

Hundred and sixty-fifth Session

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Item 3.4.3 of the provisional agenda

**RECOMMENDATIONS OF THE WORLD COMMISSION ON THE ETHICS
OF SCIENTIFIC KNOWLEDGE AND TECHNOLOGY (COMEST)**

SUMMARY

The Director-General of UNESCO submits this document to the Executive Board in response to the request for information on the work of COMEST, made by Iceland and supported by other Member States at the 164th session of the Executive Board, and in conformity with Article 9, paragraph 3, of the Statutes of the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST).

Decision proposed: paragraph 11.

1. In accordance with its Medium-Term Strategy for 2002-2007 (document 31 C/4) and its Programme for 2002-2003 (document 31 C/5), UNESCO has endorsed the ethics of science and technology as a principal priority for the Social and Human Sciences Sector. To that end, the Organization is endeavouring to ensure that the ethical dimensions of scientific and technological change are recognized and, more specifically, to promote principles and ethical norms to guide scientific and technological development and social transformation (strategic objective 4).
2. In this context, the progress of the work of the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST) is being carefully monitored by the Director-General of UNESCO and by the Assistant Director-General for the Social and Human Sciences, who is also the Executive Secretary of COMEST.
3. Pursuant to Article 9 of its Statutes, COMEST submits to the Director-General recommendations in its fields of activity. In this connection, the Rapporteurs of the Sub-Commissions of COMEST have finalized the texts of the recommendations on the ethics of outer space (Annex I), the ethics of fresh water (Annex II) and the ethics of energy (Annex III), adopted

at its second statutory session held in Berlin (Germany) from 17 to 19 December 2001, which have been submitted to the Director-General of UNESCO by the new Chairperson of COMEST, Professor Jens Erik Fenstad (Norway).

4. In response to the request for information on the work of COMEST made by Iceland and supported by other Member States at the 164th session of the Executive Board, this document is submitted to the Executive Board.

5. At the request of the Chairperson, Professor Fenstad, the recommendations on the ethics of outer space, of fresh water and of energy are presented as they stand in keeping with the spirit and the letter as desired by the Rapporteurs of the three Sub-Commissions (see Annexes¹). The Executive Secretariat of COMEST has so far not provided any revision work or technical editing. The succinct report of the second session of COMEST has already been published on the UNESCO website and is also presented as it stands (see Annex IV). The proceedings of this session will be issued by UNESCO.

6. In compliance with the same Article 9, paragraph 3, of the Statutes of COMEST, the Director-General of UNESCO brings the results of the work of COMEST to the attention of the Organization's governing bodies and the entities concerned by the COMEST proposals. In accordance with Article 9, the Director-General will report on the work done by COMEST to the forthcoming sessions of the Executive Board and the General Conference.

7. In addition to the submission of the work done under the previous presidency to UNESCO's governing bodies, the Chairperson, Professor Fenstad, has initiated other forms of international cooperation between COMEST and the United Nations, IGOs and NGOs.

8. On the basis of the work done on the ethics of outer space, fresh water, energy and the information society, COMEST has since January 2002 been addressing such themes for reflection as: (a) analysis of the basic values of environmental ethics and the search for answers in complex environmental situations; (b) ethical reflection and the concern of the international community for the safe and peaceful use and exploration of future activities in outer space; and (c) responsibility towards future generations regarding the promotion of human rights and fundamental freedoms through the wise and sustainable use of natural resources. The focus given this work by the Chairperson, Professor Fenstad, is intended to be innovative and seeks to advance ethical reflection and amplify the study of these topics by bringing them into the broader perspective of the ethics of the environment and sustainable development (see Annex V "Achievements, Activities and New Initiatives of the COMEST").

9. At the kind invitation of its Vice-Chairperson, H.E. Ms Mubarak (Egypt), COMEST will hold the next working meeting of its new Bureau in the unique setting of the Bibliotheca Alexandrina. Follow-up action on the second session of COMEST, the new topics for ethical reflection mentioned above and other administrative and budgetary matters will be on the agenda of the session.

10. COMEST wishes to raise international awareness and understanding of these topics and to promote dialogue between the scientific communities, decision-makers, civil society and the public at large.

11. In the light of the foregoing, the Executive Board may wish to adopt the following decision:

¹ For technical reasons, the Annexes are issued in English and French only.

The Executive Board,

1. Having examined document 165 EX/13,
2. Takes note of the Annexes submitted by the Director-General in this document;
3. Reaffirms its resolve to accord priority to the ethics of science and technology in UNESCO's programme relating to the social and human sciences;
4. Welcomes with satisfaction the direction given to the work of COMEST by its new Chairperson;
5. Appreciates the active cooperation existing between UNESCO, COMEST and the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) in the field of the ethics of space activities;
6. Appreciates the active cooperation existing between UNESCO, COMEST and the International Council for Science (ICSU) in the field of the ethics of the environment and sustainable development;
7. Requests the Director-General to pursue this international cooperation and to carry out an in-depth study of the report and the recommendations adopted by COMEST at its second session, in accordance with the priorities established in documents 31 C/4 and 31 C/5;
8. Invites the Director-General to submit to it at its 166th session, and to the General Conference at its 32nd session, a report on the work done by COMEST since its second session (Berlin, 17-19 December 2001);
9. Further invites the Director-General to convey the terms of this decision to the Chairperson of COMEST.



*World Commission on the Ethics
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*Commission mondiale de l'éthique
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WORLD COMMISSION ON THE ETHICS OF SCIENTIFIC KNOWLEDGE AND TECHNOLOGY (COMEST)

RECOMMENDATIONS ON THE ETHICS OF OUTER SPACE

Rapporteur: Mr Alain Pompidou

A. INTRODUCTION

1. At present the Ethics of Science and Technology is no longer an option but a necessity. The importance of science and technology for the shaping of society, for the avoidance of environmental damage and for providing realistic options for policy and development is no longer arguable. Nowadays the changes brought about by the fast pace of scientific discoveries and technological progress raise crucial questions that open up new avenues for ethical reflection, to guarantee that humanity could benefit of these extraordinary achievements in a harmonious way.

2. Mindful of this, UNESCO has set up in 1998 the the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST), whose main purpose is to highlight values permitting better and broader co-operation in the world, both in science and technology and in the social and cultural spheres, thus ensuring that the advancement and sharing of knowledge are fully consistent with respect for fundamental human rights and freedoms, encouraging the scientific community to examine subjects of prime importance and drawing up action-oriented recommendations for national or regional policy-makers. As an advisory body and forum of reflection, the COMEST has the task to formulate ethical principles that could provide decision-makers, in sensitive areas, with selection criteria other than purely economic.

3. In accordance with Article 9 of its Statutes, the COMEST submits a set of Recommendations in the field of its activities to the Director-General of UNESCO. The Director-General shall transmit the results of the Commission's work to the Governing Bodies of the Organization and to the bodies concerned by the Commission's proposals. In this respect, Recommendations concerning the implementation of ethical principles in the field of Outer Space set forth by the Commission were adopted by the Members of COMEST at its Second Session, 17-19 December 2001, Berlin, Germany.

B. PREAMBLE

4. The Ethics of Space Policy has the distinctive feature of introducing a relationship between human beings, the planet Earth and the whole Universe. Rather than embarking upon a major philosophical debate, the aim of the COMEST is to consider the facts in an effort to identify equitable principles based on ethical reflection, aimed to ensure respect for human rights, freedoms and responsibilities. These **ethical principles** must apply at every stage in the development of the use of outer space with a view to developing a new approach founded on a “culture of space”.

5. The implementation of an outer space policy must:

- be based on unanimously acknowledged essential principles: respect for dignity and socio-cultural identities; respect for freedom of choice and critical spirit; compliance with the principles of solidarity and precaution;
- ensure free access to outer space, while avoiding, as far as possible, the release of debris, by taking measures equally applicable to all concerned;
- affirm the principle of equitable access to outer space resources, in the fields of both observation and communication, as a corollary to the principle of non-appropriation;
- promote free access to knowledge, while safeguarding protection of intellectual property.

C. PRELIMINARY CONSIDERATIONS

6. COMEST favours the view that thoughts must be given to the notion of outer space regarded as common heritage of mankind and not as a mere “*apanage*”. Outer space must be placed at the service of all humankind. In this regard, COMEST reaffirms the need to develop co-operation among all international and national bodies concerned and, in particular, with the Legal Sub-Committee of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS), with a view to define the legal procedures permitting equitable utilization of data produced from the use of outer space technologies and from the discovery of potential resources associated with the inherent nature of outer space objects (e.g. planets).

7. COMEST believes that every space policy must be based on the concept of mutual and reciprocal benefits, while safeguarding fair competition and the principle of return on investment. It emphasizes the importance of the role that ethics must play in the choice of a specific project and its long-term assessment from the viewpoint of human security and economic criteria.

8. Procedures must be defined for the exchange and sharing of environmental data between the populations of the Earth to ensure protection of planetary environment (e.g. against global warming, depletion of the ozone layer, increase of the sea level), develop weather forecasting and ensure prevention of major risks and management of natural disasters. In case of civilian disasters, immediate access to satellite data must be organized and granted by policies founded on the concept of mutual and reciprocal benefits, in order to avoid unequal access to space data and prevent the emergence of coercive economic practices.

9. Development of outer space activities and progress made in the field of outer space industry hold out new prospects for intellectual property law. Inventions, processes and products must be properly protected to provide the required legal assurance essential for a strong commitment from those involved in outer space activities. In this regard, the COMEST specifically focussed on the various aspects bound up with the eligibility of outer space vehicles and all operations in outer space for patenting. The need for ongoing reflection with a view to reach an agreement on the management of intellectual property in inhabited outer space stations must therefore be borne in mind, with particular reference to the possibility of patenting products or processes developed in orbital stations or associated with materials or vehicles carried on board such stations. The development of international patent law involving the outer space industry appears imperative.

10. In the area of electronic surveillance it is essential to protect public freedoms, in particular freedom of expression. It is therewith crucial to safeguard cultural identities and permit the expression of minority cultures; to avoid the standardization of cultures and ensure a sound balance between the upkeep of existing cultural identities and the promotion of new identities (e.g. emerging from electronic forums) fostering global exchanges.

11. In the area of risk management, COMEST embraces the view that every effort to reduce the production of outer space debris must be continued and that such measures must be accepted by all concerned. Unilateral measures would simply create distortions of competition between the traditional or emerging outer space powers. A better definition of the launch State should be drawn up by the authorities concerned, in particular the Inter Agency Space Committee (IASC).

12. There is an urgent need for training in outer space technologies and in the challenges of outer space policy. In the light of its cultural mandate, UNESCO might identify different players involved all over the world in the field of “outer space culture”. The ESA example of sponsoring European universities to hold summer courses on outer space policy and law deserves to be followed. With regards to the wide diversity of cultural contexts, outer space agencies should be committed to networking operations based on electronic forums between the originators of outer space policy, political decision-makers and the segments of public opinion, which take an interest in outer space activities. This is a precondition for the development of an effective “pedagogy of mediation” in which ethical reflection will play an important role.

D. RECOMMENDATIONS

COMEST recommends

- a) To explore ways and means: to promote access to geostationary orbits; to prevent electromagnetic pollution; to avoid the proliferation of barriers seeking to limit access to outer space; and to limit outer space debris (which should also be precisely defined) through measures equally applicable to everyone to prevent any distortion of competition in the area of launch vehicles and satellites; to create a global and permanent system for observation and protection of the terrestrial environment (global system for observation shared by all on the basis of open world-wide consultation); and to put in place a system for management of the planet on a horizon which extends beyond market forecasts.
- b) To take all appropriate measures to provide researchers with free access to scientific data in order to guarantee sharing of knowledge with a view to promote scientific progress; to place scientific outer space data at the disposal of the developing countries; to foster the definition of procedures to permit sharing of the resulting benefits, bearing in mind the legitimate interests of these countries and acting in the most equitable and balanced manner possible.
- c) To pursue reflection with a view to reaching an agreement on the management of intellectual property in manned stations and more broadly in the field of outer space industry, notably as to the eligibility for patenting of products or processes produced in orbital stations or associated with on-board materials or vehicles.
- d) To promote pertinent measures: to protect the confidentiality of information exchanges between individuals with a view to ensure individual protection without infringing in collective freedoms, and to prevent the circulation of subversive messages or illicit activities; to protect individual freedoms (because of the risks of excesses in the field of remote surveillance) and cultural identities (having regard to the risks of standardization arising from the use of satellites for the new communication and information technologies).
- e) To examine, in the framework of international co-operation, the possibility of developing a system of “co-regulation” designed to protect individuals, populations and even States.

- f) To promote the precautionary measures needed to prevent accidents, liable to occur upon return of potentially contaminating materials originating from outer space, and long-term consequences of the dissemination of biological products obtained in micro-gravity state and exposed to strong irradiation from electromagnetic fields.
- g) To study the possibility of organizing specialized courses in universities touching upon technology, legislation, insurance and the ethics of outer space; to ask schools of journalism to pay particular attention to training in the field of outer space science and technology so as to develop appropriate techniques of scientific communication and a “pedagogy of mediation”.
- h) To ask outer space agencies to look into the possibility of setting up groups to study the ethics of outer space in order to guide their scientific choices.

In conclusion, COMEST asks its Secretariat to submit an interim report on the implementation of these Recommendations to its next informal meeting. It wishes to have a comprehensive report in time for its third session.



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WORLD COMMISSION ON THE ETHICS OF SCIENTIFIC KNOWLEDGE AND TECHNOLOGY (COMEST)

RECOMMENDATIONS ON THE ETHICS OF FRESH WATER

Rapporteur: Lord Selborne

A. INTRODUCTION

1. At present the Ethics of Science and Technology is no longer an option but a necessity. The importance of science and technology for the shaping of society, for the avoidance of environmental damage and for providing realistic options for policy and development is no longer arguable. Nowadays the changes brought about by the fast pace of scientific discoveries and technological progress raise crucial questions that open up new avenues for ethical reflection, to guarantee that humanity could benefit of these extraordinary achievements in a harmonious way.

2. Mindful of this, UNESCO has set up in 1998 the the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST), whose main purpose is to highlight values permitting better and broader co-operation in the world, both in science and technology and in the social and cultural spheres, thus ensuring that the advancement and sharing of knowledge are fully consistent with respect for fundamental human rights and freedoms, encouraging the scientific community to examine subjects of prime importance and drawing up action-oriented recommendations for national or regional policy-makers. As an advisory body and forum of reflection, the COMEST has the task to formulate ethical principles that could provide decision-makers, in sensitive areas, with selection criteria other than purely economic.

3. In accordance with Article 9 of its Statutes, the COMEST submits a set of Recommendations in the field of its activities to the Director-General of UNESCO. The Director-General shall transmit the results of the Commission's work to the Governing Bodies of the Organization and to the bodies concerned by the Commission's proposals. In this respect, Recommendations concerning the implementation of ethical principles in the field of Fresh Water set forth by the Commission were adopted by the Members of COMEST at its Second Session, 17-19 December 2001, Berlin, Germany.

B. PREAMBLE

4. Water, a common good for humanity, valued and respected in all religions and cultures, has also become a symbol for social equity. For the water crisis is not one of absolute scarcity, rather of distribution and knowledge. As such, questions of access and deprivation underlie most water decisions. While everyone has a need for water, this does not grant the right to have immoderate access to it. It is imperative for the society to ensure that adequate prioritization of water access is put in place, allowing essential needs of both humanity and ecosystems to be harmoniously met.

5. Most responses to water problems require finding a balance among uses and traditional and technological solutions, and will hence differ according to region. However, powerful international corporations, which are among the actors influencing regional management, are to adjust their agendas to serve rather than dominate regional needs. Data is essential: more reliable data, better use of data and public access to water data are all ethical imperatives.

6. Debates on water resources management mirror broader debates on social ethics and relate to a number of **ethical principles** that may be summarized as follows:

HUMAN DIGNITY, for there is no life without water and those to whom it is denied are denied life;

PARTICIPATION, for all individuals, especially the poor, must be involved in water planning and management, and gender and poverty issues recognized in fostering this process;

SOLIDARITY, for water continually confronts humans with their upstream and downstream interdependency, and current calls for integrated water management may be seen as a direct offshoot of this realization;

HUMAN EQUALITY, for all persons ought to be provided with what it is needed and due to them on an equitable basis;

COMMON GOOD, for by almost everyone's definition water is a common good, and without proper water management human potential and dignity are diminished for all and denied to some;

STEWARDSHIP, which teaches respect for creation and for wise use and not extreme reverence for nature; indeed, much of water management is about finding an ethical balance among using, changing and preserving water resources and land.

C. PRELIMINARY CONSIDERATIONS

7. Agriculture produces by far the largest share of the food consumed by humanity. There is simply no other path to the future but to continue cultivating the planet, and managing plants and animals for food production. Yet agriculture is also the largest user of fresh water, accounting for some three-quarters of global water consumption. The Commission considers that food security is a moral imperative and that the demands of industry and the needs of irrigation should be co-ordinated so as to ensure that subsistence farmers have the right to water, which includes efficient use of rainfall, rainwater harvesting and adequate sources for irrigation.

8. Water is a vital component of the industrial chain, being used for such purposes as processing, washing, and cooling in facilities that manufacture products. Industry can innovate water-friendly improvements to current approaches, as well as help develop wholly new procedures, products, and services such as more affordable desalinization, more efficient irrigation, etc. Industry can make positive contributions by, for example, locating water intensive operations in areas of sufficient water supply, introducing conservation practices such as use of graywater in processes that do not need high quality water, and improving discharge quality. The Commission notes that the important contribution that industry makes to national development should go hand in hand with the need to take into account prevailing socio-economic conditions and to manage the water required for its operations, products and services in relation to the available local supply.

9. Groundwater development has significantly increased during the past fifty years in most semi-arid or arid countries. This has been brought about by a large number of small (private or public) developers, often with poor scientific or technological control by the responsible water administration. The term over-exploitation has often been utilized, despite the fact that most experts agree that the concept is poorly defined and misconceptions are still pervasive. What is clear is that the terms related to over-exploitation have in common the idea of avoiding “undesirable effects” as a result of groundwater development. However, this “undesirability” depends mainly on the social perceptions of the issue, more related to the legal, cultural and economic background of aquifer development than to the hydro-geological facts. The Commission considers that groundwater development should not be rejected or seriously constrained if it is well planned and controlled. Groundwater development is especially beneficial in areas where seasonal rainfall is highly variable.

10. If we take into account the increase of the world population and the need for fresh water, it seems an immense task simply to manage water so that there is enough for people to drink, let alone for agriculture and industry; in this light, providing water to other uses, such as the environment, seems to deserve a lower priority. Indeed, the situation is often presented as a conflict of competing demand, as a matter of choosing between ‘water for people’ and ‘water for wildlife’. This ignores the direct and indirect benefits to humanity of functioning ecosystems. The Commission thus considers that maintaining ecological sustainability is one of the primary objectives of water ethics; in other words, the natural environment has a need for water.

11. Throughout history people have equated clean water with health, even before the relationship was fully understood towards the end of the nineteenth century; indeed, several ancient religious codes included rules for hygienic practices that remain appropriate today. Human populations were also acquainted with the notion of using water only once and then discarding it; if the water supply became tainted, it was always possible to turn to a nearby clean source. With the tremendous increase in world population, the provision of safe and clean water and the maintenance of sanitation systems have become more difficult to achieve. Therefore misuse clean water should be considered highly unethical. Sanitation procedures should go hand in hand with any plans to expand the water supply, while financing of implementation, proper operation and continuous maintenance, should be guaranteed.

12. The Commission considers that properly handling hazards is of a paramount importance for water resources management. Hazards may be man-made or natural; neither all hazards are disasters nor all disasters are the result of natural hazards. The link between them is the degree of vulnerability, which is generally defined as the capacity to anticipate, cope with, resist and recover from the impact of the natural hazard. The variation of vulnerability between countries and between socio-economic groups in the same country is a major factor in any consideration of ethical questions arising from disasters. More than 70% of the world’s poorest people are thought to live in ecologically sensitive areas that are subject to disasters such as drought and floods. These two types of disasters imply the necessity of putting in place reliable instruments of prevision, while striving for prevention or alleviation through both structural and non-structural measures.

13. Water management is fundamentally a question of environmental justice based on three essential concepts: equity, fairness and access between and across generations. Its ethical dimension may be perceived in the way answers are found to the following questions: who participates in the decision-making process; what are the decisions they act upon; are they involved in formulating options or are they expected only to react to proposals that are already well-developed; how and what type of opportunity costs are considered; what is the basis of ascribing the value of various decisions that may have to be played one against the other; what kind of information is open to the public; to what extent are impacts taken into account and how are they characterized; how do professionals interact with non-professionals and how is technical and professional information used. In terms of water management, special consideration must be given to the role of women, who are the principal water managers in many small villages and communities. As such, they become the keys to maintenance and operations and frequently have the greatest impact on water procedures.

D. RECOMMENDATIONS

The COMEST recommends

- a) To promote ethical considerations in all aspects of freshwater use so as to reflect the concepts of sustainable development and environmental justice, which are underpinned by equity: equity between geographical entities, between the industrialized and developing world, between rural and urban populations, between generations and between the managed and the managers.
- b) To explore ways and means: so that more efficient use of water for agriculture, especially by disseminating information, should be encouraged, with a view to increase soil productivity and crop yield and to avoid water-logging and salinization; so that incentives might be offered to farmers to obtain the necessary equipment and capacity, knowing that the use of local agricultural expertise and techniques should take precedence over imported methods that may be inappropriate and not adapted to community needs.
- c) To examine how to encourage industry to contribute to water sustainability by utilizing renewable flows and avoiding withdrawals that are not replenished, conserving water to reduce the volume of withdrawals; and, to take into account the water needs of local ecosystems in any assessment, agricultural, industrial and commercial operations, discharges, products, and services.
- d) To encourage industry, along with governments, to invest in educating the public to promote habits and “good practices” that foster water sustainability.
- e) To promote the elaboration of aquifers management plans, especially where they are the major resource for large-scale irrigation; and, to encourage the dissemination of reliable information so as to facilitate co-operation among aquifer stakeholders.
- f) To identify and disseminate environmental values that should be a fundamental element in decision making with regard to water resources; and, to help in developing methods to determine the water needs of other species and ecosystems and to assess the impact of insufficient water allocation.
- g) To promote equity in access to water supply and sanitation services by ensuring public participation in rural water supply; and, to encourage participation of women in water management decisions for social development, which is an ethical imperative for social development.
- h) To encourage scientists and engineers to provide estimations of risks and local vulnerability to a specific type of natural hazard or disaster, based on reliable data and coherent interdisciplinary conclusions (local and national authorities must make the concerned public aware of this information); and, to examine the possibility of developing a comprehensive, regularly updated global set of hydrological data.

In conclusion, COMEST asks its Secretariat to submit an interim report on the implementation of these recommendations to its next informal meeting. It wishes to have a comprehensive report in time for its third session.



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WORLD COMMISSION ON THE ETHICS OF SCIENTIFIC KNOWLEDGE AND TECHNOLOGY (COMEST)

RECOMMENDATIONS ON THE ETHICS OF ENERGY

Rapporteur: Mr Jean Audouze

A. INTRODUCTION

1. At present the Ethics of Science and Technology is no longer an option but a necessity. The importance of science and technology for the shaping of society, for the avoidance of environmental damage and for providing realistic options for policy and development is no longer arguable. Nowadays the changes brought about by the fast pace of scientific discoveries and technological progress raise crucial questions that open up new avenues for ethical reflection, to guarantee that humanity could benefit of these extraordinary achievements in a harmonious way.

2. Mindful of this, UNESCO has set up in 1998 the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST), whose main purpose is to highlight values permitting better and broader co-operation in the world, both in science and technology and in the social and cultural spheres, thus ensuring that the advancement and sharing of knowledge are fully consistent with respect for fundamental human rights and freedoms, encouraging the scientific community to examine subjects of prime importance and drawing up action-oriented recommendations for national or regional policy-makers. As an advisory body and forum of reflection, the COMEST has the task to formulate ethical principles that could provide decision-makers, in sensitive areas, with selection criteria other than purely economic.

3. In accordance with Article 9 of its Statutes, the COMEST submits a set of Recommendations in the field of its activities to the Director-General of UNESCO. The Director-General shall transmit the results of the Commission's work to the Governing Bodies of the Organization and to the bodies concerned by the Commission's proposals. In this respect, Recommendations concerning the implementation of ethical principles in the field of Energy set forth by the Commission were adopted by the Members of COMEST at its Second Session, 17-19 December 2001, Berlin, Germany.

B. PREAMBLE

4. Energy is closely connected with every aspect of human life and endeavor. The production, distribution and use of different forms of energy represent today one of the major problems confronting the whole of humankind. The hopes and risks of every single human being depend on this vital issue, which constitutes a threat to the environment, affects current and future life, and lies at the origin of deep and persistent inequalities between individuals and nations. In this regard, ethical reflection must highlight basic principles, enabling countries, communities and individuals to fully understand the implications of energy-related decisions and actions, and thus establish the foundations of a culture conducive to a collective, responsible action in the field of sustainable energy.

5. Evaluating the ethical aspects of the energy issue calls for reflection on the ethical approach to energy access and production, environmental implications, and obligations towards future generations. This reflection is to be based on a number of **ethical principles**:

EQUITABLE ACCESSIBILITY: energy should be available to individuals on an equitable basis and at an adequate level;

CONSERVATION: energy conservation may allow reduction of energy consumption through reduced energy waste and should thus be a major focus of energy policies;

SUSTAINABILITY AND INTERGENERATIONAL EQUITY: energy sources should be sustainable, thus equitably meeting the needs of the present without impairing the ability of future generations to meet their own foreseeable needs;

PRECAUTION AND REALITY: creating irreversible situations should be avoided, inasmuch as there is factual evidence that today no energy source is totally free of drawbacks;

ENVIRONMENTAL RESPONSIBILITY: active measures should be taken to reduce the environmental impact of energy production, distribution and use;

INNOVATION, ADAPTATION AND RESEARCH: all countries should invest in research, development and capacity building in the energy field;

EDUCATION AND MEDIA PEDAGOGY: education and reliable information on energy issues should be accurate and understandable for everyone;

INTERNATIONAL CO-OPERATION: global thinking with regard to the ethics of energy, is indispensable, and consensus must underpin all action programmes on energy production and use since these issues bear global implications.

C. PRELIMINARY CONSIDERATIONS

6. The Commission considers that stakeholders in energy policies (government, industry, research and development teams) must ensure the availability and preservation of vital resources at a cost sufficiently low so that each country, whatever its geographical location and economic situation, has access to them. Hence it is essential that the industrialized countries consider themselves responsible for the others, and that true co-operation in the energy field be established between North and South.

7. Whenever energy is transformed (i.e., when energy is ‘used’), a portion is degraded to heat, which is lost from the ecosystem and is unavailable for most human uses. Hence there is a duty at every level to limit energy wastage. A large part of the non-renewable energy resources may be depleted within one or two centuries: energy resources are therefore to be exploited as rationally and economically as possible.

8. In the long-term, energy supplies will have to come from renewable or nuclear sources, since non-renewable fossil carbon fuels will eventually be exhausted and are major contributors to global warming. The only question is how rapidly we should move to such sources and what mix should be used in various parts of the world over time. This is a complex question and the answer depends on careful analysis of the costs and benefits at local, national and global levels,

and must take into account the implications for land, air, water, human security and health, economics and trade, culture and other social and environmental considerations.

9. Precaution requires that the social and environmental benefits and costs of shifts in the balance of energy sources, the rate of energy use and financial implications should be carefully evaluated before changes are instituted. Ideally, energy sources should be risk- and pollution-free. A “zero risk” level being unattainable, the various stakeholders in the energy sector are duty-bound to lay down appropriate safety regulations, particularly with regard to the operation of nuclear power plants or large-scale hydroelectric installations. Creating irreversible situations with regard to the environment should be avoided. Risk management should aim at rational production and consumption of energy, and prevent the occurrence of any events with irreparable consequences. Particular emphasis is to be put on limiting releases of “greenhouse” gases, on resolving the problem of storage of nuclear power waste products and of the environmental impacts of unmanaged biomass use.

10. Research and capacity building in the field of energy are of paramount importance, particularly with respect to harnessing renewable energy sources. The exploitation of natural gas, the rationalization of biomass with efficient and effective production and conversion to useful energy, the development of fuel cells and the use of solar energy in photovoltaic and thermal form are all vast areas for research, both fundamental and technological. The relations between climate change and carbon dioxide emissions, the development of nuclear power (breeder reactors, “energy amplifiers”, thermonuclear power plants, etc.) and the management of nuclear waste are also key areas for breakthrough research. It is crucially important to keep all energy options open. New forms of energy must be developed, which would compensate for the finite nature of some types of existing energy supplies, or would use technologies in innovative ways to reduce harmful side-effects of current energy production or utilization. Energy diversification, regional integration of energy systems, and enhanced trade in energy services are all relevant strategies in this regard.

11. Education and public information on energy issues need open, transparent and independent debate. To create the conditions for such a public debate to be beneficial to civil society, COMEST considers it necessary to facilitate access to information on the ethical and technical aspects of the production, distribution and use of energy. Regional and local decision-making must be encouraged for there to be a meaningful dialogue between those who benefit from commercial energy services and those who do not, between those who compete and those who determine energy policies. Energy models and best practices, that have been proved to be efficient, must be promoted.

12. All countries have responsibilities for the global and local consequences of their national energy policies. Furthermore, in a globalized society, all entities operating internationally are requested to act as world citizens, not only respecting national laws and regulations, but also moving forward the overall energy and environment agenda. It is obvious that global reflection with respect to ethics of energy is indispensable and that consensus within society must underpin action programmes in co-operation with the industrial sector. National and international decision- and policy-makers have the responsibility not merely to react to energy crises but to promote sustainable, affordable and environmentally acceptable energy policies. The implications of any changes concerning energy policy for all sectors of the economy and for the environment are to be thoroughly evaluated before being adopted.

D. RECOMMENDATIONS

The COMEST recommends:

- a)** To incite decision-makers of the public and private sectors to make efforts at all levels by making energy available to all, on an equitable basis and at an adequate level, also by absorbing part or all the cost of energy infrastructures.
- b)** To promote the formulation and application of effective energy policies aiming at reducing energy consumption through reduced waste and improved management of

energy; to explore all possible means to take adequate pricing measures to discourage excessive use of energy due to lifestyle preferences.

- c) To promote all measures conducive to human security, such as the implementation of safety criteria in the production and distribution of energy and of safety procedures for the disposal of radioactive wastes.
- d) To promote the formulation of energy strategies at national, international and global levels, ensuring a sustainable production, distribution and use of energy that, without damaging the environment, would satisfy our present requirements without impairing the ability of future generations to meet their own foreseeable needs. In this regard, all potential sources of sustainable energy should be examined without *a priori* prejudice and their costs and benefits including environmental and social should be objectively evaluated.
- e) To explore the ways and means to raise awareness towards environmental risk-free energy sources, against irreversible environmental situations; to foster the rational production and consumption of energy and prevent the occurrence of any events with irreparable consequences; to promote all possible means so as to reduce the emission of greenhouse gases; to foster adequate capacity-building to ensure that appropriate technologies can be used and maintained at local level.
- f) To promote scientific research geared towards low-risk and minimally-polluting fossil fuels and renewable energies, safe nuclear fission and, eventually, waste-free nuclear fusion, which would produce an effective mix of environmentally benign energy sources for the present and future generations.
- g) To encourage media pedagogy and education of the public on the ethical issues of energy policies; to promote the dissemination of information, available to and understandable by all, which would avoid bias from inaccurate data, preconceived and unsupported positions and fairly represents the relative costs and benefits of the different energy sources; to promote, at all levels, education on “good practices” for the use of energy resources; and, to solicit support for national and international energy institutions so as to provide a forum for open discussion and debate on energy issues.
- h) To encourage the awareness of stakeholders on the necessity of reaching a consensus in the development and establishment of energy policies; to help in identifying regulatory and economic means in order to translate ethical principles into operational policies and concrete actions.

In conclusion, COMEST asks its Secretariat to submit an interim report on the implementation of these recommendations to its next informal meeting. It wishes to have a comprehensive report in time for its third session.

United Nations Educational, Scientific and Cultural Organization
Organisation des Nations Unies pour l'éducation, la science et la culture



*World Commission on the Ethics
of Scientific Knowledge and Technology*

*Commission mondiale de l'éthique
des connaissances scientifiques et des technologies*

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**SECOND SESSION
OF THE WORLD COMMISSION ON THE ETHICS
OF SCIENTIFIC KNOWLEDGE AND TECHNOLOGY (COMEST)**

Berlin, Germany, 17-19 December 2001

CONCISE REPORT

Division of the Ethics
of Science and Technology

The ideas and opinions expressed in this document are those of the contributors to this report and do not necessarily represent the views of the Organisation. The designations employed do not imply the expression of any opinion whatsoever on the part of UNESCO Secretariat.

I. Introduction

The Second Session of the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST) was held in Berlin, from 17 to 19 December, at the invitation of the German authorities 2001. Over 120 specialists representing forty countries in the different regions of the world attended, including the members and *ex-officio* members of COMEST and representatives of the Member States of UNESCO, international, intergovernmental and non-governmental organisations.

As an Arab adage puts it «*Unless what you have to say is worth more than silence, do not say it*». The participants in the second session of COMEST certainly did not speak idle words and their discussions proved interesting and fertile. COMEST presented the works of its Sub-Commissions on the ethics of fresh water, the ethics of energy, the ethics of the information society and the ethics of outer space. A youth forum on the ethics of science and technology was also held and a presentation given on the evolution of space policy for the benefit of mankind. The proceedings of this second session were an opportunity for COMEST to assess concrete achievements and the progress made and to gauge the impact of its ethical reflections.

II. Opening Ceremony

The opening ceremony was honoured by the presence of Mr Wolf Catenhusen, Parliamentary Secretary of State to the Federal Minister of Education and Research of Germany and Koïchiro Matsuura, Director General of UNESCO, Mr Tim Ingold, Professor of Social Anthropology at Aberdeen University in the United Kingdom and Her Excellency Mrs Vigdís Finnbogadóttir, former President of Iceland (1980 – 1996) and Chairperson of the COMEST.

«*Make your voice heard!* », was the firm encouragement given by Mr Wolf Catenhusen as he wound up his opening address. The ethics of science and technology must not remain a matter for the privileged few. The future of all mankind and of our planet is at stake. The new technologies must be universally accessible: it is intolerable for part of the world population to be excluded from progress. *Knowledge is power*, as popular wisdom rightly has it. Reminding the audience of Berlin's long scientific tradition, Mr Catenhusen welcomed the fact that ethical reflection on science and technology was breaking out of its ivory tower.

Mr Koïchiro Matsuura wanted to see *moral solidarity on the part of all mankind*. The dramatically rapid progress of science is transforming our daily lives. He paid tribute to Her Excellency Mrs Vigdís Finnbogadóttir for the ardour and passionate determination placed by her in the service of COMEST during her term of office as Chairperson and invited her to remain an honorary member of the Commission. He welcomed the presence of young scientists and expressed his admiration for the work of COMEST which had been resolutely tackling matters that will shape tomorrow's world since it was set up in 1998.

Mr Tim Ingold addressed the meeting on the hierarchy of knowledge in the modern world. The revolution of information technologies has widened the gap between people who have access to information and those who are excluded from progress. The gulf that is opening between science and wisdom has the effect of marginalizing some forms of knowledge. There is no superior or inferior knowledge –

only different forms of knowledge. Autochthonous or indigenous knowledge is too often treated with contempt or condescension. All too often verifiable, impersonal scientific knowledge, which exists out of any specific context, is contrasted with indigenous knowledge bound up with the environment which is contextual, theoretical and personal and founded on an oral tradition. But scientific knowledge in fact also depends on a context, on the creation of the frameworks and mechanisms to support it all over the world. This artificial dichotomy between supposedly scientific knowledge and indigenous knowledge is eminently political. Indigenous knowledge raises the question of the way of life and well being, of harmony with a particular environment. In the age of technological revolution, such knowledge is more precious to us than ever before to establish a dialogue between science, society and the non-human environment. If we stubbornly continue to establish a hierarchy of knowledge *we will end up knowing more and more and understanding less and less.*

Her Excellency Mrs Vigdís Finnbogadóttir expressed the hope that Berlin might become one of the foremost centres of world thinking. She went on to express her conviction that science must be a *means and not an end*. Technological progress must go hand in hand with ethical reflection. Science and technology must be our servants and not our masters. It is therefore important for COMEST to consist of members drawn from different horizons whose reflection is sufficiently broad to escape from fastidious and strictly technical discussions. We need a vision of science which promotes a *culture of responsibility and dialogue*. The COMEST members share a desire to work for the well being of all mankind. To ensure the perennial survival of their work, instruments which can be handed down to younger generations must now be shaped. They are responsible for building tomorrow's world. The Chairperson concluded her address by urging the Commission to *make its voice heard*.

III. Summary of the work of the four Sub-Commissions

The work of the four COMEST Sub-Commissions reflect this interdisciplinary and intercultural approach.

III.1 The Ethics of Fresh Water

Lord Selborne (United Kingdom), Member of Parliament, President of the «*Royal Geographical Society*», and Chancellor of the University of Southampton, presented the work of the COMEST Sub-Commission on the Ethics of Fresh Water which is chaired by him at present.

Fresh water is essential to the survival of mankind. At the dawn of the new millennium, at a time when the planet has an increasingly large population and ground water resources are drying up, careful management of an increasingly precious asset has become an urgent necessity. Today, too many people have no access to the water resources of our planet; they include both inhabitants of the developing countries and a marginal population in the industrialised countries who have access only to polluted water. Lord Selborne reminded that 70% of all fresh water resources were concentrated in just ten countries: water is becoming the *blue gold* of the twenty-first century, to borrow the metaphor used by one of the participants. This critical situation was the outcome of policies that failed to take account of social imperatives. To put in place a truly ethical policy, basic agreement must be reached on the main directions to be taken and due allowance made for the

indigenous forms of knowledge to which Mr Tim Ingold had referred. New means of communication must be used to circulate data more widely. The **RENEW** network, in particular, is designed to promote best practice and ensure that knowledge about drinking water is widely shared.

2003 will be the international year of fresh water. The suggestion has been made that UNESCO might take this opportunity to set up a prize to be awarded to the foremost practitioners in the field of fresh water resources management world wide. That prize might make the media more aware of the work of COMEST and so enable a wider audience to be reached.

The Vice-Chairman of the International Hydrological Programme (IHP), Mr Witold G. Strupczewski, recalled the symbolic, sociological and philosophical value of water. He stresses out that over and above the economic challenges, water is a matter of civilisation. Between 2002 and 2007, global water resources will be one of the major concerns of UNESCO. Water may generate conflicts - more than three hundred watercourses do cross national borders – and affect the development in some parts of the world. Fortunately the ethical principles advocated by COMEST are rapidly gaining ground, as was attested by the partnership between the World Bank and UNESCO or the Ministerial Declaration of The Hague on Water Security in the 21st century (22 March 2000). Water will certainly be one of the most serious problems in the coming century. To face this coming *water crisis*, researchers, trainers and politicians must now mobilise to define ethical principles which will enable the most equitable and effective fresh water management policies to be put in place. Mr Strupczewski pointed out the statement by Mr Kofi Annan, Secretary General of the United Nations Organisation, who described « *access to drinking water as a fundamental human right.* » One of the goals of COMEST is to make sure that this right is respected in the twenty-first century.

III.2 The Ethics on the Information Society

Mrs M.R.C. Greenwood (United States of America), Chancellor of the University of California in Santa Cruz, presented the work of the COMEST Sub-Commission on the Ethics of the Information Society, which is chaired by her at present.

The revolution of information technology is having an immense impact on society. The tension between *individual liberty* and *social liberty* lies at the heart of the Information Society. Similarly, a distinction must be drawn between information and knowledge. Our society is submerged by a constant flow of information which does not necessarily satisfy the need for knowledge. The ethics of the Information Society involves social criteria. The proponents of the Information Society maintain that it restructures our society in a positive sense. However, we are living today in a civilisation of images which has taken over from the civilisation of the written word; the omnipresence of television and the media, the constant flow of images on television or on the Internet may encourage a passive attitude on the part of young people which requires no use of the spoken or written word. Young people are unfortunately not always able to “read”, i.e. decrypt images.

The ethics of the Information Society must also deal with issues of equity. The pitfall of the *digital divide* must therefore be avoided; the fact is that progress of the new information technologies heightens inequalities between the industrialised and less developed countries whose infrastructures do not always permit access to

information circulated on the Internet for example. Unless this technology gap is narrowed, that situation might lead to the emergence of a multi-speed information society; any such disparity would certainly prove responsible for inequitable access to information.

Universal access to information is a principle whose application is necessary to build a democratic information society. But although information must be universally available, vigilance over its processing and circulation remains necessary. The stupefying progress of technology easily enables images to be diverted from their initial purpose and it is easy to estimate the use that may be made of them to serve the interests of an individual or group. In that environment, how can we ensure the democratic treatment of information? Moreover in a world in which the Internet is blurring the frontiers between the private and public spheres a little more each day, the urgent need for ethical regulations is self-evident.

Working to create balanced access to information technologies, while bearing in mind the fact that the *new technologies can never put an end to the usefulness of their predecessors*, as Mr Jean Andouze, Director of the *Palais de la découverte* in Paris pointed out, is one of the major concerns of this Sub-Commission.

III.3 The Ethics of Energy

Mr James Peter Kimmins (Canada), Professor of forestry ecology at the University of British Columbia, presented the work of the COMEST Sub-Commission on the Ethics of Energy which is chaired by him at present.

Energy takes many different forms and is encountered equally in man and in the fauna and flora. Therefore it is particularly difficult to define and still more to determine what ethics is and what it is not. There is no absolute ethics of energy. While avoiding at all costs the pitfall of relativism, we are obliged to point out that the problems are situated in precise contexts, in different times and geographical areas. Something which is ethical in agriculture may not be so in industry. The process of evolution is marked by the endeavour to satisfy needs. The different species can be harmful to each other; a bear kills to eat, some plant species stifle others to proliferate; these are problems of survival and not of ethics. Energy is vital; it enables us to assure our own security. However, major inequalities exist in access to energy and in the ways in which its impact on the environment is dealt with. A wide-ranging study should be conducted to forecast the future situation in the energy field. The question put by the Club of Rome back in the 1970s is more topical today than ever before: *are there limits to growth?*

Mr Jean Audouze pointed out that *no energy is inherently good or bad*. Energy forms must be diversified and use made of all the sources of energy available on the planet. In particular, nuclear energy must not be dismissed as a diabolical project. In an area of population explosion, we cannot afford to disdain any form of energy. *In 2010, the demand for energy will be 40% higher than today*. Moreover, greater efforts should be made world wide in the area of energy savings. *The twenty-first century will consume three times more energy than was the case in the period between 1850 and 2000*. Like fresh water, energy is becoming one of the major problems of our century. We are living today in a two-speed world where the technology gap between the industrialised and less developed countries is widening a little more every day. Life expectancy is longer when energy consumption is higher. That being so, it is unacceptable for *two thousand million persons on the planet to have no access to*

electricity. Accessibility, availability and acceptability are the three bywords of equitable energy resource management, as the World Energy Council points out.

The COMEST Sub-Commission on the ethics of energy has therefore set itself a number of priority goals. First, working to ensure more equitable access to energy which must be distributed between the poor and rich countries. Attempts must also be made to change our patterns of behaviour in order to achieve energy savings. There can be no life without risk and the use of energy undoubtedly also poses certain risks to the environment. The question is to determine what risks we are willing to assume. The principle of *environmental responsibility* must be encouraged. Universal access to energy must be facilitated; all forms of energy are needed; we cannot do without nuclear energy, but great caution must be exercised over the management of nuclear waste; outlawing a particular form of energy would not make any kind of sense; energy must be preserved and used economically; research and development must progress; the public must be better educated to make people aware of the issues involved. *Ethics holds the key to sustainable development.*

A 50% increase in pollution emissions in the next twenty years is forecast. To eradicate the threat of polluting activities, there can be no question of transferring them to the developing countries. Action must be taken to fight selective pollution. Something which is ethical today may perhaps not be so tomorrow; knowledge is not immutable. Ecosystems are interdependent. Energy calls for global responses; deforestation in one part of the world has repercussions on the whole planet. A local problem can have world wide repercussions. This is why the sub-Commission proposed that global action policies be implemented.

III. 4 The Ethics of Outer Space

Mr Jens Erik Fenstad (Norway), former President of the International Union of History and Philosophy of Science (1991-1995), Chairman of the Standing Committee for the Physical and Engineering Sciences of the European Science Foundation (1995 -1999) and member of the NATO Science Committee since 1992, presented the work of the COMEST Sub-Commission on the Ethics of Outer Space which is chaired by him at present.

Space is a new challenge to mankind. The old dream of Icarus has always haunted men's minds. But the desire to explore the universe must not lead us to forget ethics. Space requires respect for ethical rules and criteria for the benefit of all countries.

The report on the «Ethics of Space Policy », drawn up after the highly informative proceedings of the Working Group which met in Paris in September 1999 under the direction of Mr Alain Pompidou (France), has met with real success among researchers, universities, the press and civil society. The keen interest aroused by this question has encouraged COMEST to create its own Sub-Commission on the Ethics of Outer Space. We must now find partners and *transform general principles into practical actions.*

Mr Alain Pompidou (France), Member of the French “*Académie des Technologies*”, pointed out that scientific and technological research, as well as economic and philosophical studies, are the means of responding to human questioning by widening the scope of knowledge and forging new instruments. A discussion between science and society must therefore be established.

Space research leads to the projection of human beings outside their own habitat and natural environment. *Man is a pioneer*. Like all pioneers he must accept the risks of discovery. *Breaking out beyond ourselves must lead on to a review of our socio-cultural principles*. We have an ardent obligation to man and the future generations *to engage in scientific and technological research and ethical reflection*.

The ethics of space policy in which UNESCO plays a pioneering role is a territory which we must develop without waiting any longer. Some questions immediately arise:

- How can an interactive debate be organised between decision-makers, public opinion, industrialists and scientists?
- How can closer co-operation be assured between the national agencies to improve decision-making procedures?
- How can ethical filters be put in place?
- Does space have specific characteristics as an inalienable protected domain?
- How can an integrated international planetary system be created to watch the Earth?
- Can space research help to protect the environment?
- What limits are imposed by public acceptability, costs accepted by the states and industry?
- How can a system of risk management be created in relation to the use of technologies of space and to assure greater equity and better benefit sharing?
- How can better protection of intellectual property and human rights be assured?

Mr Pompidou went on to present the recommendations of this Sub-Commission. He recalled the fact that *ethical principles must act ahead of the law*. Ethics must inspire, *precede and guide the law*. UNESCO has an important role to play in promoting a *culture of space*.

Mr Cheick Modibo Diarra, Director of the « Jet Propulsion Laboratory » of the *National Aeronautics and Space Administration* (NASA), called attention to the importance of the circulation of scientific knowledge about space, especially in the less developed countries. In that perspective, researchers and astronauts regularly travelled to Africa to share their experience. For five years, in response to an initiative by the US Congress, NASA has been arranging meetings with the public and schools. 1% of the budget of each mission is now dedicated to the circulation of information.

IV. Youth Forum on the Ethics of Science and Technology

The youth forum on the ethics of science and technology chaired by Ms Lisa Pelling (Sweden) was an eagerly awaited feature of this Berlin conference and provided an opportunity for five young scientists to explain their respective points of view.

IV.1 Youth's Perception of the Ethics of Science by Ms Hafsat Abiola (Nigeria)

«*We are the clothing that we wear*» is how a Nigerian proverb stresses the unimportance of material things. We must not be content with words. Ethics does not need fine words but an authentic commitment. The COMEST Sub-Commission on the Ethics of Energy stipulates that all mankind must have access to energy. Unfortunately, that is far from being the case today. The developing countries lack of

resources to benefit from the new technologies and afford innovations for which the intellectual property rights are often very expensive. To put an end to this inequitable distribution of the profits of scientific breakthroughs, *the word « ethics » must be put into practice*. As the spokesperson of the African people, Ms Abiola therefore launched an appeal to the generosity of the industrialised countries to help the poor nations to catch up.

IV.2 Ethics of Environment by Mr Stephan Paape (Canada)

New ethical concerns are the other side of the coin of scientific progress. There is no point in being either utopian or alarmist, but we must *be aware of our responsibilities. The choices that are made today will determine tomorrow's world*. Respect and humility must be at the centre of our action. The cycles of the environment must be respected: sustainable development is essential to the future of all mankind.

Mr Paape expressed the hope that international organisations would contribute to the *development of a new ethical framework*. This must leave ample room for traditional knowledge, which was all too often marginalized. There was an imperative need to take account of the indigenous populations who are the possessors of this traditional knowledge and are often the first to feel the effects of environmental change. We must not only consult them but also enable them to participate in the decision-making and implementing procedures. The same goes for young scientists. COMEST should give its support to young scientists all over the world and follow up an initiative such as this forum. UNESCO might promote this idea to achieve the ethical objectives defined by COMEST.

IV.3 Science for the “Sustainable Transition” – or the concept of *sustainability* - by Mr Biermann (Germany)

The increasing emission of carbon gases is responsible for damage to the ozone layer. The considerable climatic changes created by it damage the environment. Desertification in particular, aggravated by the growing scarcity of fresh water referred to by Lord Selborne, accentuates the gap between the countries of the North and South. Scientists from the industrialised countries benefit from infrastructures which are not available to the developing countries. We must work to *strengthen the dialogue and scientific co-operation between North and South*.

Different sources of pollutant emissions exist but a *distinction must be drawn between emissions caused by the needs of survival and superfluous (luxury) emissions*; we must endeavour to reform our consumerist habits.

IV.4 Ethical Responsibility of Engineers by Ms Eva Estók (Hungary)

Each era has its own particular problems! *The changed understanding and evolution of technology call for a new approach to ethics*. Ethics cannot be frozen at a particular point in time but must accompany evolution in the world. Technology consists of networks and actors between whom interactions exist. We must make use of these networks, especially because of the difficulty experienced today in reaching agreement on social and economic values. In the sphere of ethics, maximisation of present value should condition future value. We must include risks and the responsibility of engineers. For this purpose it would be desirable to

systematically stimulate ethical thinking. By way of conclusion, Ms Estók spoke of her wish to see the advent of *a new culture, that of a responsible technology*.

IV.5 How to Encourage Young Scientists to Promote the Ethics of Science? by Ms Maria Cecilia A. del Mundo (Philippines)

The thirst for knowledge and the desire to help others are powerful motors of research. But although the intentions are noble, inventions can sometimes serve the interests of a single person or a group of individuals to the detriment of mankind. Unfortunately the twentieth century has given many examples of harmful uses of science and technology. We are never sheltered against such perils and the series of contaminations with anthrax in the United States of America at the end of 2001 teach us the hard way that *ethics are never an established achievement but a real and urgent need*. Young people must be trained to guarantee *good science*. Ethics must be promoted in companies and in schools, while insisting in school syllabuses on the ethical example of the prominent scientists who enabled science to progress for the benefit of all mankind. Ms del Mundo suggested the creation of interactive Internet sites on which young scientists could put forward their ideas. The most productive sites might be rewarded with a prize.

There is no point in trying to hide reality. Science and technology not only bring benefits for mankind but also create undeniable risks. To limit those risks, children must be taught to respect the environment and prepared to become responsible adults.

Ms del Mundo wound up her presentation by quoting a declaration by Kofi Annan: *«I have tried to put man at the heart of our action.»* Let us hope that science will never forget this primacy of human beings and remain in the service of life.

V. Closing Session

Mr Alain Pompidou addressed the meeting on the **“Evolution of Space Policy for the Benefit of Mankind”**.

Never has scientific progress shaped the economy and social relations to the extent that is the case today. Ethics underpins the morality of action and calls for a reflection on risk. It has many aspects. The existence of a public debate on these matters is imperative. The ethics of space policy has been examined in co-operation with the European Space Agency (ESA). The ethics of space policy touches on a new field in which man is still in his infancy; although it holds out great promise, it nevertheless causes much anxiety. In this context, an ethical approach which takes account of acceptability to public opinion is necessary. Equitable access to technologies and protection of the integrity of the human person are priorities. Given the “unique character” of outer space, we must therefore identify space activities to the benefit of all countries.

Space is an environment without frontiers, which raises far-reaching questions. It encourages us to reflect on the role of the human being in the universe and also on the links to be established between the earth and man. How can priorities be determined for space policy? What risks are acceptable when measured against the ultimate objectives? On what democratic bases must our action be founded? What

measure of responsibility do we bear to future generations? Consideration of these matters is essential to position ethical reflection effectively.

Life in outer space itself poses many questions. *Astronauts are the ambassadors of mankind in space.* In that capacity, they must respect the forms of life, which exist on the other planets in the solar system. The necessary precautions must therefore be taken to prevent their contamination, in particular by space probes. We must also prevent the dispersion of space debris which would make access to the confines of the universe impossible. Space can bring us many benefits in the field of communications. Mobile phones and the Internet contribute to the construction of a *global village*. But every village has its hierarchy and the great universe of communication to which we aspire is incompatible with a cumbersome hierarchization. Communications established with satellites will permit the emergence of new identities and new ways of communicating. Space can also contribute to the creation of new forms of transport and better management of the environment; it enables us to make a more effective study of climate and predict disasters. Health care too can derive huge benefits from the use of the resources provided by space. Remote medicine (telemedicine) holds out hopeful prospects for the elderly and handicapped and for patients living in isolated geographical areas and enclaves.

However, there is another side to the coin and if we want to benefit from the advantages of space technology we must also face up to the risks involved. The controversy over the use of space to dispose of nuclear waste and the thorny question of electronic surveillance in which the balance between individual freedom and collective freedom must be respected are forceful examples. *Risks and crises must be managed in a spirit of transparency.* An international consultation should be organised to *define a system of global co-regulation.*

Access to space is a topic which appeals to the general public and generates passionate interest and dedicated following. *Access to space is a mobilising activity. This emotional context* makes it essential for us to remain vigilant to avoid all exploitation of the credulity of individuals.

Space is a shared commitment which involves both the military and civilian spheres. *Space is an instrument of power and sovereignty.* That is why we must avoid massive domination of the industrial sector over investments and test the dependability of the link between the public sector and the private sector because the *nation state is no longer the sole guarantor of moral integrity. Man has no right to appropriate space.* Outer space is a scientific field of exploration for all mankind. Environmental data must be broadly accessible to all countries, whatever their degree of development may be. For the time being, we must rely on the existing provisions of the international space law, and especially the *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space*, which entered into force in 1967. Three great principles must be respected in every case: the dignity of the human being; socio-cultural identities and individual freedoms; equity and solidarity.

Winding up his address, Mr Pompidou stated that *the ethics of space is a new strategic approach for all mankind.*

VI. Conclusions

«*Only those people who can see the impossible are also capable of seeing the invisible*», Her Excellency Mrs Vigdís Finnbogadóttir concluded before announcing that Mr Jens Erik Fenstad would be taking over from her as the Chairperson of COMEST. Mr Fenstad thanked her warmly and greeted her action which had enabled COMEST to develop so rapidly. He affirmed his determination to take up the cause with the same ardour.

The Chairperson of COMEST wound up these three days of a *remarkably dynamic and promising* session by thanking the German government for hosting the meeting; she also expressed her gratitude to all the speakers in the exciting and passionate debates and in particular the young scientists who had been courageous enough to address this solemn gathering. She welcomed the strength of commitment shown by the members of COMEST. They were the pioneers of an ethics which might well become a model for the international community. She recalled the imperative role of UNESCO as an *ideal international platform* to deal with the new ethical challenges. She spoke of her trust and optimism in the future. *The citizen must not be regarded as a simple consumer of science and technology but as an actor*, she concluded. That is the real ambition of COMEST: to make each one of us a responsible actor in tomorrow's world.

The work done by the COMEST in the last two-year period have been typified by farsighted thinking and transparency which have enabled COMEST to become widely known all over the world and encouraged a dialogue at global level on the ethics of science and technology, while also attracting the attention of governments, media and the general public.

Berlin, a city devastated by history, has managed to find the strengths necessary to rebuild and become a guiding light of a multicultural and tolerant Europe. We see here a symbol of the action of COMEST and UNESCO which is mobilising good will and energies on the ruins of a century that saw so many tragedies and technological nightmares, to build a more ethical future. At the end of its second session, COMEST is more than ever on the right track to keep its humanist promise and might easily take this Chinese proverb as its motto: «*No matter whether you leave your house to go to the bottom of the garden or make a journey round the world, the first step is always the same.*»

In future, the ethics of science and technology will cease to be a mere option. At the end of its second session, COMEST envisages with renewed optimism the task of placing ethical debate at the very heart of science and technology.

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Attachment

NEW COMPOSITION OF THE COMEST BUREAU

(Established at the Second Session of COMEST in December 2001)

- CHAIRPERSON:** **Mr Jens Erik FENSTAD** (Norway)
Professor of Mathematical Logic
Vice-Rector of the University of Oslo
Former President of the International Union of History and
Philosophy of Science (1991-1995)
Chairman of the Standing Committee for the Physical and
Engineering Sciences of the European Science Foundation
(1995-1999)
Member of the NATIO Science Committee
- VICE-CHAIRPERSONS :**
- Mrs Suzanne MUBARAK** (Egypt)
First Lady of Egypt
Founder and Chairperson of the Egyptian Association for
Childhood and Development
Former Chairperson of the International Jury of the UNESCO
Prize for Literature for Children's and Young People's Literature
in the Service of Tolerance (1997 – 1998)
- Mrs Leila SETH** (India)
Life member of the World Wide Fund for Nature (*WWF*)
Former Principal Advisor to the Supreme Court of India
Former Chairperson of the High Court of the State of Himachal
Pradesh
- Mr Cheick Modibo DIARRA** (Mali)
Goodwill Ambassador of UNESCO for Science and Technology
Director of the *Jet Propulsion Laboratory* of the *National
Aeronautics and Space Administration* (NASA)
- Mr Serguey Petrovitch KAPITZA** (Russian Federation)
Professor at the Moscow Institute for Physics and Technology
Vice-Chairman of the Natural Sciences Academy of Russia
Member of the *Academia Europaea* and of the World Academy
of Arts and Science
- RAPPORTEUR :** **Mr José SARUKHAN KERMEZ** (Prof.) (Mexico)
Special Advisor to the President of the United Mexican States
Former Rector of the Autonomous National University of Mexico
(UNAM)
Titular Professor of Ecology at UNAM
Member of the Academy of Sciences of the United States of
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Chairman of DIVERSITAS

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ACHIEVEMENTS, ACTIVITIES AND NEW INITIATIVES OF THE COMEST

Human impacts on the ecological systems of the planet as well as human activities in outer space have reached an unprecedented level with a direct impact on health, society, economy, security and justice. This situation calls for international action in favour of introducing an ethical approach on environment and space activities for a sustainable development. In this respect, UNESCO has established the World Commission on the Ethics of Science and Technology (COMEST) to advise the Director-General on the promotion of ethical principles pertaining to scientific and technological progress.

Building on its previous work on ethics of outer space, energy and fresh water resources, COMEST will address, in cooperation with international concerned bodies, a number of new issues, such as:

- Analysis of the basic values of environmental ethics and the search for answers in complex environmental situations;
- Ethical reflection and concern of the international community for the safe and peaceful use and exploration of future activities in outer space;
- Responsibility towards future generations on the promotion of human rights and fundamental freedoms through the wise and sustainable use of natural resources, including water, energy and outer space;

COMEST wishes to raise international awareness and understanding of these issues and to promote a dialogue between the scientific communities, decision makers and the public at large.

COMEST is now focussing on the **Ethics of the Environment and Sustainability**. At the initiative of its Chair, COMEST and UNESCO should work in collaboration with the International Council for Science (ICSU). The Chairs of COMEST and ICSU as well as the Assistant Director-General for Natural Sciences and the Assistant Director-General for Social and Human Sciences of UNESCO decided to convene a working group to start cooperation on this matter. The working group, which should study ethical issues related to the impact of new technologies on the environment, held a preparatory meeting at ICSU Headquarters on 24-25 June 2002. The Chair, Professor Jens Erik Fenstad, the Rapporteur, Professor Sarukhan, Lord Selborne and President Hubert Curien participated in the meeting together with the Secretary-General, the Executive Director and the Deputy Director of ICSU, as well as the Deputy-Director for Social Sciences of the International Geosphere Biosphere Programme (IGBP), a representative of the MAB Programme, and the President of the mixed Programmatic Commission "Science and Ethics" of the UNESCO-NGO Liaison Committee. The outcome of the meeting was the proposal to establish COMEST/ICSU cooperation in the field of ethics and sustainability. This initiative would associate as well as the civil society. The main challenge is to act as catalyst, set the conditions of a structured dialogue on ethical values and create the elements for a new commitment for the scientific community with society. If this initiative is approved by ICSU Executive Board, a joint workshop could be organized in 2003.

COMEST has also been involved in the preparation of the **World Summit on Sustainable Development** (Johannesburg, South Africa, August-September 2002) through the participation, in March 2002, to the Third Preparatory Committee for the Summit (PrepCom III). In this occasion, a side event in the form of a Forum on the Ethics of Science and Technology was organised at the United Nations Headquarters in New York. COMEST was there represented by its Chair, Professor Jens Erik Fenstad, Lord Selborne (Chairperson of the COMEST Sub-Commission on the Ethics of Fresh Water) and Prof. James P. Kimmins (Chairperson of the COMEST Sub-Commission on the Ethics of Energy). Furthermore, COMEST contributed to the preparation of a substantive part of the UNESCO Position Paper for the Johannesburg Summit.

Concerning the **Ethics of Outer Space**, the Resolution 56/51 of 10 December 2001 of the General Assembly of the United Nations adopted the recommendation of its Committee on the Peaceful Uses of Outer Space (UNCOPUOS) to prepare a joint COMEST-UNCOPUOS report on the Ethics of Space Activities. This report should contain an analysis of the ethical principles governing present and future activities in Outer Space. In this regard, meetings have already been held with the European Space Agency (ESA) and the European Centre for Space Law (ECSL). The Chair of COMEST participated in the forty-first session of the UNCOPUOS Legal Subcommittee, held at the United Nations Office in Vienna (April 2002). UNESCO has also been invited to participate at the first meeting of Group of experts on Ethics of Outer Space Activities, held at the United Nations Office in Vienna (June 2002), during the forty-fifth session of UNCOPUOS. The mandate of the group is to establish a report, in consultation with other international organisations and in close collaboration with COMEST, in view of presenting the issue to the UNCOPUOS Legal Subcommittee at its next session in 2003.

The project **Research and Ethical Network Embracing Water (RENEW)** was established in close co-operation between COMEST and the International Hydrological Programme (IHP), in the framework of the activities of the COMEST Sub-Commission on the Ethics of Fresh Water. RENEW is an activity of capacity-building aimed at identifying and endorsing examples of best ethical practices in all aspects of freshwater use and management. The RENEW Network envisages the creation of Regional Centres worldwide. The Australian National University (ANU) established the first RENEW Centre in 2000, representing the South-East Asia-Pacific region. The Australian RENEW Centre is to be a joint initiative of the water industry and major water users. The aim of RENEW is to generate, endorse and promote best practices and innovation in the ethical use of freshwater in the region, foster the widest possible community participation in the planning and management of water, and create a collaborative network of regional organizations. A second RENEW Centre for the Baltic and Nordic countries was established in 2001 in Bergen (Norway). These networks are in the process of being strengthened. Following a request of the Egyptian Government to establish a regional RENEW centre in Egypt, which was approved by the COMEST at its Second Session, held in Berlin in December 2001, a new RENEW Regional Centre for the Arab States is to be established during the current biennium.

As to the **Third World Water Forum** (Japan, 2003), contacts have been established with the Secretariat of the International Hydrological Programme (IHP) and the World Water Assessment Programme (WWAP) to prepare the active involvement of COMEST in highlighting the importance of the ethical dimension in the management of fresh water resources world-wide.

At present, a Session on "*Ethical Dilemmas in Water Management and Use: a Global Perspective*", is planned jointly with the San Francisco Public Utilities Commission (California, USA), the National Water Works Association (USA), and the Water Supply and Treatment Division of the University Complutense (Madrid, Spain). A primary purpose of the workshop would be to help participants in recognizing ethical dilemmas in their own work settings. A related Virtual Water Forum should also be launched.

Furthermore, COMEST will participate to the International Conference "*From Conflict to Co-operation in International Water Resources Management: Challenges and Opportunities*" (UNESCO-IHE Delft, The Netherlands, 20-22 November 2002), which is a joint initiative of the International Hydrological Programme (IHP) and Green Cross International. Lord Selborne will be the moderator of the final conference debate on "*Water for Peace*".

The World Conference on Science *Framework for Action* states, in paragraph 71, that: "*Ethics and responsibility of science should be an integral part of the education and training of all scientists.*"(...) "*Young scientists should be appropriately encouraged to respect and adhere to basic ethical principles and responsibilities of science. COMEST, in co-operation with ICSU's Standing Committee on Responsibility and Ethics of Science (SCRES), have a special responsibility to follow up on this issue.*" Given this statement, ICSU, SCRES, UNESCO and COMEST are taking relevant steps. The first is for the organisation of a Working Group that will give the necessary advice on how to integrate awareness and competence in the field of **Ethics and Responsibility** of science in the training of every young scientist. It is planned that at its Third Session in 2003, and as a follow-up to this work, COMEST will issue Recommendations on the Ethical Component of Scientific Education that, according to its mandate, will be addressed to public and private decision and policy-makers in UNESCO Member States.