on 1-2 July 2008 in Nahabino, Moscow and produced a preliminary discussion document in which the themes of an ethics of climate change were identified, reviewed and highlighted. He stressed that this document was not an official position paper but aimed merely at introducing themes and stimulating debate with a view to identifying areas for further investigation. He then presented the content of the background document starting with the themes under discussion, which comprise the following:

- links with work ongoing in UNESCO;
- the connection between the work of UN organizations and that of COMEST;
- conceptual issues around the greenhouse effect, global warming and climate change;
- key ethical issues relating to climate change;
- existing normative instruments available to the international community and possible responses to ethical issues relating to climate change.

Concerning the connection between work ongoing in UNESCO and other UN organizations and the work of COMEST, the Rapporteur drew the attention of COMEST members to the UNESCO Strategy for

Action on Climate Change, as approved in October 2008 by the Executive Board. The strategy aims at building and maintaining the requisite knowledge base, adopt measures to adapt to the impacts of climate change, contribute to the mitigation of its causes, strengthen sustainable development and promote intersectoral cooperation. He emphasized that COMEST could contribute with inputs to UNESCO's Strategy by forming a better understanding of the ethical challenges related to climate change and build on work done by the Intergovernmental Panel on Climate Change, the United Nations Framework Convention on Climate Change (UNFCCC) and the Bali Road Map of the Conference of Parties-13 of the UNFCCC (December 2007). The Rapporteur noted that COMEST could play a role in finding international consensus on the Bali Road Map.

As regards work on environmental ethics, the Rapporteur listed the various publications produced and drew the attention of COMEST members to the fact that ethical principles previously established could be reused as a basis for the debate on the ethical implications of climate change. He specifically referred to the draft policy document on environmental ethics discussed at COMEST's Ordinary Sessions in Bangkok and Dakar. Although consensus on founding principles for environmental ethics had not been found, the Rapporteur suggested revisiting the draft document and continuing work on the principles. He also briefly outlined current work in environmental ethics: capacity building training sessions for teachers and awareness-raising campaigns in Moscow and Dakar and, led by the UNESCO Bangkok office, work on the ethics of energy.

The Rapporteur then defined and clarified the concepts of the greenhouse effect and of global warming along with their relationship to climate change, noting that the ethics of climate change can only address matters that fall within the ambit of human agency.

With this in mind, the working group had identified four central questions relating to the ethical implications of climate change:

- what should be done to reverse the trends in global climate change that are already present?
- what should be done to adapt to climate change that cannot be avoided because of past, and thus irreversible human generated Green House Gases (GHG) emissions?
- what is the value basis of our concerns and responses?
- can we draw upon and extend already existing values and principles?

The working group had also identified five characteristics of climate change that make its ethical implications particularly complex and challenging: dispersion of causes and effects, fragmentation of agency, institutional inadequacy, scientific uncertainty and cognitive barriers to envisioning the challenge.

The working group further distinguished three approaches to the challenges of climate change: scientific, practical and political.

The scientific approach deals with the factual basis of claims about climate change; areas of uncertainty, especially about future trends of climate change; ways to deal with uncertainty in a responsible manner; and whether the precautionary principle is adequate to deal with scientific uncertainty about climate change.

The Rapporteur described the practical approach in terms of responses developed by people directly confronted with climate change and its threats. Among relevant areas in this respect, he noted:

- the lives of people and animals living on small islands, large river deltas and low-lying areas;
- the property, wealth and livelihoods of victims of regular floods or droughts;
- the health of people exposed to disease vectors that have shifted in range;
- cultural heritage prone to sudden irreversible submergence;
- local, regional and global ecosystems and possible mass migrations of victims of climate change;
- the economy or health status of countries forced to accept climate change refugees;
- the world order and the world economy;

- the dignity of people who become victims of climate change.

The political approach focuses on collective and coordinated action of all the nations worldwide.

The working group has suggested, as a point of departure and a strong reference for COMEST debate, a values approach to climate change cutting across the former three approaches and focusing on the good of individuals and communities (human and non-human) and the virtues that promote this good, e.g. solidarity and unity between individuals and within communities; not causing harm; contributing towards the good of others; non-violence; justice; fairness; tolerance; respect for others' dignity. Such a values approach needs also to acknowledge the epistemic challenges of climate change, including the implications of the duty to actively pursue knowledge on the impact of human actions on global climate system; the duty to share that knowledge when it is available; and the duty to act timeously and appropriately on that knowledge. This approach also bears on human rights, which may be at stake in the effects of climate change and in policy responses to it. Other key ethical issues raised by climate change include justice and collective and shared responsibilities. The Rapporteur also reminded COMEST that climate change threatens the well-being and survival of humans and non-humans and, ultimately, the conditions that make life on Earth possible.

A number of existing normative instruments are available to facilitate ethical reflection on the challenges of climate change. The Rapporteur referred specifically to:

- the Universal Declaration of Human Rights;
- the Earth Charter;
- the Framework Convention on Climate Change;
- the Convention on Biological Diversity;
- the UNESCO Declaration on the Responsibilities of the Present Generations towards Future Generations;
- the Kyoto Protocol;
- the Universal Declaration on Bioethics and Human Rights.

However, the Rapporteur noted that there are difficulties in enforcing international principles. The

political will of signatories is often lacking, there is no global mandatory regime that can enforce principles and there is a lack of effective cooperation between countries. Nonetheless, each one of these documents was based on certain values and principles for which universal support already exists in the international arena. These values and principles could be explored to determine their relevance and applicability to addressing ethical issues related to climate change. Where gaps (inevitably) exist, COMEST should devise a method to address them.

Given the scope and complexity of an ethics of climate change, the working group established that it will be essential to rethink the fundamentals of ethics by addressing principles such as the right to life, liberty and personal security; the right to a decent standard of living; the right to enjoy the benefits of scientific progress, which implies a duty to share scientific knowledge; the acknowledgement of the importance of biodiversity and its conservation as a common concern of humankind; the precautionary principle; the principle of protecting human rights; equitable access to medical, scientific and technological developments and the greatest possible flow and rapid sharing of knowledge about these developments with particular attention to the needs of developing countries.

The Rapporteur then outlined the current consensus about climate change. Global warming is caused by human emissions of greenhouse gases (GHGs) such as carbon dioxide and methane. Climate change has already caused harm to humans and non-humans, and will continue to do so for a long time. As a result, adaptation to unavoidable climate change effects is required, as well as measures for immediate disaster relief for victims of extreme weather events. Nonetheless, climate change can be arrested, mitigated and even reversed by reducing GHG emissions to optimum levels. The Rapporteur concluded by emphasizing that the discussion on how to encourage Member States to adopt and promote an ethical approach to climate change had been left open so as not to pre-empt input by COMEST members.

In discussion, COMEST members pointed out that the positive value approach should entail best practices: it is essential to formulate strategies to mobilize more people to comply with such practices. Certain

best practices, e.g. European Union policies to reduce GHG emissions, could be analyzed to determine the ethical premises that gave rise to such policies. Therefore, when communicating to Member States, it was regarded as important to emphasize that best practices have been developed for a specific set of problems by using ethical criteria.

The issue of scientific uncertainty was also raised. It was suggested that up-to-date knowledge on climate change was a necessity. Some COMEST members, stressing the global nature of climate change, suggested that UNESCO, as a global organization, is well positioned to respond.

Among other issues addressed by COMEST members in discussion were technological innovation and its immediate or long-term effects. The example of the production of bio-fuel leading to overpricing of food commodities was given. It was noted that the outcome of the Conference of the Parties to the United Nations Framework Convention on Climate Change, which will be held in Copenhagen in 2009, should also be taken into consideration. Other discussion points included the existence of international collaboration on climate change at the regional level, the link between science and politics as exemplified by the Intergovernmental Panel on Climate Change (IPCC) and the impact of policies on the public in general and on indigenous peoples in particular. It was reaffirmed that collaboration with other institutions was a necessity, e.g. with the International Human Dimensions Programme on Global Environmental Change (IHDP), the International Council for Science (ICSU) and the United Nations University.

The President responded that inputs from and dialogue with other organizations are welcome. He added that the end result of the working group could take several forms: studies or background documents and policy recommendations of different formats and lengths which could be sent to different organizations for inputs or information. The background document as presented by the Rapporteur was welcomed as a statement of the importance of ethics, its principles, criteria and rules. Its limitations as a guide to practical strategies were also noted, and the President invited the working group to be particularly sensitive to this dimension in its future work.

Concerning the report on the ethical implications of climate change to be presented in due course to the Director General, the representative of the Secretariat, Mr John Crowley, explained that recommendations should be concise, precise and in the format relevant to the governing bodies of UNESCO. In terms of timeframe, a pre-final draft of the report should be made available to be discussed and adopted during the Ordinary Session. In order to achieve this, the working group should meet in Monaco in the first week of March 2009 on the occasion of a UNESCO international expert meeting on climate change in the Arctic at which working group members have been invited to present ethical perspectives, and again in Niamey, Niger, in late May 2009 in conjunction with a conference on the regional implications of climate change in West Africa. It was noted that the regional dimension of climate change is one to which UNESCO can make a distinctive and valuable contribution, since work at the global level is better covered by other international organizations.

Regarding the climate change mitigation agenda, the representative of the Secretariat drew attention to the fact that, consistently with the UN system response to climate change, UNESCO should not interfere with the Kyoto Protocol or any other process within the post-Bali framework. COMEST work could more appropriately focus on the two pillars of UNESCO's climate change strategy: reinforcement of the scientific knowledge base, with due consideration given to ethical issues such as the status of the human right to enjoy the benefit of scientific progress as applied to climate change; and policy support for climate change adaptation.

After discussion, COMEST formalized the theme of the working group on environmental ethics as "ethics of climate change" and confirmed its current members. Other members were invited to join the working group if they wish.

## ISSUES AND ONGOING ACTIVITIES IN SCIENCE ETHICS

The President, Mr **Alain Pompidou**, started his presentation by giving a brief overview of the schedule of activities in the field of science ethics implemented or planned in 2008-2010 at COMEST, UNESCO and international level. He pointed out that a report on the ethics of science, including recommendations, should be drafted, approved by the Ordinary Session of COMEST and handed to the Director General in 2009.

He briefly mentioned other science ethics meetings to which COMEST has provided or may provide input:

- Arab regional consultation meeting (Cairo, October 2008);
- the World Science Forum (Budapest, November 2009);
- the OECD Global Science Forum committee on research misconduct, leading up to the 2nd World Conference on Research Integrity planned for 2010.

The President defined “science ethics”, for the purposes of UNESCO’s strategy and programmes, as the principles according to which scientific activity should be conducted by professional scientists and by those with responsibility for research policies.

A presentation followed of the Recommendation on the Status of Scientific Researchers adopted by the UNESCO General Conference in 1974, a key international document that provides a focus for UNESCO’s work in the area of science ethics. The key substantive ethical principles of the Recommendation, all concerned with various forms of responsibility are:

- the responsibility to ensure that science serves the interests of humanity as a whole: “the full potentialities of scientific and technological knowledge [should] be promptly geared to the benefit of all peoples” (article 19);
- the responsibility of scientists to conduct themselves in accordance with high ethical standards: “effective scientific research calls for scientific researchers of integrity and maturity, combining high moral and intellectual qualities” (article 10);

- the responsibility to “respect public accountability”, which is to be construed as a corollary of enjoyment of “the degree of autonomy appropriate to their task and to the advancement of science and technology” (article 8);

- a generic requirement of humane, social and ecological responsibility in research conduct (article 14);

- “social” responsibility, being interpreted in terms of service to one’s own country (article 9(c)) and of “community service” (article 11(b));

- a specific responsibility to be “vigilant” with respect to the “probable and possible social and ecological consequences of scientific research and experimental development activities” (article 12(b) (iv)).

The President noted that the Recommendation should also be considered in light of the 1999 Budapest Declaration on Science and the Uses of Scientific Knowledge, first adopted by the World Science Congress and subsequently endorsed by the UNESCO General Conference. The key ethical principles of the Budapest Declaration on Science and the Uses of Scientific Knowledge are the following:

- science should be for the benefit of humanity as a whole (article 1) but, alongside its benefits, has led to “environmental degradation and technological disasters, and (...) contributed to social imbalance or exclusion”;

- scientists have “a special responsibility for seeking to avert applications of science which are ethically wrong or have an adverse impact” (article 21) – a responsibility more specific and far-reaching than provided for in the 1974 Recommendation;

- a specific requirement is placed upon Member States to “establish suitable measures to address the ethics of the practice of science and of the use of scientific knowledge and its applications” (article 40), which goes beyond the background institutional framework of the 1974 Recommendation;

- “Science curricula should include science ethics” (article 41), which reflects the emphasis in the 1974 Recommendation on education and training, but

goes beyond in giving “science ethics” intellectual autonomy as a sub-discipline, and not simply a topic.

The President noted that the 1974 Recommendation has not been systematically implemented and monitored. During the UNESCO General Conference in 2007, the Director General was requested to take steps in order to ensure monitoring of the implementation of the Recommendation. In order to prepare such monitoring, COMEST will first report, UNESCO Member States will then be consulted, and a reporting and monitoring mechanism will be implemented in 2010-11. The main substantive issues relating to the 1974 Recommendation on which COMEST can usefully advise the Director General are the following.

- The 1974 Recommendation offers a primarily “public sector” framework for science.
- Certain major contemporary issues are not explicitly dealt with and may call for a framework that is less oriented towards research policies.
- The 1999 Declaration, while broader, does not address the gaps of the 1974 Recommendation and does not have the same normative status.
- Many topics in the 1974 Recommendation, however institutionally important, are not in themselves ethical. The work of COMEST needs therefore to be articulated with parallel work on science policies.

The President then described UNESCO’s overall strategy for the ethics of science and technology, which aims at ensuring the monitoring and analysis of the impact of scientific and technological innovations on human rights. He listed the key areas of work as analysis of challenges, elaboration of principles, development of mechanisms, awareness-raising and education and training. Work in science ethics, like work in environmental ethics, needs to be sensitive to this overall strategic framework.

In discussion, COMEST members expressed concern about important ethical issues raised by science and research in general that deserve to be dealt with in the forthcoming science ethics report, including:

- the responsibility of scientists when communicating results through Internet where results are released without having been peer-reviewed;
- the availability of harmful information on the Internet;

- the misuse of available information on the Internet;
- the exaggeration and elevation of expectations of research findings as a way to secure funding, leading vulnerable people to have a false sense of hope;
- the premature release of research results for commercial reasons;
- brain drain;
- the inequitable distribution of research funds globally, leading to a divide between developed and developing countries;
- access to technology including patenting issues;
- the crucial distinction between public investment in research, which operates for the benefit of the public, as opposed to private investment where commercialization is the objective;
- equity in research partnerships;
- science ethics teaching.

The President took note of these proposals and invited COMEST members to provide appropriate input to the report drafting process.

With respect to science ethics issues related to publication, the SciDev.net website maintained by the editors of the scientific journals, Nature and Science, was presented as an example of best practice of peer-reviewed information available on the Internet. It was proposed that COMEST reflect on this matter and look into the possibility of collaboration with SciDev.

Responding to the background document on science ethics distributed to COMEST members by the Secretariat, the comment was made that it addresses Member States, communities and institutions but not individual researchers and corporate scientists. The last two addressees should be included in the document since more and more research is conducted in private corporations. It was further pointed out that academic freedom is ethically ambiguous since ethical considerations may lead to calls for its restriction. Therefore the COMEST report should in due course appeal to scientists as individuals and to scientists as public intellectuals, taking account of the ongoing work of ICSU on academic freedom. It was also suggested that the report might usefully include in the document a reflection on the notion of the “common good”, exploring in particular possible tensions between the common good as generally understood and human rights.

The issue of patenting was also raised. Without contesting its relevance, the Executive Secretary reminded COMEST members that the International Bioethics Committee is dealing with the issue. He advised against using examples related to medicine as there is a risk of duplication between the work of the two bodies.

The question was raised why the discussions and efforts to formulate an international declaration for science ethics or a general framework on science ethics, as surveyed in the background document prepared for the Session, had not materialized. The Executive Secretary replied that, five years ago, Member States were looking into the possibility of developing an international code of conduct for scientists. However, it was realized that many normative instruments in UNESCO, e.g. the 1974 Recommendation on the Status of Scientific Researchers, were not being implemented by Member States. Therefore, it was decided that, instead of developing another instrument, UNESCO should help Member States implement the 1974 Recommendation. The Executive Secretary added that another approach to promotion of ethical behaviour and assistance to Academies of Science or professional scientific bodies in developing codes based on examples could be through the database of codes of conduct in the online Global Ethics Observatory (GEObs 5).

The President then opened discussion on upcoming events to which COMEST's science ethics work might be connected.

He first gave the floor to Mrs Mary-Lou Kearney, the representative of the Education Sector of UNESCO, who presented a brief history of UNESCO's World Conference on "The New Dynamics of Higher Education and Research for Societal Change and Development", which will take place in Paris on 5-8 July 2009. The World Conference will provide a global platform for forward-looking thinking and debate on the rapidly changing higher education and research spaces and will identify concrete actions aimed at ensuring that the Education Sector of UNESCO meets both national development objectives and individual aspirations. The conference will last for three and a half days and the two major themes under debate will be "The role of higher education in addressing major

global challenges" and "Societal commitment and social responsibility". A number of sub-themes are also foreseen, including revitalization of higher education in Africa; equity, access and quality; and learning, research and innovation. Member States, various UNESCO bodies, civil society organizations, inter-governmental organizations and other interest groups will be invited to contribute to the programme.

The President requested the Secretariat to keep COMEST Members informed about the programme of the conference and proposed that a member of the science ethics working group attend the conference on behalf of COMEST or that other ways be explored of ensuring visibility of COMEST during the conference. It was suggested that science ethics might itself feature as a sub-theme. The representative of the Education Sector said that different scenarios could be envisaged e.g. a special presentation, side events or inclusion in the list of experts. Learning, research and innovation seems to be an appropriate heading for science ethics and the matter will be discussed in due course with the organizing committee.

Again with a view to briefing COMEST members about upcoming events at which the work of COMEST on science ethics might be presented and refined, a presentation was then made, on behalf of the Natural Sciences Sector of UNESCO, of the World Science Forum, which is organized by the Hungarian Academy of Sciences in partnership with UNESCO and ICSU and will be held in Budapest on 5-7 November 2009.

The World Science Forum is the fourth follow-up meeting of the 1999 World Science Conference, where the Science Agenda – Framework for Action and the Declaration on Science and the Uses of Scientific Knowledge were adopted, and is explicitly designed as a 10-year review of these commitments. To this extent, the World Science Forum is directly connected to the science ethics work of COMEST.

The precise content of the Forum was still in discussion at the time of the Extraordinary Session, but the general orientation is towards science and society and the connection between all sciences including social and human sciences in light of the Framework for Action adopted in 1999. As of November 2008, the themes under consideration are North-South coop-



eration, development and latest technologies, natural hazards, stock taking at the 10-year anniversary, science and latest technologies, science and ecosystem services, mobilizing science, energy and science for policy/policy for science. Concerns expressed by COMEST and suggested adjustment to the themes will be communicated to the organizing committee, the response of which will be communicated to COMEST members and in particular to the working group on science ethics.

A presentation was also made on planning for the World Social Science Forum, organized by the International Social Science Council, which will be held in Bergen, Norway on 10-12 May 2009. COMEST members were invited to express opinions or concerns for communication to the organizers.

The Executive Secretary expressed the view that, when possible, COMEST should aim at putting ethics of science and technology on the agenda of international events before considering participation. He pointed out that COMEST should use such events as a platform to promote its own activities, e.g. raising awareness on the implementation of the 1974 Recommendations or informing Governments about its recommendations. The President reaffirmed the point made by the Executive Secretary and pledged that once the working group on science ethics has been established, the guidelines laid down by the Executive Secretary would be followed in particular for the three forthcoming events in Bergen, Paris and Budapest.

Coming back to the report on science ethics in light of the whole discussion, COMEST members stressed

that the definition of science should be made explicit – i.e. science in its broad sense including social science – and that, concrete examples on science practices and use of knowledge should be used to reflect ethical principles.

The Executive Secretary specified that the statutes of COMEST refer to science in the broad sense. The 1974 Recommendation also explicitly defines science as follows:

*The word “science” signifies the enterprise whereby mankind, acting individually or in small or large groups, makes an organized attempt, by means of the objective study of observed phenomena, to discover and master the chain of causalities; brings together in a coordinated form the resultant sub-systems of knowledge by means of systematic reflection and conceptualization, often largely expressed in the symbols of mathematics; and thereby furnishes itself with the opportunity of using, to its own advantage, understanding of the processes and phenomena occurring in nature and society. (Article 1(a)(i))*

*The expression “the sciences” signifies a complex of fact and hypothesis, in which the theoretical element is normally capable of being validated, and to that extent includes the sciences concerned with social facts and phenomena. (article 1(a)(ii))*

COMEST members were encouraged to keep these definitions in mind during the preparation of the science ethics report.

# REVIEW OF 2007 COMEST POLICY RECOMMENDATIONS ON NANOTECHNOLOGIES

In his presentation, the Executive Secretary, Mr **Henk ten Have** explained that COMEST had decided to focus on nanotechnology for two main reasons. Firstly, this field is still in its early stage of development and COMEST has the opportunity to be more prospective and anticipatory in identifying ethical issues that will possibly emerge; secondly, the impact of this technology is global. Nanotechnologies were first explored at the 3rd Ordinary Session in Rio de Janeiro in December 2003, a special session was held on nanotechnologies at the 4th Ordinary Session in Bangkok in 2005, the outline of a policy document was developed at the Extraordinary Session in Paris in 2006 and the policy recommendations were adopted at the 5th Ordinary Session in Dakar in 2006. In order to raise awareness among Member States, a background brochure entitled *Ethics and Politics of Nanotechnology* was produced in 2006.

With regard to the working methodology, the Executive Secretary recalled that COMEST had adopted a three-stage strategic approach. In the first phase, a multidisciplinary group of experts was established. The group's mandate was to review the state of the art of ethical considerations on nanotechnologies and to identify opportunities for international action. The group of experts met at UNESCO in July 2005 and December 2005. Their work led, in 2007, to publication of a book entitled *Nanotechnologies, Ethics and Politics* including in-depth information and extended substantive discussion.

The second phase entailed testing the relevance of potential international actions. Representatives of various sciences involved in the development and application of nanotechnologies examined the strategies and options proposed. A draft policy document was developed and circulated to a selected group of individual scientists.

The third phase aimed at enhancing the political feasibility of potential actions. Consultations were undertaken with major significant stakeholders

regarding the political feasibility of potential actions identified in the two previous phases. On the basis of this preliminary consultation process, a policy document in 6 languages on *Nanotechnologies and Ethics: Policies and Actions* was prepared for the UNESCO General Conference in 2007.

The policy document defined the central features of nanotechnology in terms of various distinct dimensions that combine to shape a complex ethical universe. Nanotechnologies rely on several sciences and technologies and have an interdisciplinary and transdisciplinary dimension. Among the issues that call for ethical consideration are the invisibility of nanoparticles and nanofibres, the rapid development of nanotechnologies, their military and security use, global impact; and the risk of a “nanodivide” between the developing and developed countries.

The Executive Secretary briefly presented four types of action regarding nanotechnologies and ethics: articulating an ethical framework, awareness raising, ethics education, and research and development policies. With regard to the ethical framework the main directions of work that COMEST should consider are further reflection on ethical principles; public accountability and transparency; capacity building on ethical issues; public participation; media outreach on ethical issues; international cooperation; and the creation of an International Commission for Nanotechnologies and Ethics or other appropriate regulatory body. In the area of awareness raising, what are needed are an early, informed and interdisciplinary public debate focusing on environmental impact and health issues, risk assessment, nanomedicine, privacy and confidentiality and intellectual property. If public engagement and educational strategies for nanotechnologies are not adequately promoted, there will probably be public mistrust, leading to a backlash against new scientific and technological developments. Finally, there is a lack of knowledge on many issues pertaining to nanotechnologies, which requires more scientific research.

The Executive Secretary also emphasized that, while the policy recommendations had been distributed in 6 languages to Member States and had been freely available on the UNESCO website since 2007, no measures have been taken to follow up and implement the policy document. He suggested that COMEST members focus their attention, as a priority, on this implementation gap.

COMEST members expressed their concern about the lack of visibility of the policy document the failure to take steps towards implementation, given the serious ethical issues emphasized by past work. It was also suggested to update the document, since nanotechnologies are evolving very fast, to include examples from everyday life and new achievements in order to increase the level of public awareness. Furthermore, it was emphasized that training in ethics is of utmost importance. COMEST members stressed that UNESCO is the only international organization debating the ethics of nanotechnologies and called for work in this area to continue. It was proposed to create a working group to monitor development and applications of nanotechnologies and to discuss ethical issues. The working group would then regularly update the policy document and document implementation strategies and policies adopted by various countries and make them available through the GEObs system.

With respect to UNESCO follow-up to the suggestions made in the debate, the representative of the Secretariat, Mr John Crowley pointed out that limited funds had been allocated for 2008-09. The most appropriate response would therefore be to plan activities for 2010-11 which could shape the UNESCO programme and budget in due course. As a way to make the policy document more visible, one option could be to review existing processes at a national or regional level with a view to providing a formal COMEST contribution

at the consultative level. One example is the ongoing process in Europe, where the European Commission (EC) has produced recommendations on ethics for responsible nanoscience. Collaboration with the EC will provide opportunities to make the existing COMEST recommendations visible. The only specific short-term opportunity for new work on nanotechnologies and ethics will be a regional meeting in the Arab region on nanotechnologies and development planned for spring 2009 in collaboration with the Islamic Educational, Scientific and Cultural Organization (ISESCO).

The President suggested that, in the lead-up to the Ordinary Session, COMEST members should reflect on the policy document and send their proposals and comments to the Bureau. This would lead to a further discussion on nanotechnology during the Ordinary Session of COMEST where recommendations on specific follow-up activities would be made. He also encouraged COMEST members to make the policy document more visible in their country or region and stressed that, in the next biennium (2010-11), a working group should be created with the necessary resources.

In conclusion, the Executive Secretary stated that the Organisation for Economic Cooperation and Development (OECD) is developing a database on nanotechnology policies for OECD countries: UNESCO may collaborate to cover countries not in OECD. He mentioned that OECD has a working group on risk but not on ethics and proposed that COMEST, with the limited resources available for the year 2009, might add the ethical dimension to the OECD's existing work. The President asked the Secretariat to liaise with OECD and to report during the Ordinary Session in 2009.

## THE ETHICAL DIMENSIONS OF THE INFORMATION SOCIETY

Mr *Boyan Radoykov*, The representative of the UNESCO Communication and Information Sector presented the subject and detailed its history.

Since 1997, UNESCO has initiated a series of events enabling specialists and decision-makers to address the ethical dimensions of the information society. The main goal of the UNESCO INFOethics Congresses, organized in 1997, 1998 and in 2000, was to stimulate reflection and debate on the ethical, legal and societal aspects of the information society by bringing together participants from the largest possible number of countries representing the widest range of educational, scientific, cultural and social environments. The World Summit on the Information Society process ended with the decision that UNESCO should be in charge of coordinating the implementation of several Action Lines of the Geneva Action Plan, including in particular Action Line C10, which underlines the importance of the ethical dimensions as a key factor for development of an information society contributing to inclusive knowledge societies. As a result, and in accordance with the Tunis Agenda for the Information Society, a first consultation meeting on Action Line C10 was convened by UNESCO in Paris in October 2006 in order to facilitate initial sharing of views among stakeholders on their priorities and expertise in the implementation of Action Line C10 and to exchange ideas and opinions on the Action Line and its relation to other Action Lines, as well as on ways for its practical implementation.

In this respect, several ethical challenges were noted, relating to:

- access to knowledge contents on interactive networks which remains a key issue with various ethical, legal and societal aspects that require the full attention of the international community;
- privacy, which is often linked to security;
- accuracy: who is ultimately responsible for the authenticity, fidelity and accuracy of information? Who is to be held accountable for errors in information? Misinformation has many ways of undermining people's lives, especially when the party with the

inaccurate information has an advantage in power and authority.

- property: who owns information and knowledge? What are just and fair prices for its exchange? Who owns the channels, especially the airways, through which information is transmitted? How should access to this resource be allocated? How is the contributor of his knowledge to be compensated?

- Accessibility: what information does a person or an organization have a right or a privilege to obtain, under what conditions and with what safeguards?

There is a need for global governance in terms of free access to quality public information, adequate governmental instruments adapted to the digital world, protection of privacy, and the promotion of open source software. Even though the ethical challenges are enormous, the content and structure of an information ethics is still vague and has limited visibility. Collaboration between COMEST and the Information for All Programme of UNESCO (IFAP) would be valuable within the framework of ethical principles for the information society firmly based on the Universal Declaration of Human Rights. Finally, the representative of the UNESCO Communication and Information Sector listed the activities that could be executed within the framework of the Information for All Programme: promotion of free access to information, increasing the visibility of IFAP publications, integration of information ethics within the general ethical debate, information ethics training and increasing the visibility of IFAP conferences. Two concrete examples were given of work done by IFAP in Africa, Latin America and the Caribbean.

The Executive Secretary informed COMEST members that, in 2001, a report on information ethics had been published by a working group of COMEST. He wondered whether this report had any impact on the work done on information ethics in the Communication and Information sector. Noting this point, the President requested the Secretariat to send the main IFAP publications on information ethics to COMEST members.

Questions were raised on how to make sure that the development of information technologies has inputs from ethicists and the public and whether the debate on the human-machine interface – which corresponds in some respects to emerging technologies, in other respects to science fiction – is within the framework of IFAP. It was noted that IFAP functions by creating the necessary conditions for people to discuss such issues and is trying to mobilize governments to open debate on such issues. A draft code of ethics for information is under development by IFAP and COMEST could be given the opportunity to provide input. This issue will be taken up during the Internet Governance Forum to be held in Hyderabad in December 2008, where a workshop will be devoted to the possibility of an international normative instrument on privacy and data protection.

In the discussion, COMEST members also stressed that the information technology divide needs to be tackled, considering the pace at which information technology is developing.

## CONVERGING TECHNOLOGIES

In a brief exploratory discussion proposed by the President, Mr **Alain Pompidou**, the issue of “convergence” between new scientific and technological areas was raised as an adjunct to the discussion on nanotechnologies. “Convergence”, for these purposes, refers primarily to the connections between nanoscience, biotechnology, information technology and cognitive science and is therefore often summarized by the acronym “NBIC”.

It was commented that the reshaping of connections between areas of technology might undermine or destabilize existing ethical frameworks. For example, codes of conduct or ethics codes based on disciplines enforced by disciplinary scientific associations might be rendered obsolete by work in cutting-edge converging technologies, which could escape existing normative frameworks or regulations because of its innovative scientific nature. There is a need, therefore, to adapt on an ongoing basis the institutional framework regulating scientific conduct in order to ensure that cutting-edge research does escape the purview of

ethics. This general science ethics concern is all the more important that some versions of the convergence scenario suggest that radically new ethical challenges might in due course emerge from new technological developments, including, in particular, profoundly destabilizing forms of machine-life hybridization. While such applications are currently not feasible, the timeframe over which they might become possible is not necessarily lengthy and furthermore the science required to pursue such areas of research might itself raise serious ethical issues.

It was suggested that COMEST work at global level to raise awareness among scientists of their social responsibilities in this regard, and to help Member States develop and implement mechanisms to provide proactive information about the pros and cons of such technological developments. Given the substantive stakes, it was suggested that COMEST’s work on nanotechnologies in 2010-11 should include consideration of convergence issues.

## **NEXT MEETINGS**

The President announced that planning for the 2009 Ordinary Session was still in progress with a target period of June 2009. He invited the Secretariat to complete the process as early as possible in order to facilitate preparation and participation. It was also noted that it would be desirable to have a clear idea of the likely location and timing of the 2011 Ordinary Session at the time of the 2009 Ordinary Session.

## List of COMEST members as of November 2008

### *Individual members*

Mr **Khalid Abdullah al-Ali (Qatar)** is an Associate Professor of Human Genetics in the Department of Biological Science and Director of the Foundation Programme of Qatar University. He is Member of the Arab Ethics Committee for Science and Technology. His research interest is in moral judgments. He currently chairs the Qatar University Ethics Committee and the Shafallah Ethics Committee.

Mr **Rajaona Andriamananjara (Madagascar)** is an economist. He is the President of the Madagascar Academy of Science, Arts and Letters and also President of the newly founded Madagascar Committee of Ethics of Science and Technology.

Mr **Ruben Апресян (Russian Federation)** is a philosopher. He is the Head of the sector of Ethics at the Institute of Philosophy, Russian Academy of Sciences, and Professor at the Faculty of Philosophy, Moscow Lomonosov State University. As a Member of COMEST, he has been involved in the development of the core curriculum in bioethics. He directs a three year project on the advancement of teaching of environmental ethics. His main area of interest is moral philosophy and history of thought.

Mr **Philippe Busquin (Belgium)** is a nuclear physicist. He was a former Minister (Belgium). Currently, he is a member of the European Parliament and holds the chair of the Science and Technology Options Assessment (STOA), Brussels. He was also the EU Commissioner for Research (1999-2004) and has developed a number of projects relating to science and society.

Mr **Somsak Chunharas** is a medical doctor by training and currently works as the Secretary General of the National Health Foundation, an NGO in Thailand promoting research and policy development. He is also the Chair of the medical and health cluster of the National Science and Technology Development Agency promoting development in science areas such as biotechnology, nanotechnology, information technology as well as material sciences and is responsible for developing national strategies for promoting better understanding, good practices and ethics in science and technology

Mr **Jun Fudano (Japan)** is a historian of science and director of the Applied Ethics Centre for Engineering and Science at Kanazawa Institute of Technology (KIT) in Japan.

Mr **Robert P George (United States of America)** is a philosopher. His field of study is Philosophy of Law and he has served on the President's Council on Bioethics and was a member of the United States Commission on Civil Rights. He teaches at Princeton University.

Mr **Johan Hattingh (South Africa)** is the Rapporteur of COMEST and is a Professor of Philosophy specializing in different areas of applied ethics. Head of the Unit for Environmental Ethics at the University of Stellenbosch (South Africa), he is particularly interested in issues related to this field. For COMEST, he has produced documents related to environmental ethics and climate change. He also teaches business ethics for commerce and accounting students.

Mrs **Tafeeda Jarbawi (Palestine)** is Dean of the Women's Community College and Director of Ramallah Women's College.



Mr **Hwan-suk Kim (Republic of Korea)** is a Professor of Sociology at Kookmin University in Seoul, South Korea and has been involved in science and technology ethics activities in academia and NGOs. He is currently dean of the College of Social Science of the Kookmin University.

Mrs. **Marta Kollarova (Slovak Republic)** is a Professor of Biochemistry and Molecular Biology and is currently the Head of the department of Biochemistry of the Faculty of Natural Sciences, Comenius University, and Bratislava, Slovakia. She is also vice rector for doctoral study. Her principal research interest is enzymology of the metabolism of nucleic acids, in particular DNA and structural biology. She teaches basic and advanced biochemistry at the Faculty of Natural Sciences at Comenius University.

Mr **Ulrich Heinz Jurgen Körtner (Austria)** is a Doctor in Theology, a professor at the University of Vienna and head of the Institute of Ethics and Law in Medicine, and a member of the Bioethics Commission of the Federal Chancellor of Austria.

Mr **Alain Pompidou (France)**, President of COMEST, is a Professor at the Faculty of Medicine, Cochin - Port-Royal, Paris (France), Member of the European Academy of Sciences and Arts, and President of the French Academy of Technology. He has been Advisor to the Minister of Research and Higher Education, the Minister of Health, served as Advisor to the Prime Minister for five years and was President of the Parliamentary Office for five years. He has been Member of the French National Commission for UNESCO since 1997 and spearheaded the COMEST Working Group on Space Policy.

**Tan Sri Datuk Dr. Haji Omar Abdul Rahman (Malaysia)** is President of the Malaysia University of Science and Technology. He was Science Adviser in the Prime Minister's department from 1984 to 2001.

Mrs **Susana Sommer (Argentina)** is a biologist, Professor at the University of Buenos Aires, and Member of the Board of the Feminist Approaches to Bioethics.

Mrs **Nadja Tollemache (New Zealand)** is a former Council Member of the Auckland University of Technology (formerly Auckland Institute of Technology) and Ethics Committee. She is Chair of the Health Research Council of New Zealand Ethics Committee.

Mrs **Hebe Vessuri (Venezuela)** is a social anthropologist at the Venezuelan Institute of Scientific Research and has been active in the field of science and society for almost 30 years.

Mr **Xu Zhihong (China)** is a Professor of Life Sciences, President of Peking University and a member of the Chinese Academy of Science and of the Third World Academy of Sciences (TWAS).

#### *Ex-officio members*

President of the International Bioethics Committee of UNESCO (IBC)  
President of the Intergovernmental Bioethics Committee of UNESCO (IGBC)  
President of the International Council for Science (ICSU)  
President of the International Council for Philosophy and Humanistic Studies (ICPHS)  
President of the International Social Science Council (ISSC)  
President of the Pugwash Conferences on Science and World Affairs  
President of the Intergovernmental Oceanographic Commission of UNESCO (IOC)  
President of the Programme on Man and the Biosphere (MAB)  
President of the International Social Sciences Programme on Management of Social Transformations (MOST)

President of the International Hydrological Programme Intergovernmental Council (IHP)  
President of the International Geological Correlation Programme (IGCP)

*Executive Secretary*

Mr Henk ten Have (UNESCO), Director of the Division of Ethics of Science and Technology