United Nations
Educational,
Scientific and
Cultural
Organization

World Commission
on the Ethics of
Scientific Knowledge
and Technology

COMEST

Fourth Session

23 - 25 March 2005

Bangkok, Thailand

Proceedings

List of COMEST Members – March 2005

1. Members

Mr Jens Erik Fenstad (Norway)

Mr Ruben Apressyan (Russian Federation)

Ms Pilar Armanet Armanet (Chile)

Mr Mohamed Bennouna (Morocco)

Mr Cheick Modibo Diarra (Mali)

Mr Jun Fudano (Japan)

Mr Diego Gracia (Spain)

Mr Johan Hattingh (South Africa)

Prof. James Peter Kimmins (Canada)

Mr Pavel Kratochvil (Czech Republic)

Prof. Lu Yongxiang (China)

Ms Suzanne Mubarak (Egypt)

Mr Luiz Hildebrando Pereira da Silva (Brazil)

Mr Alain Pompidou (France)

Mrs Leila Seth (India)

Mr Song Sang-yong (Republic of Korea)

Ms Nadja Tollemache (New Zealand)

2. Ex-Officio Members

Chairperson of the International Bioethics Committee of UNESCO (IBC)

Chairperson of the Intergovernmental Bioethics Committee (IGBC)

Chairperson of the International Council for Science (ICSU)

Chairperson of the International Council for Philosophy and Humanistic Studies (ICPHS)

Chairperson of the International Social Science Council (ISSC)

Chairperson of the Pugwash Conference on Science and World Affairs

Chairperson of the Intergovernmental Oceanographic Commission of UNESCO (IOC)

Chairperson of the Programme on Man and the Biosphere (MAB)

Chairperson of the International Social Sciences Programme on Management of Social Transformations (MOST)

Chairperson of the International Hydrological Programme Intergovernmental Council (IHP)

Chairperson of the International Geological Correlation Programme (IGCP)

3. Executive Secretary

Mr Henk ten Have (UNESCO)

FOURTH SESSION

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

Bangkok, Thailand, 23-25 March 2005

SHS.2005/WS/41

TABLE OF CONTENTS

CONFERENCE REPORT

Opening Session

Mr **Korn Thapparansi**, Minister of Science and Technology of Thailand, welcomed the participants and commended UNESCO's and COMEST's objective to promote ethics in science and technology in the Asia Pacific region. The conference, he said, brought together more than 500 delegates. Four events would be held: COMEST public sessions, COMEST private meetings, a youth forum and a ministerial meeting expected to lead to a ministerial declaration. It was a privilege, he said, that UNESCO had selected Thailand for this event, and that it was an opportunity to exchange knowledge and experience on the ethics of science and technology, particularly in regards to equality and human rights.

Mr. **Koïchiro Matsuura**, Director-General of UNESCO, emphasized the central importance of ethics in science and technology in the determination of UNESCO's actions and thanked Thailand and HRH Princess Maha Chakri Sirindkorn for this opportunity to exchange views on the matter. In our time of rapid changes, he said, the United Nations Charter gives us guidance, as it stipulates that science should promote 'social progress and better standards of life in larger freedom'. The concept of equity, he added, is central to the achievement of social progress. The task of conciliating differing views defies easy resolution and yet is made necessary by growing technological capacities. As norm building is a long-term endeavour that necessitates a better understanding of the ethical implications of science and technology, ethics education is an important issue and the youth forum is a good initiative.

Mr. **Jens Erik Fenstad**, Chairman of COMEST, joined Mr. Matsuura in expressing gratitude to the generosity of the Thai government in organizing the meeting. The 1999 World Conference on Science, he recalled, showed that there are remarkable advances in store for humanity through science but that dangers are involved, such as environmental and social imbalances or technological disasters. From the early days of COMEST, he said, expectations have been very high but, thanks to the support of UNESCO, COMEST has started to deliver, for example, in the field of fresh water, with its contribution to the Kyoto Conference of 2003. After the 2002 World Summit on Sustainable Development in Johannesburg, COMEST included this work in the framework of a broader concept of environmental ethics. As ethics cannot be a top-down activity, education and dialogue are of utmost importance. The World Conference on Science asked COMEST to take the lead on ethics education, and the efforts by UNESCO and COMEST in this regard, as well as the youth forum, will contribute to a bottom-up approach.

Her Royal Highness Princess **Maha Chakri Sirindhorn** expressed her pleasure in opening the meeting and welcomed this opportunity for the scientific and technological communities to exchange views with the political sector for the benefit of humankind. In an age of globalization and rapid progress, science and technology should be instrumental in solving problems and improving living standards in a spirit of respect for culture and nature. The princess wished the meeting success. A multimedia presentation concluded the ceremony, presenting the history, objectives and current activities of COMEST, as well as the programme of the conference.

Keynote Addresses

Mr. **Koïchiro Matsuura** started by emphasizing that scientific and technological progress offers both risks and benefits. The concern about the adverse consequences of scientific development, however, is mounting,

and some of that concern is focused on ethical aspects that may undermine the whole enterprise of modern science. Life science, for example, is challenging our usual notion of ethics. The gap between the complexity of ethical issues and popular understanding is dangerous. Ultimately, science must be responsible to society and not only to itself. Scientists showed that they were aware of this during the 1999 World Conference on Science. The ethical question of whether the (scientifically) possible is (ethically) desirable must be raised, not only by some experts and not only about some cutting-edge technology. It is, rather, a question concerning daily life and common technologies. The role of UNESCO to advise Member States in this regard, with the help of COMEST, is unique and is emphasized by the fact that ethics in science and technology is a priority for the Organization and will remain so, if Member States agree, through 2007. Ethical reflection implies that the debate should be conducted in public and should be seen in a proactive perspective: this is the approach of COMEST today. COMEST, Mr. Matsuura explained, is entering its maturity. The regional approach it has adopted is one aspect thereof. This approach allows for wider dissemination, broader debate and a better preparation of future action at the same time. Another sign of the maturity of COMEST is its reinforced interaction with all stakeholders, for example as in the meeting on the feasibility of a code of conduct for scientists held in Paris in early March 2005. It is commendable that despite its maturity, the Commission did not neglect the involvement of young people, as is apparent from the youth forum. The Commission is also, Mr. Matsuura stressed, committed to providing action-oriented recommendations. The role of the Commission became clearer with the clear distinction between ethical problems related to science and technology and other problems the world is facing. The idea of a declaration of ethical principles for the sustainable use of the environment is an illustration thereof: there are urgent environmental problems, but their ethical dimension is often neglected. This also shows the specific role UNESCO can play in addressing environmental problems. The promotion of ethical debates is vital to the ethical endeavour. The implementation of the report on the teaching of ethics, which was adopted by COMEST in 2003, goes in that direction. The clarification of ethical debates is also important for the achievement of consensus, which is the *raison d'être* of multilateral organizations like UNESCO and exemplified in the recent working group on the precautionary principle. Mr. Matsuura asked COMEST to consider the following prospective issues: nanotechnology, the rapid obsolescence of technological objects, the use of technologies for development that are both more appropriate and affordable, and problems related to the ethical evaluation of emerging technologies. As the example of bioethics has shown, prospective reflection is essential but tends to be neglected. The mandate of COMEST to give early warnings of risk situations is, in this regard, evidence of the international community's vision. It is also a source of confidence that in the future COMEST can raise issues that previously had not been thought of. Mr. Matsuura finally paid tribute to the departing Chairperson, Mr. Fenstad, and to the other members of the Commission for whom this would be the last session. He concluded with renewed thanks to the Thai Government.

Mr. **Yongyuth Yuthavong** - Professor of Biochemistry, Former President of the Thai Academy of Science and Technology and Senior Researcher at the National Centre for Genetic Engineering and Biotechnology - emphasized how timely and important the topic is. It has actually been timely, he argued, for several hundred years, even before Frankenstein and the atomic bomb. The day-to-day practice of scientists, he explained, rests on the assumption that scientific activity is good in itself because it empowers humankind, and that scientists cannot be blamed for the unethical use of their findings. However, he said, most of the time, inventions are just too new to be ethically asserted, referring to weapons and to therapeutic and human cloning

as examples. In time, he added, as technology becomes more familiar, ethical issues will be better understood, as has been the case, for example, with *in vitro* fertilization. There are issues other than cloning, he added, such as the right to information, designer babies, use of drugs that alter character, nanotechnology and, on the whole, prospects of what Fukuyama calls our 'post-human future'. Many books and movies raise suspicion that bad news accompanies new technologies. Human health and environment liabilities are the main concerns to be addressed. In addressing these ethical issues, Mr. Yuthavong argued, help can be found in the three guidelines of Buddhism: being good, doing good and purifying the mind. Of course, such guidelines require case-by-case consideration and raise other questions. Science and technology-based action and reflection provide peace of mind, he stated. There is a need to reflect upon the ultimate consequences of our action, for example with global warming. The main point, Mr. Yuthavong said, is that scientists and engineers should be aware of their effect on society and the environment, and look for the opinions of a wide range of people before making up their mind. This matches the principle of purifying the mind. While there are other interpretations and other moral systems, Mr. Yuthavong expressed his certainty that they lead to the same conclusion: the public needs to be involved in decisions regarding science and technology. The complex effects of new discoveries cannot be discovered by individuals only. In the story of Godzilla, the monster is an unintended product of nuclear experimentation, but the discovery that would allow its elimination is also a weapon of mass destruction. This is why the young scientist who made the discovery preferred to face the monster and burn his invention. While one hopes that all scientists would be that brave, one also hopes that they would not meet the same fate. As Amartya Sen pointed out, there is an economic interest in ethics as well, and taking ethics into consideration can also enrich science and technology. Reciprocally, the ethical impact of new science and technology development should not be ignored, Mr. Yuthavong concluded.

Session on Ethics Education

Mr. **Jens Erik Fenstad**, Professor of Mathematical Logic at the University of Oslo and Chairperson of COMEST, co-chaired the session with Mr. **Pavich Tongroach**, Secretary-General of the Office of Higher Education, Thailand. Mr. Fenstad recalled that ethics education has always been a priority for COMEST, and that this priority was reinforced by the mandate given by the 1999 World Conference on Science. Ethics teaching was a starting point, he said, for a number of activities. Mr. Fenstad introduced the speakers: Mr. **Diego Gracia**, Professor of Ethics and Health Sciences at Complutense University, Spain, a member of COMEST; Mr. **Ruben Apressyan**, Professor of Philosophy at the Institute of Philosophy, Moscow Lomonosov State University, also a member of COMEST; and Mr. **Soraj Hongladarom**, Associate Professor of Philosophy, Chulalongkorn University, Thailand.

Mr. Diego Gracia stated that after the Second World War, the experiments conducted in camps and the atomic bomb, it could no longer be thought that science, dealing with facts, had nothing to do with ethics. It was at that time, he recalled, that UNESCO was founded and that the promotion of social and ethical responsibility in science and technology has been one of its goals from the beginning. Science and technology are not value-free but rather value-laden. As knowledge means power, Mr. Gracia argued, that it cannot be left solely in the hands of scientists, but scientists do, however, have a responsibility to control new developments. In the 2003 report, *The Teaching of Ethics*, COMEST made two important recommendations: to promote ethics courses and PhDs, and to develop ethics teaching in developing countries. Following this report, the ethics education programme was started in 2004, initially focusing on higher education. An advisory expert commission was also created. Mr. Gracia then stated that there are two traditional models for ethics teaching. The first is indoctrination – which is still used in some groups; the second is the neutrality model, which was born in the 17th century in Europe, and only permits value clarification as opposed to deliberation or evaluation. The neutrality approach was exemplified by Max Weber in 1919 when he wrote 'the prophet and the demagogue do not belong to the academic platform'. Mr. Gracia quoted Yeats: 'The best lack all convictions, while the worst are full of passionate intensity', before stating that the neutrality model was precisely the one put in crisis with the Second World War. Discussion about values, he explained, is not only possible but also necessary. A third model, then, is the deliberation model, the goal of which is not to reach consensus, but to increase practical wisdom. Deliberation is difficult because it requires the acceptance that no one knows all the truth and that one can benefit from the help of another to become wiser and more prudent, because it requires the unusual capacity of listening to those who disagree. The father of this method is the father of ethics: Aristotle. What is right, Aristotle says, is the result of deliberation. The only way to ensure that we are wise and prudent, Mr. Gracia summarized, is to test the reasonability of our values. In this regard, deliberation is not only a method, but also a moral duty. In deliberation, conditions and circumstances, and not only principles, are taken into account. Such a Socratic procedure, Mr. Gracia claimed, should be UNESCO's lemma for the coming decade on education for sustainable development. Both extremes of indoctrination and neutrality should be avoided and education through participative development should be favoured, he concluded.

Mr. Ruben Apressyan began his response by emphasizing the relevance of Mr. Gracia's distinction when speaking of the value-

oriented teaching of ethics. But teaching ethics, he said, is not only about values and beliefs, but also about concepts and methods. This teaching may indoctrinate, as in high school, where ethics is often reduced to teaching values and making practical decisions. Over the last 50 years, Mr. Apressyan said, ethics as a university discipline has been considerably altered: it has ceased to be a sub-discipline of philosophy, and has started to take on applied forms. In that sense, it has become a part of professional education. There are now two concepts of ethics: as part of humanities teaching and as part of professional education. While its appeal to the individual makes it modern, the complexity of ethics makes it rather post-modern, in line with the plural belongings (family, community, church, etc.) of today's individuals. While modern ethics was concerned about the self, it had no interest in a personalized individual. But the post-modern discourse on the ethics of discourse, care, etc., is accomplished by various kinds of professional ethics. Obviously, these two diverging tasks of teaching ethics, he stated, should be convergent. A third role of ethics teaching, he added, is moral education for the sake of the public good, and ethics education is vain if it is limited to classrooms.

Mr. Soraj Hongladarom agreed with the former speakers that both pitfalls of relativism and indoctrination should be avoided. If there were no real answer to the question of values, ethics itself would become impossible, he argued. Typically, he stated, policy makers tend to focus either on imposing a set of values or on the technical part of education. But this distinction has become obsolete, as fact and values cannot be strictly separated. So, a concrete proposal is to nurture deliberative thinking, which can only be done in a system of programmes, Mr. Hongladarom said, such as the one set up by the ASEAN-EU Lemlife project on the legal, ethical and management aspects of life sciences. Its main goal, he explained, is to develop a programme of study in bioethics and ethics in science and technology. Hence, the main challenge for this programme is to be interdisciplinary and attractive to students. The idea of a consortium of universities would allow it to widen the pool of talented students while reinforcing the ability of the programme to survive on its own. Actually, Mr. Hongladarom added, there is an overwhelming demand for ethics in science and technology due to advances in science and technology, so the challenge would be to design good programmes rather than to attract good students. The idea of a consortium of universities also addresses the issue of the shortage of qualified teachers. On the whole, he concluded, the question is how to design the best institutional setting for deliberative ethics.

During the discussion, one person asked at what level the deliberation should take place and whether the scientist is a concern or not. The discussion on stem-cells, he argued, is absurd in a scientific context. Another participant argued that students risk losing their identity when they go to different universities. Mr. Hongladarom responded that this problem can be solved in many ways, one of them being to maintain the preponderance of a home university. Another participant stressed that the discussion seemed to be limited to formal education. Mr. Gracia stated that deliberation does not aim at reaching a sole conclusion among diverse participants, but rather makes room for pluralism, at least as a condition for deliberation. Rather than imposing points of view, he argued, deliberation should be taught in primary school. A participant agreed with this view and underlined that, in some cultures; openness is a sign of weakness. Mr. Gracia responded that while there are many practical problems, it is necessary to give deliberation a try. A COMEST member emphasized that ethics education should include media and public dissemination, as the issue is a political one. Answering to a question about the preconditions of deliberation, Mr. Gracia specified that they consisted more of skills than socio-economic conditions, and that is

why training in primary school is needed. He added that he did not think the media are interested in ethics education and deliberation. One COMEST member argued that the teaching of teachers is a prerequisite to address ethical issues raised by the complex system faced. Good teachers, he added, are often passionate and tend to indoctrination. One philosophy teacher stressed that a philosophical mind is needed to teach ethics, and another stressed that, in a world of knowledge explosion, participation in the decision process is more important than the decisions themselves. A Thai ethics teacher shared her experience that students sometimes do not speak in deliberative processes, and that media tend to be only interested in ways to kill animals. A physicist acknowledged that she was never taught anything about ethics, but insisted that students are passionate about ethical issues and should be encouraged. She also said that university cooperation is an excellent idea in this regard. A Japanese professor emphasized the change of view by doctors in the 20th century about informed consent and mentioned the Swiss debate about pharmaceutical industries. In both cases, he said, the role of the media has been instrumental. The chairperson emphasized the growing need for public support and funding by scientists, and how this challenges traditional scientific arrogance. Mr. Hongladarom acknowledged that students sometimes feel they should not speak and that this is a recurring issue in ethics teaching. Mr. Apressyan argued that ideally, ethics should be taught three times in a lifetime, not only as professional training, but also as part of humanities. Mr. Gracia finally referred to his experience in teaching bioethics, in which all issues mentioned during the debate indeed arose. He concluded that a very difficult and important personal conversion is needed.

Session on Environmental Ethics

Mr. **James Peter Kimmins** - Professor of Forest Ecology at the University of British Columbia and a member of COMEST, co-chaired this session with Mr. **Saksit Tridech** - Deputy Permanent Secretary of the Ministry of Science and Technology, Thailand. Mr. Kimmins began by saying that environmental ethics has to do with wildness, but that this notion is unclear. The perception of endangered species, he argued, is fairly modern. While wildness is valued, human beings have traditionally welcomed tame landscapes that they tend to judge sustainable and good. Yet such landscapes have very little to do with the original systems. All systems, he said, are up to a point, resilient to the growth of the human population. Hence, the issue of overexploitation is hard to judge, as in the case of British Columbia. We tend to judge visually, he argued, but that does not reflect sustainability. The ethics of wilderness, he claimed, has to do with the recreational experience of wealthy people, romanticism and cultural values. A balance has to be found between human needs and environmental ethics. Mr. Kimmins listed some issues that in his opinion were key environmental ethics issues before giving the floor to his co-chair.

Mr. Saksit Tridech emphasized that environmental ethics is relatively young, and yet has always been part of our lives. We start feeling the impact of what we have done, and we become worried. Impact assessment, however, is very complicated. While the earth is trying to tell us something, new technologies like cloning and GMOs show that we do not yet have enough protocols and rules to save our environment, as is apparent from the Kyoto Protocol. We have to change our habits, Mr. Tridech concluded, to be friendly to the environment, to educate our children in this regard and to live with the world in a safe way. He then introduced the speakers: Mr. **Johan Hattingh**, philosopher, Professor and Chair of the Department of Philosophy at the University of Stellenbosch and a member of COMEST; Ms. **Nadja Tollemache**, lawyer, ombudsman and a member of COMEST; and Mr. **Chamniern Paul Vorratnchaiphan**, Director of the Grassroots Action Program, Thailand Environment Institute (TEI).

Mr. Johan Hattingh gave a presentation on human interest, intrinsic value and radical questioning in which he explained the three snapshots of a practical environmental ethics, and talked about their interpretation. The first snapshot is the Kyoto Protocol, which had entered into effect just a few days earlier. Mr. Hattingh recalled the principle of the protocol and its objectives, as well as its main instrument, namely the market of carbon emissions. Then he presented the second snapshot, namely the World Summit on Sustainable Development. Ten years after Rio, the diagnosis was still pessimistic in regards to the suffering global environment, the growing gap between rich and poor and justice and equity, which are seen as environmental issues. The causes of unsustainable development, the Johannesburg document states, are the unsustainable production and development patterns. The definition of sustainable development used came from the Brundtland report, in which the needs of poor people should be central. In the third snapshot, the millennium goals, key values pertaining to the environment, are respect for nature, freedom, equality, solidarity, tolerance and shared responsibility. They advocate new ethics in conservation and stewardship. Turning to the normative basis of environmental ethics, Mr. Hattingh underlined that ethics entails distinctions. The distinction between right and wrong is apparent in the duty of nations, corporations, professionals and individuals to fight climate change, reduce the greenhouse effect, pursue sustainable development, eradicate poverty and ensure justice and

dignity. The distinction between good and bad embeds what we embrace as the good life: dignity and justice for all, peace and prosperity and freedom from terror as well as the prerequisites thereof such as access to water, information and technology transfer. The distinction between respect and disrespect relates to caring for all life, human or not, rich or poor, etc. Now ethics, Mr. Hattingh said, also has to do with the quality of our justifications and fundamental values. In the words of the Kyoto Protocol, the goals are to prevent harm to people, present and future. In Johannesburg, they are justice, dignity and social development. In the Millennium Development Goals, they are cooperation for the achievement of freedom, equality, solidarity and improvement of people's lives. One can consider, Mr. Hattingh continued, that there are three main positions in environmental ethics: the human-centred view, the nature-centred view and the radical positions. The three snapshots we mentioned here, Mr. Hattingh argued, seem to be anthropocentric: we care for nature for the sake of humankind. While this may be the best place to start to engage governments and corporations, is this good enough, he asked. The nature-centred approach argues that instrumentalist values are not strong enough to protect nature from human beings. The basis of any stronger position is intrinsic value, according to which there should be respect for nature and its parts. While the three snapshots move away from a cynical exploitation of nature, they do not ensure 'strong' sustainability. Radical environmental ethics try to identify the root causes of our environmental problems, for example in the structure of the economy or the power struggles between countries. They focus on the social and corporate structure forming the organization of the world and refer to public choice, dominant conceptions of self, narrow egotistical self, logic of dualistic thinking and eco-feminism. While this kind of questioning may be going too far, Mr. Hattingh said, we should wonder whether we are happy with the images of self that we have. Radical questioning, he argues, starts when we do not recognize ourselves - when we realize that we face a deep crisis of culture. The environmental crisis is not only about survival and human development, but also, he argued, about who we are and how we use our energy. We are seriously fooling ourselves if we think that we have done enough for the environment and do not need to question root causes. Mr. Hattingh's conclusion was threefold: addressing environmental issues without consideration of human benefit would be futile; we need more than instrumental value to protect nature, we need a change of attitude; and finally, the state of the world confronts us with the issue of our identity.

In her response, Ms. Nadja Tollemache emphasized that the anthropocentric approach is the most likely to persuade governments and other bodies to take measures, as democratic governments need to promise benefits to their electors. However, this approach is dangerous in the long term, and it is due to human weakness that short-term specific gain is often preferred to longer-term indefinite benefit. As the alternative theory of the lifeboat goes, we are all doomed if we exhaust the supplies in the vessel, and taking measures to avoid the catastrophe is still selfish and unethical, she argued. 'How far does the change of attitude have to go?' she asked. While the shift towards an ecocentric approach would be quite significant already, it would not avoid the difficulty of prioritizing various life forms. There is, Ms. Tollemache continued, an argument for a more radical approach. But even in that case, the issue of organization and implementation would remain. While environmental problems are global, their impact is local and subject to the decisions of local communities. Some imperceptible problems may drastically alter the situation in the long run. Property rights, here, are also an issue, as is regulating circulation, she stressed. Furthermore, she stated, the invisible are sacrificed: how could they care about the impact of their lifestyle on a distant people? The world, she deduced, is not ready for a transformative theory and the biggest danger

would be to not defend the right argument. Children have not yet been contaminated, and we should take full advantage of the decade of education for sustainable development in this regard. We should be careful to give children a truthful message, she concluded, because once deceived, they may turn against the whole preservation message.

Mr. Chamniern Paul Vorratnchaiphan gave a presentation on spiritual maturity. Philosophy and theology, he said, are to be put into practice in environmental protection, and some place should be made for discretion and spiritual maturity in this regard. Important words here are respect for earth, life and compassion. Implementing these ideas requires a change of mind and heart, Mr. Vorratnchaiphan said. The failures of instrumental values, economic instruments and public choice, show that they are not strong enough to protect nature from human-induced destruction. But nature should not be blamed. As Mr. Hattingh said, the environmental crisis is a cultural crisis, and the root causes should be looked after. Spirituality, he said, should go beyond theories and interests in an awareness of the unity of life. Spiritual tradition is a mode of consciousness in which individuals and communities are related to the cosmos. Mr. Vorratnchaiphan took the example of northern Thailand, where the spirits of forest, river and land are holy. The land to be protected is seen as the spirits' house, and nature is perceived as alive. The ordination of the trees in the forest, he said, is to be seen as a spiritual manifestation and should make obvious that the destruction of the forest is spiritual destruction. Sustainable development, he concluded, should be in the style of integration and balance inspired by spiritual maturity.

During the debate, a COMEST member stressed that the contrast between preservation and destruction is not well defined from the scientific point of view, and that, if we can scientifically define nature as something of which human beings are a part and define our survival by including future generations, the anthropocentric approach should become a humanistic approach. Mr. Hattingh agreed that scientific definitions avoid futile debates. However, he emphasized, answers to normative issues cannot be given by facts alone and we eventually have to make judgment calls because such is the nature of ethical problems. A Japanese professor underlined the importance of spirituality in addressing environmental issues and asked about the organization of the grassroots movement. In Thai tradition, Mr. Vorratchaiphan emphasized, consumerism dominates and this makes such actions very difficult. An Indian participant asked if all beings including, for example, illiterate people, are equal. Mr. Hattingh stated that this question was multidisciplinary in essence and could not receive a short answer. A COMEST member emphasized the difference between substitutable and non-substitutable resources, for example, water or air and oil. A young Canadian ethicist emphasized that, in the preamble to the convention on biodiversity, a less anthropocentric stance was taken, and that the questions of legitimacy, of property and of life are completely out of the scientific field. Mr. Hattingh warned against the strict implementation of the distinction between anthropocentrism and biocentrism. A part of our problem, he stated, is to find the necessary vocabulary and approach to articulate our environmental concerns. He concluded that some of the words may be found in science, some others in the spirituality thesaurus, but new vocabulary and approaches are certainly needed.

Session on Good Governance of Science and Technology

In her introduction, the co-chairperson of this session, Ms. **Leila Seth** - Judge of the Delhi High Court, Chairperson of the Multiple Action Research Group and of the Executive Committee of the Commonwealth Human Rights Initiative, India, and a member of COMEST - compared governance to parenthood: we want our children to develop, but without putting them at too much risk. She introduced her co-chairperson, Mr. **Yodhatai Thebtaranonth**, Professor of Chemistry and President of the Academy of Science of Thailand, and the speakers: Mr. **Korn Thapparansi**, Minister of Science and Technology of Thailand; Mr. **Jens Erik Fenstad**, Professor of Mathematical Logic at the University of Oslo and Chairperson of COMEST; and Ms. **Orapin Sopchokchai**, Commissioner of the Public Sector Development Commission, Office of the Prime Minister of Thailand.

Mr. Korn Thapparansi recalled the powerful wave of global change due to science and technology over the last three decades. The development of science and technology obviously was a catalyst for international competition, as these are the leading factors of production. But the over-optimistic view encountered severe setbacks, he stated, for example with regards to atomic power and fossil fuel. The benefits of scientific and technological advances do not reach all communities on the planet equally and, Mr. Thapparansi stressed, any exclusion is unethical. Furthermore, the general public tends to distrust both science and policy makers. Because science and technology can produce unintended consequences, he stated, dialogue with the people is not enough. Mr. Thapparansi explained the Thai experience in this regard where reform of the research structure has been a priority. Thai scientific and technological development has four pillars, namely the indigenous strengths that are biotechnology, agriculture, electronics and computers, and health. The investments in science and technology aim to achieve two goals: making the country a better place to live and work and fairly distributing scientific and technological advances. In this same spirit of serving the well-being of the Thai citizen, public control over science and technology was developed, and good governance effectively implemented, Mr. Thapparansi stated, by the practice of result-based management. Thai research is framed by contracts which ensure that research plans are based on public needs and the national agenda. Good governance, he said, is a means to ensure that the public, government and science can benefit together, ensuring public access to findings. Mr. Thapparansi insisted that his government would never lose sight of the excluded. His biggest concern, he continued, is about the current international intellectual property regime, in which he deemed that the interests of developing countries are not properly taken into account. Some trade agreements, he claimed, must be revised to accommodate this very restrictive level of protection. Scientific knowledge should remain a public good, and the competitive advantage of the North on this matter should not be self-reinforcing. In conclusion, Mr. Thapparansi called for actions to defend the principles of good governance.

Mr. Jens Erik Fenstad announced that COMEST had just adopted its report on the precautionary principle. Sharing the concerns of the Minister about the possible misuse of science, he expressed the hope that this report be a useful instrument for managing the difficulties of science and technology today. He also added to Mr. Thapparansi's concern

about intellectual property a word about traditional knowledge, which, he said, should be actively protected. Now good governance, Mr. Fenstad continued, depends on a good understanding of the proper role of knowledge. Knowledge, he specified, has a cultural and a critical role in addition to its instrumental role, which is mostly emphasized. There is a need in good policy to balance these three aspects of science. Moving from the higher rhetoric to the everyday life of scientists, good governance includes competition through peer review and other mechanisms. While this seems obvious in the North, Mr. Fenstad claimed that this was not self-evident from his personal experience elsewhere. The promotion of the right kind of competitiveness and the right kind of management, he argued, is essential. To that end, skills need to be developed, as well as some awareness of freedom in the conduct of science. These constitute the internal view. Turning to the external perspective, Mr. Fenstad emphasized that we have to move from good intentions and declarations to proper understanding in a complex market. The linear model, in which good ideas follow investment which is in turn followed by new technology and then products and markets, does not seem to be relevant anymore. The coupling between science and the market is very complex. In fact, they are almost two autonomous systems. This is also the case, Mr. Fenstad said, in the European Union, where the managing of relationships between science and innovation and market forces has grown increasingly complex. At the time of governmental control, Mr. Fenstad argued, there was no wonder the system functioned. But as we move towards information and communication technology, the linear model has proven itself inadequate. While there is research everywhere, only a few products do reach the market. Therefore, science and technology management require specific competence. In this regard, Mr. Fenstad said, the NATO apprenticeship programme was particularly useful. Furthermore, as science must be for the benefit of mankind, setting scientific priorities cannot only be an internal, scientific process. Mechanisms need to be created to involve all stakeholders, such as scientists, policy makers and the public at large, in setting priorities and judging results. This is the struggle to set up a mechanism. We need to have all sectors of society really involved in setting all aspects of scientific policy, Mr. Fenstad concluded.

Ms. Orapin Sopchokchai emphasized the importance of the topic and the necessary role of policy makers in providing guidelines. The key elements of good governance, she said, are a fair legal framework and predictability, accountability, honesty and transparency, participatory governance and public participation, efficiency and effectiveness. She presented a triangle of scientific policy, whose three angles were 1) Social and economic development in all of society because bad governance leads to unbalanced development, i.e. creates poverty and abuse of resources, 2) Sustainability, happiness and well being, because bad governance leads to environmental problems and 3) Ethical governance of science and technology, because bad governance leads to unethical scientific and technological development. There are two ways to promote good governance, she said. The first one is called inside-out, or supply side driven. It originates with the government and the scientific community and consists of: improving the mechanism of the political checks and balances mechanism; developing fair laws and regulations with effective enforcement; reforming administrative mechanisms, rules and procedures; and promoting good governance, core values and ethics (regulators, educators, scientists, business community). The other way may be called outside-in or demand-side driven. It consists of enhancing public opportunity to get access to information (right to know); strengthening the capacity of citizens to understand science and technology (public education, promoting the role of mass media, citizen report); empowering citizens to voice their concerns; and offering opportunities to participate in decision making processes. The

current practice in Thailand to promote good governance relies in particular upon: a legal framework to promote good governance in Thai society (1997 Constitution, State Administration Act of 2002, Royal Decree on Principles and Procedures of Good Governance of 2003); a restructure of public organizations to be more accountable and responsible to the public; raising awareness of and promotion of cultural changes in the public sector; and the enhancement of efficiency and effectiveness of law enforcement in science and technology. In conclusion, Ms. Sopchokchai emphasized the importance of good governance and her hope that the issue will remain on the agenda of COMEST in the future.

During the discussion, a Japanese professor expressed his view that the bottom-down, or outside-in approach is where trust will come from. In the Tropical Medicine Institute of Thailand example, people know that scientific workers are working to save lives. The minister emphasized that science policy is a high priority for his government. Thai research, he claimed, must be under one roof and accountable to a national agenda, which in turn must be known to all scientists in Thailand. These, he explained, are not directives, but directions needed for Thai research. Society and the scientific community have agreed upon them. Today, Mr. Thapparansi said, the right hand does not know what the left hand is doing as far as Thai research is concerned. Communication, he added, must be done in a much more transparent and open manner, and this is why the budget bureau is in charge of streamlining. A UNESCO representative emphasized that some tools may have double uses, such as intellectual property or the precautionary principle, which can also be used to serve protectionism. Regarding the relationship between traditional knowledge and intellectual property, the Minister raised the issue of traditional Chinese medicine and stressed that the pursuit of knowledge is his priority. The people of the South, he said, already possess a certain knowledge, while in the North, consumers have been spending more on non-chemical health, thus sending the positive message that Southern people have a valuable asset - nature. Certain plants can now be used to replace fossil fuels, which have been traditionally imported. Here, an international research programme could be created with the Northern people, he said, not on the basis of intellectual property, but of knowledge. We would concentrate on emerging technology and partnership with the northern hemisphere, he said, and commercial benefits would not be in the first chapter of discussion. Southern countries, he said, could focus on organic fertilizers, and thus attract a very high profit margin from northern markets. Mr. Fenstad added that good rules among nations were also needed. The representative of the World Federation of Scientific Workers emphasized the role and fruitfulness of public investment in research that is not driven by the existence of a potential market. A COMEST member expressed the view that the value of science to society ultimately lies with its predictive capacity, and that science should not, in the end, serve scientists only. The Minister explained that the agenda of scientific research in Thailand is discussed every twelve months with the scientific community and that budgets are determined in accordance with this agenda. The only way to enhance the competitiveness of Thailand, he added, is to encourage e-networking and to come out with a concrete analysis. This framework, Ms. Sopchokchai specified, allows Thailand to henceforth adjust public sector performance. To a remark by Mr. Fenstad stating that scientific research should make room for some chaos and plurality, Mr. Thapparansi responded that this room should indeed exist but be very limited. A COMEST member stressed the importance of open decisions and public consultation. Ms. Seth underlined the importance of citizenship and concluded with the saying: 'knowledge comes but wisdom lingers'.

Session on Benefit Sharing and International Cooperation in Research

This session was co-chaired by Mr. **Alain Pompidou** - Professor at the Faculty of Medicine at Cochin-Royal, President of the European Patent Office and a member of COMEST - and Mr. **Krissanapong Kirtikara** - President of King Mongkut's University of Technology, Thonburi, Thailand. Mr. Pompidou introduced the speakers: Mr. **Lu Yongxiang**, Professor of Engineering Sciences, President of the Chinese Academy of Sciences and a member of COMEST; Mr. **Luiz Hildebrando Pereira da Silva**, Professor of Parasitology at the University of São Paulo, Scientific Director of the Tropical Medicine Research Center in Porto Velho, Rondônia, and a member of COMEST; and Mr. **Pinit Ratanakul**, Director of the College of Religious Studies, Mahidol University, Thailand. The sharing and transfer of technology for the benefit of humankind is the issue at stake, he added. Mr. Kirtikara underlined that Thailand has always been at the crossroads of knowledge sharing between the Indian sub-continent, the Islamic World and Confucian thought from China and Japan, and has been exposed to the western world for the past 150 years.

Mr. Lu Yongxiang began by noting the increasing role that science and technology is playing as human society enters the era of a globalised, knowledge-based economy. Scientific breakthroughs and technological developments will continue to emerge, he said, which will bring both opportunities and challenges to economic development and to the advancement of human civilization. Mr. Lu said that the new ethical challenges to be encountered would relate to human rights as well as to ethical relationships among people, between humankind and the eco-environment, and between humankind and other living beings. Mr. Lu then examined the potential issues arising from the development of specific fields within science and technology. Regarding information technology, he referred to the problem of a growing digital gap between the rich and poor due to an imbalance in technological development and application at the international and individual level. He named Internet-based fraud, infringement on privacy, data forgery and the illegal distribution of pornography as being some of the concerns associated with better information technology. On biotechnology, he said that advances would bring us closer to solving the long-existing problems of food supply and healthcare but that ethical problems would be faced, such as the unendorsed disclosure of individual bio-information, threats to human health genetics, and the possible destabilization of the natural ecological system. Nanotechnology, Mr. Lu said, would allow humans to create new materials and devices at the nano-scale. He cautioned that research has shown that some nano-materials have toxic effects. Disposal of nano-waste will be a new issue, he continued. He observed that nanotechnology might eventually be applied to the development of weapons, against which no protection may yet have been found. With regard to cognitive science, Mr. Lu said that development in this field would make it possible for scientists to discover the mystery of human intelligence and better understand human cognition. The dangers he enumerated included psychological induction and the control of human thinking and behaviour, which in turn raise issues of the violation of privacy and the loss of behavioural autonomy. Space technology development - including the improvement and increased application of global positioning systems, geographical information systems and remote sensing systems - would promote the advancement of digital earth and resources science and

technology, he said. However, he continued, the new space-based monitoring technology raises concerns about the protection of privacy and confidentiality. Unequal access to such advanced technology would result in information asymmetry, unfair competition and threats to national security, he added. Mr. Lu observed that all the issues he had mentioned would be the result of the inappropriate use of science and technology, rather than the development of science and technology itself. These ethical problems, he said, should therefore not be used as an excuse to slow down development in these areas. Nevertheless, he stressed that there was a social responsibility to ensure the appropriate application of science and technology for the benefit of humanity. International cooperation must be strengthened if the capacity to innovate in science and technology is to be developed, Mr. Lu insisted. Such cooperation is also necessary for the exploration of ways to neutralize negative effects due to science and technology. The promotion of public understanding of science and technology and the dissemination of knowledge are crucial in order to narrow the digital divide and to share scientific and technological benefits, he continued. Improved cooperation in research would reduce imbalances of development in various disciplines, he added. Mr. Lu recommended that efforts be made by the scientific community and academic circles to work towards an international convention on ethics in science and technology. He said the scientific community should develop ethical rules on scientific research and should inform the public about possible ethical concerns created by scientific and technological development. He listed four principles that should guide international cooperation in ethics of science and technology: scientists, engineers, lawyers and social scientists should be involved in the discussion of ethical issues related to science and technology; principles of equality, equity, reciprocity and transparency should be respected; scientific and technological development should be accompanied by ethical development to ensure harmonious and sustainable social development, a harmonious relationship between humankind and nature, and the development of science and technology itself; and education about ethics in science and technology should be promoted. He closed with a reminder of the need for international cooperation.

Mr. Luiz Hildebrando Pereira da Silva, referring to the principles of international cooperation mentioned by Mr. Lu, said that these commandments of global science had also been laid out during a meeting in 2003 of the Third World Academy of Sciences. Mr. Pereira indicated that he would comment about the practical application of these commandments. Two problems must be considered by UNESCO and by other international agencies concerned with development through science and technology, he said. One is the asymmetric position of science and technology in the developing world as compared to the developed world. Research in science and technology is based on innovation, which in turn is based on production, he explained. In the developed world, production generates not only consumer goods but also tools and machinery that can be used for further production and innovation. However, Mr. Pereira observed, in underdeveloped countries, production is a parasitic activity - dependent on the import of goods, machines and equipment - and must be compensated for by the export of low value-added products. Research development, therefore, also becomes a parasite of the social production upon which the most vulnerable segments of the population rely. He illustrated this by measuring the cost of a piece of equipment needed for scientific research in terms of the hundreds of hectares of soybean that Brazil would need to export to purchase it. The second problem, Mr. Pereira continued, is that, although international cooperation does exist between centres of excellence in developing and developed countries, the effect has been that centres of excellence in the South tend to focus on problems that mainly afflict the North. While problems such as

cardiovascular diseases and cancer are important, infectious and parasitic diseases are more urgent concerns for Latin America and other regions, he added. He suggested that cooperation be encouraged among centres of excellence that are more peripheral to the current network. Mr. Pereira stressed the fact that technology is present in underdeveloped countries but that it does not contribute to the socio-economic progress of the poor parts of the population. On the contrary, in the example of soybean harvesting he considered, machines supplant the local population, and profits from such technology-intensive production do not reach the poor. Mr. Pereira then discussed the global pollution problem created by burning tracts of forest to clear land for agricultural purposes and cattle breeding. UNESCO and other agencies are concerned by the increasing carbon dioxide pollution generated by countries such as Brazil, China and India, he said. He insisted that these methods of clearing land, although in general use in the United States and in parts of Europe, are not a solution for socio-economic development in underdeveloped countries. It is the role of scientists and technologists, funding agencies and scientific agencies to stimulate the development of new technologies more appropriate for the socio-economic development of the Third World. As an example of appropriate technology, Mr. Pereira cited the zero-tillage technology that, among other benefits, eliminated the need for costly machinery and reduced soil erosion. In closing, he concurred with the need for good governance, ethical rules and other such ways to ensure that science benefits the marginalized of the world. But, he added, we also need scientists and academics to create technology appropriate for the socio-economic development in needy parts of the world.

Mr. Kirtikara said that ethics in science and technology should be the subject of multidisciplinary discussion. Drawing upon Mr. Jens Erik Fenstad's earlier assessment of the role of scientific knowledge, Mr. Kirtikara said that science and technology should be viewed on three levels: 1) the instrumental level, in which science and technology is seen as accountable to the public; 2) the cultural or epistemological level; 3) the critical level, as alluded to by Mr. Lu. Mr. Kirtikara claimed that much remained to be done at the critical level, adding that COMEST provided an excellent forum for developing this further. He said he was struck by Mr. Pereira's illustration of the sacrifice underdeveloped countries must make to invest in research. He regretted the overuse of insecticides, herbicides, and other such chemicals in Thai agriculture and expressed the hope that through cooperation means could be found to minimize the intensive agriculture methods requiring extensive chemical use.

Mr. Pompidou concluded from the earlier presentations and comments that COMEST should address the call for cooperation and a policy of innovation in science and technology. Cooperation, he said, should not only be fostered between North and South but also between disciplines. To promote innovation, young scientists should be included in the new scientific community as a source of fresh ideas on how to better serve the particular needs of the various countries, he suggested. This would also allow young scientists to interact and build momentum towards a common understanding, despite differences in culture and goals, he claimed. In this regard, Mr. Pompidou identified two issues. First, behaviour must be changed, he said. One must look beyond one's immediate surroundings and be concerned with what is happening at the global level. The common understanding to be forged by this new scientific community will not only be scientifically based and ethically oriented, but will also address concerns and events at the worldwide level, he envisioned. Thus, he continued, the opportunity would be created for elaborating ethical rules to guide cooperation towards innovation for benefit sharing. The second issue is foresight - what will be the impact of a given scientific breakthrough or new technology, Mr.

Pompidou asked. He observed that the capacity for foresight is rendered all the more important by the acceleration of developments in science and technology. Such foresight should be based on ethical considerations. In closing, Mr. Pompidou said that he did not know what an ethicist was but he knew what was meant by 'ethical commitment': paying attention to what is going on throughout the world and keeping in mind the needs of the different nations.

During the open discussion, a speaker from India asked how the principles of cooperation would be enforced and who would be held responsible if the principles were not respected. Mr. Pereira responded that moral rules are important guides for human behaviour but remain at the general level: they do not give guidance on how they should be applied in practice. Practical application of these rules necessitates mobilization across disciplines, he said. He insisted that the involvement of scientists is crucial to this process for the critical view they bring and for their ability to create and innovate. Mr. Lu said that ethics in science and technology is an important part of being a moral entity and of human civilization more broadly. Ethics in science and technology must emerge through common effort such as the establishment of regional rules, education, information dissemination, discussion and cooperation. A Thai student asked what incentive there was for developed countries to share hard-earned technology and scientific knowledge with developing countries. Mr. Lu said that developing countries should strengthen their own capacity to innovate through education. Knowledge and techniques can be shared in the sense that, unlike physical objects, it can be used by many at the same time and is not depleted, he continued. In our increasingly globalized economy, he said, technology and knowledge dissemination to the South is evermore rapid. He noted that because of the specific situation each country faces, technology cannot simply be copied from elsewhere but must be adapted to suit the development context. Mr. Lu expressed the hope that the developed countries would more actively assist developing countries in building capacity for technological innovation. As long as we inhabit the same planet, this will lead to future benefit for all, he said. Adding to Mr. Lu's remarks, Mr. Pompidou observed that natural resources, even if well managed, would eventually not be able to support the growing population. New technology would be needed to find solutions for the resource scarcity and thus capacity building for innovation would be very important, especially for countries of the South, he argued. A professor from Waseda University, Japan, drew attention to the growing tendency of countries to limit access of foreign scientific researchers, particularly in the field of medicine, to national biodiversity and biomaterials. He attributed this to the fact that research subjects seldom benefit from the outcomes of the research. He asked what kind of mechanism would be needed to ensure benefit sharing so that countries would no longer be inclined to take a defensive stance. Mr. Lu said that local innovative capacity should be nurtured. Local governments should establish a rational policy on intellectual property to encourage local innovation as well as to attract innovative foreign companies to boost local innovator sectors, he said. He stated that enterprises played a major role in innovation and, beyond intellectual property measures, monopolies must be broken to ensure the dynamic growth of enterprises. While acknowledging the role played by universities and other such institutions in innovation, he expressed the view that government funding should be channelled towards fundamental research, key technology exploration and research on the protection of resources and the eco-environment. With only biodiversity and human creativity we have all we need to continue development into the future, he claimed. Mr. Kevin Brennan, representative of the South African Permanent Mission to UNESCO, returned to the earlier question of why countries of the North would want to share their knowledge. He refuted the notion that altruism provided sufficient motivation. Rather, he argued, it was in the

interest of developed countries to do so because it stimulated economies in the South, creating a market for Northern products, and because poor conditions in the South might have effects on the North, such as increased political instability, terrorism and migration. He appealed to the countries of the South to communicate this to their own scientists and researchers, as well as to representatives of the developed world in international forum. Ms. Pilar Armanet, Director of Higher Education, Ministry of Education (Chile), observed that research capacity building is closely related to doctoral studies. She described the Chilean situation in which top students leave to pursue PhD programmes in the North, returning with networks and research interests oriented towards the North. She suggested that it was insufficient to have competing PhD programmes in the South, but that PhD programmes in developing countries should target locally relevant issues that are shared by the North so as to orient young researchers more towards local concerns. Mr. Kirtikara commented that Thailand had taken a similar approach. Finding that it was not feasible in terms of finance or management to send its students overseas for PhD programmes, Thailand had established local PhD programmes linked with institutions overseas. Mr. Pompidou observed that the gap between North and South was smaller than it had been a decade ago but that the remaining distance still had to be bridged. In conclusion, he said we should continue to work jointly towards an ethical approach and to develop original ideas.

Session on Animals and Ethics

The session was co-chaired by Mr. **Diego Gracia** - Professor of Ethics and Health Sciences at Complutense University (Spain) and a member of COMEST - and Mr. **Somsak Chunharad** - Secretary-General of the National Public Health Foundation, Thailand. While this discipline is new, the topic has a long history, Mr. Gracia said, and the difficulty lies with the new idea that it is the human duty to be respectful of their rights in this regard. Mr. Chunharad emphasized the scientific implications of this issue and introduced the speakers: Mr. **Sukhit Phaosavasdi**, Manager and Editor of the Journal of the Medical Association of Thailand; Mr. **Ruben Apressyan**, professor of Philosophy at the Institute of Philosophy, Moscow Lomonosov State University, and a member of COMEST; and Ms. **Puckprink Sangdee**, Senior Principal Medical Scientist at the Department of Medical Sciences, Thailand.

Mr. Sukhit Phaosavasdi started by defining animals as anything that is living but non-human. Many animals, he stressed, had come into the room with the audience such as unicellular organisms, microbes and acarians. Animals, he said, cannot speak but only make noises. And although their minds may be dull, their bodies are useful. With innocent and unpretentious eyes, animals offer friendship to human beings. They can be useful in many ways as pets, watchdogs and in agriculture. They are also used as symbols, weapons, sources of clothing, pieces of furniture and for hunting as a hobby or even a form of business. Animals are used in research, entertainment and transportation as well as for communication, agriculture and education. They are also used in advertisement, as biomaterial and in sport. However, they cannot say anything. Being right, just, honest, true, doing good and performing no bad actions are all ethical considerations, as are good care, love, supply of animal needs, tenderness, refusing torture, taking care not to hurt or irritate. How do we feel, he asked, when we see elephants walking down the street, sport fishing or puppies offered as caged gifts? Vaccination, a clean cage, adequate food and water are ways we should take care of these animals. But, he stated, this is not often seen in Thailand. There are, he said, trucks full of stressed animals, whose driver does not know at what speed he should drive. Dishes such as bear's paw, monkey's brain or tiger's penis should be avoided, he argued. Laboratory research must follow world standard guidelines, which is not often the case in Thailand, he said. While we mostly have no direct contact with wild animals or animal trading, our economy has been badly hurt by SARS and bird flu because these diseases are transmittable to humans. They also affect, Mr. Phaosavasdi argued, farm animals, tigers, pets and many other wild animals. However, nothing is done about it. Bird flu has forced many Thai people into bankruptcy. He argued that bird flu had caused worse consequences in Thailand than AIDS or the recent tsunami. Turning to the issue of how COMEST and UNESCO should deal with the issue, he recommended that ethics for animals be implemented at all levels of educational curricula. UNESCO could act by starting the learning process. Ethics, he concluded, is at the crossroads of religion (soul), nature (true and false) and community (body, materialism). Some poor people, he added, do no evil. Though they have no religion, they teach us a lesson.

Mr. Ruben Apressyan started his response by addressing the call by the speaker for COMEST to urge people to consider the ethical treatment of animals. We treat animals, he argued, the way we used to treat slaves. Mr. Apressyan distinguishes several types of animal slavery: What should we do, for instance, with those animals that were selected from the

beginning to be pets? In his famous essay, *Animal Rights and Public Education*, Peter Singer does not accept animal research. His point is: What can't suffer or enjoy cannot be considered. But how do we know if stones or plants suffer or have feeling? Any being, he explained, has its own positive and negative reactions, which are analogous to pain and joy. When we consider human rights, they go hand in hand with human obligations. But the rights/obligations model for animals should obviously be different, Mr. Apressyan noted. The golden rule, according to which we should not do to others what we do not want others to do with us, applies. Since morality is not a unified phenomenon, the question of which ethical language we should speak remains, he said. Singer considers that animals have prejudice. Soloviev, in *Justification of the Good*, argues that there are three types of moral relations: to inferiors, to equals and to superiors. He gave a profound argument of how ethical behaviour to animals is, as it would be, to inferiors. In the 1970s, Gilligan applied Kohlberg's theory to the moral consciousness of girls, which was the starting point for 'different feminism'. In her view, Mr. Apressyan explained, feminine values are care and unilateral giving. Motherhood was the model for another kind of morality. To put it simply, Mr. Apressyan said, there are three levels of moral attitude: the first and most universal is not to hurt others; the second is to respect them, to consider their needs; and the third consists of taking care of them, promoting their needs and interests. Now, of course this notion of care may be understood in various ways, just as the examples of a mother and a boss show. Both of which obviously demonstrate very different types of care. Hence, Mr. Apressyan concluded, when speaking of human behaviour towards animals, a clear hierarchy is needed.

Ms. Puckprink Sangdee referred to the need to use animals in the laboratory. Medical scientists, she said, rely heavily on the sacrifice of laboratory animals. She took the example of her own research for which she used hundreds of mice as living tools used for anti-epileptic treatments. Mice have pain, a neural system, and can feel the difference between trained and untrained personnel. Laboratory animals would otherwise be dangerous. Whatever roots us, equally roots animals, she said. Animal use should be humane and responsible, she argued, and no laws and regulations can be fruitful to those who do not have an ethical attitude toward animals. Thus, the National Research Council of Thailand has guidelines and distributes them to scientists throughout the country. Every protocol that uses animals must be reviewed and approved. Ms. Sangdee concluded her intervention by a wish that COMEST would strongly advise governments to treat animals well.

During the discussion, a member of the National Research Council argued that scientists ignore ethics when they treat animals, despite the 1980 guidelines of the World Health Organization and the publication of ethical guidelines for researchers. These guidelines, he said, cannot actually be followed for want of appropriate facilities and equipment. He also commended the action of the King in favour of the good treatment of animals and emphasized the need for enhancement in Thailand in this regard. A participant argued that some farm animals are better treated than some children, and distinguished between wild and farm animals. A Canadian ethics teacher shared her experience of teaching ethics to veterinary students. She stressed how uncomfortable the students were and how they would apply double standards, treating animals they use for research and study differently from those they want to help. A lot could be done, she said, by using replacement techniques in universities to change the attitude of future scientists towards animals. A COMEST member asked whether or not the usefulness of animals was consistent with the use of the language of rights. An Australian participant emphasized that not exercising appropriate stewardship of the environment is diminishing human integrity. Ms. Sangdee referred to the 'three Rs' that

should precede any experiment with animals: replacement, refinement, and reduction. The costs of testing animals, she also said, vary with the kind and size of the animals. Mr. Apressyan insisted that professional ethicists only gave a starting point, and that specific experience and knowledge were needed to give specific significance to such ideas as 'respect for animals'. Responding to Singer's argument, he said it is difficult, and should be based on practical research undertaken by scientists who need animal use. The minimization of utilitarian exploitation, he said, is obviously a good idea, but the language of rights is not appropriate and not sufficient, and the language of care is more appropriate and reliable. A code is needed, which would be taught. Mr. Phaosavasdi expressed his satisfaction at the gathering of different points of view and stressed the difficulty and need to bring ethics from humans to animals.

Session on Human Rights and Ethics

Mr. **Pierre Sané**, Assistant Director-General for Social and Human Sciences at UNESCO, presented the speakers: Mr. **Sang-yong Song**, Professor of Philosophy at Hanyang University, Seoul, President of the Korean Bioethics Association and Vice-President of the Asian Bioethics Association, and a COMEST member; Mr. **David Jan McQuoid-Mason**, Professor of Law at the University of Natal, Durban, South Africa; and Mr. **Saratoon Santivasa**, Associate Professor of Law at Chulalongkorn University, Thailand. Co-chairing the session, Mr. **Saneh Chamarik**, Professor of Political Science and Chairperson of the National Human Rights Commission of Thailand, introduced the issue of the bearing of science and technology on human rights, in particular, technological imbalances. Human rights and ethics, he said, are two faces of the same coin.

Mr. Sang-yong Song used a historical approach to focus on scientism and to consider the Asian situation. The history of science, he claimed, can be written as the story of the expansion of science. The belief in science, he argued, is not without reason. The scientific revolution of the 17th century, of which Newtonian physics was the peak, led to the French Enlightenment, which basically adopted the simple equation that science equals progress. But in a way, the independence of objective reality was a downgrading of human subjectivity. The industrial revolution was another turning point, with a shift to *scientia activa* and the Baconian dream of an industrial civilization, Mr. Song said. Then scientism came and this tendency to trust science was continuously strengthened until the 20th century. The only acknowledged mode of knowledge was scientific. Metaphysics, history and ethics disappeared for at least one generation. There was some resistance, indeed resentment, toward the disturbance introduced by new science. During the 20th century, obvious discrimination took place, such as forced sterilization and human experimentation by the Nazis and Japanese. In south-eastern China, Mr. Song said, 3000 people died from human experimentation. In the case of Unit 731, he said, there was no sanction taken and no explanation given as to why Japanese and German scientists had been treated differently in the aftermath of the Second World War. The issue was never raised by the governments of North or South Korea, Mr. Song stressed. There has also been controversy about the Atomic Bomb – can any argument be accepted for using it? In the Sixties, the image of science deteriorated as it became the target of the counter-culture movement. With the anti-science movement, attacks came from within as well. With the emergence of bioethics and the DNA controversy raising research ethics issues, ethics in science was rediscovered in the late 20th century. The Universal Declaration of Human Rights, Mr. Song recalled, includes the right to share scientific advancements and their benefits and there are growing pressures to extend rights to animals. Citing Claude Bernard, Mr. Song emphasized that the issue of animals was already present in the 19th century, and in a rather convincing way. With the various activities of UNESCO, IBC, COMEST and through the World Conference on Science, it became clear that the criticism of science was carried out by the scientists themselves. Coming to the Asian situation, Mr. Song explained that there has been a deep tradition of scientism for more than a century. The only way to survive, he claimed, was to catch up with Western technology: 89% of graduates in Tokyo were in science and technology and engineering. In Korea, there was a belief that independence could be achieved through science and technology. National income per capita had indeed risen a lot, but, Mr. Song argued, it was at the expense of the environment, tradition and ethics.

Scientism, he said, continues to be paramount in Korea. The government is very interested in the development of biotechnology, up to the point where the scientists who surprised the world with cell cloning experiments in 2004 were made national heroes, as Hilary Rose put it. Mr. Song expressed regret that such issues are not discussed more. Referring to the keynote address by Mr. Yuthavong, Mr. Song stressed the profound influence of Confucianism on south-east Asian countries, and found the current situation difficult to explain. While scientism is to be blamed, he concluded, it is a great task for us to achieve science with human dignity, and anti-scientism is dangerous as well.

Mr. David Jan McQuoid-Mason made a presentation on human rights, science and ethical principles. Science has developed in parallel with science, since the 18th century, he started. Bioethical principles can usefully be applied to science in general. There are four ethical principles that can also be linked to human rights. The Principle of Autonomy recognizes the duty of scientists to respect freedom – and it relates to Articles 3, 12 and 18 of the Universal Declaration on Human Rights (UDHR) that concern research on human beings, GMOs, perverse incentives and consequences of the human genome project. The Principle of Beneficence is the duty to do good to individuals and society and relates to Articles 8 and 25 of the UDHR concerning compensation for environmental disasters, spectacular technological advances, reduction of disease, sanitation and water, stem cell research, and the taming of the AIDS pandemic. The Principle of Non-maleficence states a duty not to harm and relates to Article 5 of the UDHR concerning Nazi and Japanese experiments, the atomic bomb, chemical and biological weapons and environmental degradation. The Principle of Justice implies a duty to treat people equally and fairly. It relates to Articles 1, 2 and 7 of the UDHR and concerns eugenics, race classification, and apartheid in architecture. These four broad ethical principles, Mr. McQuoid-Mason said, do apply to science, and the conduct of scientists would be consistent with international human rights norms and standards if they comply with them. Furthermore, in democratic countries, observance of these principles would also be compliance with local constitution, he concluded.

Mr. Saratoon Santivasa gave a presentation on the protection of the right to health in international law and the development of biotechnology with ethical implications. The eruption of epidemics and impact of new technologies modify the relationships between medical sciences and human rights and lead to a review of protection of individuals in the public order. Human rights have some particularity compared to public international law. In the field of human rights, individuals are entitled and states have obligations. The right to health is a fundamental human right, which implies a right to protection. States cannot possibly put forward any reason, including underdevelopment, to justify non-compliance with this obligation. Turning to the relationship between biotechnology and the right to health, there are two international instruments dedicated to this issue: non-binding instruments and regional conventions which are more specific. Furthermore, there is general human rights protection. But, Mr. Santivasa said, the international community feels that more standards are needed - with new direction in bioethical principles, which should be pluralist, general and universal. UNESCO's draft declaration on universal norms in bioethics matches these criteria, Mr. Santivasa claimed. It contains twelve basic principles, starting with human dignity and human rights, and continuing with equity, justice and equity, benefit and harm, respect for cultural diversity and pluralism, non-discrimination and non-stigmatization, informed consent, privacy and confidentiality, solidarity and cooperation, social responsibility, sharing of benefit, and responsibility towards the biosphere. A crucial element, he argued, is monitoring. Several

options are possible, such as international, national-public and national-civil-society. However, co-monitoring, he said, is the ideal and self-regulation can become self-protection.

Mr. Sané started the discussion by summarizing the session: Mr. Song gave a historical perspective and explained how the misuse of science had a role in the UDHR. His concern is that in Asia, ethics and human rights are still neglected in the ongoing rapid scientific and technological development, and that scientism should be weakened. Mr. Mason gave guidelines for scientists derived from the UDHR: autonomy, beneficence, non-maleficence and justice. Finally, Mr. Santivasa looked at the obligations of states. Mr. Chamarik argued that the ideological structure of science and technology should be discussed and that the adverse impacts of their use do not just happen by chance. Imagining a new kind of science and technology with inherent moral and ethical values would set creative examples for the future as well. It would be respectful of indigenous knowledge and creativity. Another participant stressed that scientism does not regress in the West and that governments still have a strong belief that scientific policy will solve social problems by contributing to economic development, although that belief is contradicted by the facts. Mr. Song responded that, despite existing policies, there are protests and reactions of all kinds in the West which do not exist to a comparable extent in Asia and are not taken into account by governments in the region. Scientists, he argued, should make an effort to reorient the use of science. A UNESCO staff member wondered about the situation in South Africa and China regarding the relationship between human rights and HIV/AIDS, to which Mr. McQuoid-Mason responded that South African courts have been very strong in seeing HIV/AIDS as a human rights issue and not only a health issue, although the government attitude lately did not help. A Thai participant emphasized the difficulty of the poor to have their rights respected. Mr. McQuoid-Mason agreed that learning by doing was a good thing, especially for law students, and that in his university they were sent to a law clinic for poor people who needed legal advice. The Chairman of COMEST recalled that part of the mandate of the Commission is to promote the dialogue between scientists, policy makers, and the public at large. A Japanese professor expressed his feeling of guilt with regard to Unit 731, and stressed that pardon to Japanese scientists was granted by the USA for reasons of national security. Mr. Song thanked this professor and claimed that recognition of past crimes is necessary in order to learn from history. He also stressed the difference between the German and the Japanese attitude with regard to science crimes of the Second World War. There was a debate about the legality of therapeutic cloning and its commercial use. In Thailand, the only threat is the revocation of one's professional licence. A South African participant emphasized that the retro-virus campaign announced in November 2003 was by no means complete, and was but one portion of the fight against AIDS. Mr. McQuoid-Mason stated his full agreement. The Chairperson of COMEST recalled that respect for traditional knowledge and its bearers was already emphasized at the World Conference on Science, led to a symposium in Johannesburg 2002, and was a matter of deep concern to COMEST. Mr. Song criticized the excessive counter posing of European and Asian thought, emphasizing that monism had a significant place in Western culture, even if Eastern thinking tended to be more environmental friendly. In conclusion, Mr. Sané commended the type of truly international dialogue that just took place, which allows consensus to be reached through dialogue.

Round Table on Ethical Use of GMOs

Ms. **Nadja Tollemache**, lawyer, ombudsman and a member of COMEST, and Mr. **Banpot Napompeth**, Advisor of the National Biological Control Research Centre at Kasetsart University, Thailand, jointly chaired this round table. Ms. Tollemache began by acknowledging the highly controversial nature of the use of genetically modified organisms (GMOs). Ms. Tollemache cited one position taken in the ongoing debate in New Zealand that found a ban or moratorium on genetically modified crops to be inappropriate because of the harm it would bring to the country's position in the export market. She expressed doubt as to the validity of this argument given the growing tendency of consumers to opt for organic foods. Ms. Tollemache recalled that the need for sharing scientific knowledge and the issue of informed consent had been raised at that morning's youth forum session and that these concerns applied to the debate on GMOs. She highlighted the lack of full public access to unbiased information about GMOs as well as the inability of consumers to exercise freedom of choice because of inadequate food labelling. Just as patients should have the right to choose whether or not to undergo treatment, consumers should have the right to refuse genetically modified foods, whether or not their fears are well founded, she said. She then gave the floor to Mr. Napompeth.

Mr. Napompeth described existing policy frameworks on GMOs. At the international level, he mentioned in particular the Convention on Biological Diversity; the Cartagena Protocol on Biosafety; and the Aarhus Convention, which deals with access to information, public participation, and decision-making on environmental issues and those surrounding GMOs. He noted that although the broad stance of the European Union (EU) has been against the commercialization of GMOs, individual EU members in this respect have begun to soften. At the regional level, Mr. Napompeth said that within the Association of South East Asian Nations (ASEAN) the harmonization of regulations was being considered. He stressed the importance of regulation at the national level, especially given that the Convention on Biological Diversity and the Cartagena Protocol act through national regulations. He also pointed to the existence of regulation at the institutional level. Mr. Napompeth observed that genetic engineering was often depicted as being a form of modernization, making genetic modification appear more acceptable to the public. He referred to the difficulties experienced in reaching agreement on the Cartagena Protocol and noted that Thailand remained hesitant about whether or not to use GMOs. Mr. Napompeth then pointed to a number of recommendations made by the Nuffield Council on Bioethics which, though intended for the United Kingdom, were also relevant for developing countries. Among these were the maintenance and further development of 'a powerful public policy framework to guide and regulate the way GM technology is applied' and the establishment of 'an overarching independent biotechnology advisory committee...to consider within a broad remit, the scientific and ethical issues together with the public values associated with GM crops'. The Nuffield Council on Bioethics furthermore advised that 'all GM food so far on the market in the UK is safe for human consumption' and that 'the moral imperative for making GM crops readily and economically available to developing countries who want them is compelling'. Mr. Napompeth then introduced the speakers: Mr. **Sakarindr Bhumiratana**, President of the National Science and Technology Development Agency of Thailand, and Mr. **Matthias Kaiser**, Director of the National Committee for Research Ethics in Science and Technology (NENT), Norway.

Mr. Sakarindr Bhumiratana described his efforts to create biosafety guidelines for Thailand but observed that, to date, Thailand had yet to approve the commercial production of GMOs. He posed the question, 'Why has Thailand been unable to make a decision on whether or not to carry out limited field trials?' He expressed the view that Thailand was ready for the limited commercialization of genetically modified products but reported that a proposal to commercialize GMOs had been rejected by Thailand. He ventured that this rejection was due in large part to ineffective communication. Mr. Bhumiratana acknowledged that much controversy existed surrounding GMOs but felt that this could be overcome by considering GMOs on a case-by-case basis, rather than treating GMOs in general. On one hand, benefits of GMOs abound, including enhanced quality, efficiency and productivity. On the other hand, the use of GMOs raises concerns about environmental safety, the ability to control technology and the ability of consumers to choose, he said. Arguing in favour of the case-by-case approach, Mr. Bhumiratana stressed that GMOs cannot be categorized as always good or always bad. He said that by considering individual cases, satisfactory answers could be found to questions such as genetically modified and non-genetically modified foods: 'Is the difference between genetically modified and non-genetically modified foods significant in terms of their effect on the environment and on human health?' In addition to these concerns, questions of control also arise: Would regulations be sufficiently strict and adequately enforced to control GMOs? Mr. Bhumiratana said that if society believes the use of GMOs to be ethically acceptable then we should use it; if not, we should not. However, he conceded that this rule of thumb was not simple to apply because of the difficulty in arriving at a common notion of what is ethically acceptable. Nevertheless, evaluation of ethical acceptability still benefits from a case-by-case approach, given that different products have different ethical dimensions. Mr. Bhumiratana named three ethical paradigms within which one might assess the ethical acceptability of GMO use: consequentialist ethics, ethics of autonomy and informed consent and ethics of virtue and tradition. Consequentialists, concerned with people's wants and preferences, are in general accepting of GMOs because of the potential increases in quality and productivity. However, some groups may have different preferences. In addition, the long-term consequences of GMOs affecting future generations are not known. Arguments can thus also be made against GMOs within the consequentialist framework. Consequentialist analysis remains applicable, he said, but should be performed on a case-by-case basis. In the 'ethics of autonomy and informed consent' paradigm, the right to self-determination is paramount. According to this paradigm, Mr. Bhumiratana explained, people should have the right to make an informed choice about whether or not to consume a product, which necessitates transparency of process, food labelling and so forth. At the same time, from the farmers' point of view, freedom of choice may be interpreted as the ability to choose to grow genetically modified crops. The third ethical paradigm mentioned, 'ethics of virtue and tradition', encompasses such schools of thought as agrarianism, which sees agriculture not as business but rather as a way of life, and naturism, which is against 'playing God'. Both agrarianism and naturism look unfavourably upon the use of GMOs - the former because it competes with traditional agriculture and, by extension, with real human values; the latter because it upsets the natural operation of the ecosystem. Mr. Bhumiratana then identified three elements needed for the furthering of the debate on GMOs: risk assessment, regulation and communication. Risk assessment was needed to determine how to preserve the ecosystem, to ensure sufficient food supply for the growing population and, more broadly, to ensure wise stewardship of the world, he said. Regulation and political vigilance was needed for the good governance of science, not an outright ban or moratorium on GMOs. Communication would help to improve public understanding of the science behind the GMO debate. Mr. Bhumiratana called for the further

development of tools for communication to and with the public. The debate should take the form of dialogue between scientists, policy makers and the general public. Scientists should help people understand what is at stake in using GMOs, he said, and also try to understand people's needs and wants.

Mr. Matthias Kaiser, responding to Mr. Bhumiratana's presentation, began by expressing his agreement on many points. One such was the point, that a blanket ban on all kinds of GMOs, is an inappropriate and perhaps even unethical solution to the problems faced. Mr. Kaiser also agreed with the need for good risk assessment and with the need for a case-by-case approach, suggesting that even a step-by-step analysis may be required. He cautioned that areas about which we have incomplete knowledge should not be overlooked, as 'what we don't know may be more important than what we do know'. He then made an appeal to scientists and policy makers to establish tools and mechanisms to make scientific uncertainties explicit to decision makers. He pointed out that only within the past ten to fifteen years were scientific uncertainties being considered and treated explicitly. He stressed that scientists needed to be more sophisticated in dealing with scientific uncertainty. The precautionary principle and other such strategies for dealing with scientific uncertainty need to be employed, said Mr. Kaiser. These strategies do not automatically imply a ban or moratorium on the use of GMOs, he assured. He added that the precautionary principle lends itself to application on a case-by-case basis. He then contrasted intrinsic and extrinsic concerns. He defined intrinsic concerns as those that deal with a technology 'as such' whereas extrinsic concerns focus on how a technology would affect other things. Intrinsic concerns expressed in the GMO debate - where the technology is deemed bad 'as such' - can take a variety of forms. Mr. Kaiser recalled the examples of the 'playing God' and the 'technology is unnatural' arguments that Mr. Bhumiratana had described earlier. A third variant, based on the view that it is part of human nature to respect life, sees GMO usage as profiteering from all life forms and therefore finds it objectionable. Mr. Kaiser expressed the view that such intrinsic concerns were weak, lacking any strong and coherent philosophical underpinning. Nevertheless, the right to freedom of choice must be respected, he said, and the need for clear labelling of products is therefore undisputed. He added that alternatives to genetically modified products must be readily available on the market. However, consumers are often mistakenly perceived as having only intrinsic concerns, Mr. Kaiser observed. Consultations during which lay people receive information and engage in discussion with scientists have demonstrated otherwise. He reported that people appeared willing to accept extrinsic arguments that took explicit account of ethics, indicating the need for a much more inclusive assessment. This calls for tools for ethical assessment that are more bottom-up and pragmatic than those found in theological tradition, he said. Mr. Kaiser suggested as one approach the use of an ethical matrix that assesses, from the viewpoint of different stakeholders, what is needed for various ethical principles - such as the four medical ethical principles of non-maleficence, beneficence, respect for dignity and autonomy and, justice - to be upheld. He proposed that such a schema might be used to involve the public in an ethical assessment of certain products. Mr. Kaiser warned that cost benefit analysis is not equivalent to a full ethical assessment, which may involve important considerations other than costs and benefits. He reiterated that public understanding was not the sole concern, but that 'there is learning to be done on all sides'. In closing, he made a plea against the use of sweeping arguments, which are often scientifically specious, citing as an example the argument that the growing world population could not be sustained without genetically modified food.

In the ensuing discussion, Ms. Ellen Kitson of the State Government Victoria, Australia, drew

attention to the Australian situation in which, despite a national regulatory scheme with case-by-case assessment, some jurisdictions have imposed moratoriums against the commercial release of genetically modified crops because of the potential impact on trade. She observed that community concerns about GMOs appear to focus mainly on crops and foods, rather than organisms not intended for human consumption. She asked for comment on the need to be explicit about value judgments made in risk assessment processes. Mr. Kaiser pointed out that being explicit about value judgments formed part of the framework he had recommended in his presentation. He agreed that in risk assessment, a number of value assumptions are made, which he found was not often a problem because many values were commonly held. However, in some cases it was less clear which potential outcomes might be of concern for some. He noted that implicit value assumptions were often made without sufficient debate. He expressed the belief that the situation could be improved by the development of explicit and systematic consideration of uncertainties, the scientific context, and the framing of issues. One speaker from India bemoaned the use of techniques to deceive consumers about the quality and safety of food. She underlined the importance of ethical practice in the food industry. Mr. Kaiser said that while levels of food safety might differ between countries, the trust of people everywhere in food producers and in the authorities is very dependent on food safety and might be easily lost by a single failure, lie or oversight. Maintaining this trust is a concern for all countries, he said. Mr. Kevin Brennan of the Permanent Mission of South Africa to UNESCO, Paris, described an example of the practical difficulties of dealing with genetically modified foods and how they had been overcome. Certain southern African countries faced severe food shortages but were reluctant to receive genetically modified maize as food aid because of the possibility that stray genetically modified grain might begin to grow in their countries. This problem was resolved by milling the maize before sending it to those countries, rather than by directly tackling the ethical question of whether to provide genetically modified food to people who would starve without it. Mr. Brennan mentioned that in southern Africa the introduction of crops genetically modified to withstand drought and to be less labour-intensive was being considered. Mr. Napompeth said that public education on GMOs was needed for both improved understanding and improved know-how. In Thailand, GMOs are seen as categorically 'bad', even though some GMOs are known to be safe, he said. Mr. Kaiser acknowledged the complexity of the famine situation Mr. Brennan had described. Commercial and political interests play a big role concerning GMOs, making it difficult for the public to find unbiased information, he added. Mr. Kaiser likened the question of providing starving people with genetically modified food to that of providing starving Hindus with beef. Although the facts are clear, he said, the issue is ethical and the answer is not obvious. He advocated looking beyond the most obvious or easy answers because alternatives may provide a more ethical solution. Ms. Tollemache, extrapolating from the southern African example, commented that better understanding of what the specific objections are to GMOs may help to find suitable solutions. Often, not enough effort is made to find out what these objections are, she said.

Round Table on Ethics, Technological Innovation and Emerging Technologies

Mr. **Jens Erik Fenstad**, Professor of Mathematical Logic at the University of Oslo and Chairperson of COMEST, and Mr. **Suvit Vibulsresth**, former Director of the Geo-Informatics and Space Technology Development Agency of Thailand, co-chaired the round table. The speakers were introduced: Mr. **Alain Pompidou**, Professor at the Faculty of Medicine at Cochin-Royal (Paris, France), President of the European Patent Office and a member of COMEST; and Mr. **Weerapong Pairsuwan**, Director of the National Synchrotron Research Centre (Thailand).

Mr. Alain Pompidou started by thanking Mr. Fenstad for his four years of office as Chairman of COMEST. He also specified that he was speaking in his personal capacity as a COMEST member. The issue discussed here, he continued, is at the same time complex, urgent and essential for the future. New technological situations, he said, have ethical and legal consequences. Some of these new technologies may have limited impact because of their high cost and difficult access, but this is not always the case. He mentioned airplanes and the Internet as technologies that are affordable and accessible throughout the world. Ethical assessment, he said, usually focuses more on efficiency than ethics. However, new technologies are emerging and will diffuse quickly through society, propelled by their economic potential. In line with its mandate to give early warning of risk situations, COMEST will address this real need for ethics in technological innovation and new kinds of technology assessment. The emergence of nanotechnology, outer space technologies and disposability and obsolescence issues do illustrate this need. Ideas to explore for new technology assessment are mainly the incorporation of ethical consideration in the process of decision-making. A broader concept of technological assessment is needed that brings all breakthroughs together. There is also a need to explore low-tech and low-cost technologies to address the needs of developing countries, the Global Positioning System (GPS) being an example of such a technology. In the case of sustainable technologies, there are reasons to fear the Schumpeterian paradigm of 'creative destruction', as the accumulation of capital is competing with the scarcity of natural resources. In this regard, the shorter lifetime of technology is manifested in the growing use of disposable items such as tissues, cameras, syringes and packages; in the rapid obsolescence and replacement of machines such as cellular phones, computers and cars; and in the tendency for technological objects to be less and less repairable. This should be an ethical worry because it implies a waste of natural resources while worsening the issue of waste management, in particular for non-recyclable wastes which account for a significant proportion of technological objects. Turning to nanotechnology, he said there is a lack of research on ethical, legal and societal implications. The specificity of nanotechnology includes the ability of some of its products to be self-reproductive systems beyond direct control, where atoms and molecules organize themselves. In December 2003, Mr. Pompidou recalled, COMEST started to discuss this issue. A working group will be put in place to explore potential areas for international action. Outer space is another field in which COMEST is active and has a bearing on technological innovation. In this field, there are more and more electronic systems as well as a lot of emerging issues coming from biotechnology - issues related to universe exploration and extraterrestrial life; space debris; earth observation (how to share the images); and communication. Some ethical issues are also related to benefits and risks of space activities

and benefit sharing. This has involved significant cooperation with the European Space Agency, as well as with the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS). A large consultation of experts in the space community concluded that there should not be international regulation of space as there is for the oceans. Emphasis is put on awareness raising and education and on reinforcement of international cooperation and the involvement of different space nations. Turning to the issue of intellectual property, patents are accused of creating a malaise, Mr. Pompidou noted. But they are also welcome. The positioning of patents between society and technological knowledge is indeed a real problem. While patents are at the heart of the economy and open the door for the use of new technology, either society is predominant on technological knowledge or it's the opposite. In one case, the patent is a catalyst, in the other, a regulator. Protection of the invention by a temporary monopoly and its publication bring legal certainty to the invention and reward to the inventor, while allowing the traffic of inventions. Despite claims by some researchers that the patent blocks further research, it is actually a catalyst, because patents are accessible universally, free of charge. 55 million patents are available on line, which make patents an essential vector of scientific communication and benefit sharing: they give security, permit the raising of money and will be used for the welfare of society.

Mr. Weerapong Pairsuwan focused on 3 items: new technology assessment, emerging technologies (in particular nanotechnology and biotechnology) and patents. Patents in Thailand, he said, are a very controversial issue. He agreed with Mr. Pompidou on the need for the promotion of 'low-tech' and that low-cost technology is needed. Technology progresses so fast that developing countries cannot catch up, and some agencies, he claimed, should be more active in that regard. There are so many new technologies, he argued, that we overlook many of them. He also agreed that new technology generates a lot of disposable items and expressed his opinion that this is not manageable. People don't talk about it, he regretted. Nuclear waste should be counted among these new disposable items. This kind of waste, he said, is simply not affordable to many countries, and we should explore how to dispose of such dangerous items produced by new technology. Turning to nano- and biotechnology, he also emphasized that international action is needed. Scientific progress, he noted, is regarded with increased scepticism. Policy making and science require understanding and should be guided by the needs of society in determining the direction of investment in science and technology. Policy makers, he argued, should take society's demands into account while reinforcing the social acceptability of science. Scientific guidelines for the exploitation of emerging technology are equally needed. Therefore, a broad discussion should take place, Mr. Pairsuwan concluded.

During the discussion, Mr. Pompidou agreed that the Thai rate of filing for patents is very low, but said that the European Patent Organization (EPO) was to advertise its patent database in Thailand, demonstrating the catalytic power of patents for the country. A participant raised the issue of the relationship between the costs of patents to the cost of new products. Mr. Pompidou responded by pointing out the drastic reduction of fees taking place in the EPO and by emphasizing that the significant cost often lies with the protection of patents. A COMEST member took the example of a drug discovered in an institute that could not alone afford to perform the vast amount of tests required by the Federal Drug Administration in the United States, and therefore must participate in a joint venture and accordingly share the benefits. Mr. Pompidou emphasized that, in such a case, the company associated with the institute usually takes a significant risk. Furthermore, he argued, an excellent patent is likely to be a prerequisite for that kind of joint venture. About nanotechnology, a participant noted the

difficulty of assessing its ethical implications when the effects of this technology remain to be seen. Mr. Pompidou argued that we should not wait for epidemiological studies before starting the discussion about the ethics and nature of nanotechnology, so as to avoid the kind of backlash that happened with GMOs. The need for education and communication on new technologies was also emphasized by Mr. Pairsuwan. In response to a question on the urgency of reflection about possible contact with extraterrestrial civilizations, Mr. Pompidou expressed his opinion that extraterrestrial beings already surround us and observe us. On a question about controlling the improvement of knowledge, he stressed the importance of scientific freedom and individual control. A Japanese professor emphasized the role of the private sector in these issues and wished they were more involved in the debate. The Chairman of COMEST stressed that this aspect had not been neglected, for example, in space ethics, and also referred to the partial successes of past collaboration with the private sector. A question on information technology was an occasion for him to specify that this issue was being addressed by a different programme within UNESCO and by the international community. A COMEST member underlined that present knowledge on nanotechnology suggests that pollution is more of a risk than are self-replicating entities. The need for good information on new technologies was stressed. Mr. Pompidou said he expected that worldwide dissemination of nanotechnology would be rapid, which would be both an advantage and a concern.

Closing Session

Mr. **Korn Thapparansi**, Minister of Science and Technology of Thailand, reported on the ministerial meeting and announced in particular the adoption of the Bangkok Declaration on Ethics in Science and Technology, which had just been unanimously adopted by the eleven countries represented at the meeting. The four main points of the Declaration, he said, are: scientific and technological cooperation and modern free trade should be enhanced; the intellectual property regime should give priority to benefiting humanity over commercial benefit; the role of youth should be promoted; and finally mutual understanding is needed for the ethical consideration of emerging technologies such as nanotechnology, radiation, satellites and organ replacement. This Declaration, Mr. Thapparansi announced, was to be formally submitted to the Director-General of UNESCO.

Mr. **Pierre Sané**, Assistant Director-General of UNESCO for Social and Human Sciences, thanked Thailand on behalf of the Director-General of UNESCO for the opportunity to have a face-to-face exchange of views. He hailed the ministers and their staff for taking the lead in the agenda and for their wonderful organization and hospitality. He ensured that UNESCO would bring this success to the attention of all its Member States. Over these three days, he said, there has been both willingness to participate and substance to be communicated, and the presence and active participation of concerned parties and stakeholders has been a key factor in this success. Ethics, he said, cannot be handed down by decree, but must address local concerns. In this regard, Thailand's proactive approach and high-level representation at the ministerial meeting show that ethics in science and technology will have strong roots in the region. Mr. Sané emphasized the relevance of the youth forum - as sensitivity to the ethical dimension of science and technology should be transmitted to each new generation of scientists. COMEST, he continued, insists on the local relevance and applicability of its work, and listens closely to the views and needs of the region. Mr. Sané paid a tribute to the departing Chairman of COMEST, Mr. Fenstad, and to his accomplishments during the formative years of the Commission. Through all difficulties, he said, Mr. Fenstad helped us keep COMEST afloat by holding firm to his vision of a stronger Commission and making it a reality. Mr. Sané finally welcomed the new bureau and the new Chairperson, Ms. Pilar Armanet Armanet. He also thanked the COMEST members, the Thai Government, the Ministry of Science and Technology, and all those who contributed to the event. Mr. Sané then presented tokens of appreciation to the Minister of Science and Technology of Thailand; the Permanent Secretary of the Ministry of Science and Technology of Thailand; the Deputy Permanent Secretary of the Ministry of Science and Technology of Thailand; Mr. Jens Erik Fenstad, outgoing Chairperson of COMEST.

A **representative of the youth forum** took the floor to present the youth forum report. Youth and ethics had been the topic of discussion, she said. The forum began with the question 'What is ethics?' and 'What guidelines, if any, exist?' Guidelines on what is ethical would help the young scientists become better and more ethical scientists, she stated. The next question considered was 'Ethics for whom?' The forum participants believed that everyone needed to be ethical. Inventors, for example, must be ethical, she said, and should work with an awareness of what impact, benefits and risks their inventions would have. Research findings should be shared with the rest of the world to hasten technological advancement, she insisted. Those who financially support research, whether government or enterprise, should also be ethical. She commented on the need for

pure science and fundamental research for the generation of new technology and thus the need for adequate funding in these areas. Benefit sharing should also be supported, she added. Users need to be ethical by avoiding unethical products such as illegal software as well as by not misusing products. By assuming our ethical duty as users, we will help humanity and the environment, she argued. The forum considered the issue of ethics versus plagiarism, she reported. In the medical field, she said, we face an ethical dilemma concerning life-saving drugs that are patented and unaffordable by those who need them. To make affordable generic imitations of these drugs is to commit plagiarism, but these cures then become more affordable and accessible to the needy, she explained. She also gave the example of unaffordable versus illegal software. The forum recommended that: 1) international legislation be improved, especially in the area of patent law, and made more favourable to developing countries; 2) incentives be given for developing drugs to fight tropical diseases and for providing cheaper drugs to those in need; 3) governmental subsidies be given to reduce the financial costs of subscriptions to scientific journals; 4) ethics be included in school curriculum and standardized internationally; 5) prices be based on income; and 6) commercialization be regulated by international organizations.

Mr. Korn Thapparansi then awarded certificates of participation to the participants in the youth forum.

Mr. **Johan Hattingh**, Rapporteur of COMEST, took the floor to give a summary of the presentations and debates that took place during the three-day COMEST session. In his keynote address, the Director-General emphasized the maturity of COMEST and the willingness of the international community to engage in the debate on ethics in science and technology. The Bangkok Declaration is clear evidence of this, Mr. Hattingh said. COMEST's maturity is evidenced by its regional approach, wide dissemination of results, wide interaction with stakeholders, action-orientation, focus on standard-setting, ethics education, awareness raising and its activities in early detection of potential risk areas. In the keynote address by Mr. Yongyuth Yuthavong, the relationship between spiritualism and ethics was emphasized, Mr. Hattingh reported. Mr. Yuthavong showed how the basic principles of Buddhism - do good, be good and purify the mind - could help find answers to the difficult questions raised by developments in science and technology. The first session was on ethics education, a topic central to the work of both UNESCO and COMEST. The Report on the Teaching of Ethics (2003) was a reference text for the session and responded in part to the question, 'What is Ethics?', that had been raised in the Youth Forum, Mr. Hattingh said. The importance and difficulties of the Aristotelian deliberative process, vis-à-vis either indoctrination or a neutral approach, had been considered during the session. The Aristotelian process requires that a position be taken in a specific practical context in which we assess the reasonableness of our beliefs and values, Mr. Hattingh reported. A responder had emphasized that ethics was caught between philosophy and professionalism: teaching ethics is often either confined to within the lecture halls of a university or, at the other extreme, limited to practical codes in a practical context. A middle way should be found to develop a strong foundation in both philosophy and practicality by stressing the goal of ethics education as being to serve the public good. The need for ethics and ethics education at many levels was a topic raised in all other sessions but underlined particularly during this session. In the session on environmental ethics, a number of questions were raised, Mr. Hattingh said. One such was the question of whether human-centred approaches were efficient for protecting the environment. One point raised was that spiritual values, in addition to instrumental value, should be taken into account. The point was also made that critical questions should be asked about the language we use to formulate our concerns and proposals about environmental problems. The

task of ethics is to make explicit the underlying values embedded in the many existing international instruments on environmental protection. The importance of making a good, practicable, argument for the preservation of the environment was emphasized. A speaker had posed the question of whether our environmental problems are environmental or cultural in nature. In this regard, it was suggested that the environmental problems might be symptomatic of a more general cultural crisis, Mr. Hattingh recalled. In the session on the good governance of science and technology, the Minister of Science and Technology of Thailand had explained that there was distrust of science and policy makers by the general public. To overcome this, a review of the internal structure of science would be needed. A restructuring of the external requirements of science must also take place - science should be at the service of the community and the benefits shared fairly, according to the Minister. Mr. Hattingh reported that the Minister had described the Thai example, where science was restructured along these lines and in accordance with the principles of good governance. The point had been made that the close relationship between science and power must be understood: science functions within a politico-economic context that places different pressures on those who must ensure the responsible development of science and technology. It had been emphasized that the role of knowledge in society must also be better understood. Knowledge could be seen as operating on three levels: instrumental, cultural, and critical. It had been underlined during the session that the key to integrating these levels is dialogue rather than directives. In the session on benefit sharing and international cooperation in research, the need was emphasized for a global perspective of the unequally distributed effects, both positive and negative, of new technologies. The point was made that the sharing of scientific and technological benefits were often hampered by the intellectual property regime, Mr. Hattingh said. One speaker stressed the need to move beyond the antagonistic relationship between South and North in which the South remains in the service of an agenda set by the North. It was suggested that the development of South-South links be given greater priority than maintenance of North-South links, Mr. Hattingh reported. Also highlighted during the discussion was the misuse of ethics as an alibi for protectionist ends or as a means to promote national self-interest. In the session on animals and ethics, it was emphasized that animals are an integral part of human culture. The language of respect and care, rather than the language of rights, had been deemed more adequate for articulation of the relationship of humans to animals. The issue of research on animals was often raised during the discussion, Mr. Hattingh noted. Here, he said, COMEST and specific guidelines on the conduct of scientists could make a significant difference. However, the more diffuse issue of treatment of animals in everyday life and in agriculture would be more difficult to influence, he continued. During the session on human rights and ethics, attention was drawn to the ambiguous relationship between science and rights that has existed historically. The point was made that, while both are rooted in the 17th Century Western culture of Enlightenment, democratization, critical reasoning and recognition of the dignity of each individual, recent developments in science may threaten this same culture of human rights. One speaker warned that scientism, which treats science as the only mode of knowledge, was dangerous as it placed science beyond the reach of criticism. It was considered important to remind scientists that they are part of a wider society. The dialectical relationship between ethics and rights was also highlighted: ethical principles can promote respect for human rights, which can then lead to responsible science. At the round table on genetically modified organisms, the current position appeared to favour regulation falling between the extremes of blank rejection and blind acceptance, Mr. Hattingh reported. The central issues mentioned were safety, labelling, access and intellectual property. Wider concerns surrounding GMOs were also highlighted, including tampering with nature, 'playing God', and the commodification of life.

The acceptability of GMOs was a concern discussed that could be tackled on a number of levels, including the instrumental and cultural levels. A major conclusion from the debate was that the issue of GMOs could be resolved only by employing analysis on a case-by-case, step-by-step, basis. It was also been that decision-making should not be left to scientists alone, but that public dialogue was needed. During the round table on ethics, technological innovation and emerging technologies, issues covered included potential future topics of study by COMEST, namely nanotechnology, the technological dimensions of sustainability, less expensive technologies for development, and ethics and technology assessment. Regarding the latter issue, it was observed that it is difficult to assess a technology in its infancy, which in turn creates ethical, legal and social gaps. However, it was pointed out that emerging technologies also provide an opportunity to improve benefit-sharing and international cooperation. It was said that ethics has been made sufficiently prominent that it should now be easier to incorporate them into the development of new technologies, Mr. Hattingh reported. It was also mentioned in the discussion that the focus should not only be on developing expensive new technologies but also on low cost technologies. Summarizing decisions taken by COMEST during its closed sessions, Mr. Hattingh recalled that a report on the precautionary principle had been adopted as a COMEST document; that COMEST would recommend that UNESCO undertake a feasibility study on declarations in the areas of environmental ethics and science ethics; and that, in the area of ethics of outer space, COMEST would recommend that UNESCO pursue awareness raising activities but not work towards a declaration in this area.

Mr. **Jens Erik Fenstad** thanked the Government of Thailand, UNESCO and all those who worked to make the conference a success. He emphasized his happiness at the results and activities of the youth forum and hailed that morning's ministerial meeting at which a declaration on ethics in science and technology had been adopted. For, he said, these are in the spirit of COMEST's work to promote cooperation and dialogue between decision makers, scientists and the public at large, with an emphasis on the youth. Reaching out to the youth will help create a bottom-up pressure that will keep ethics alive as an integral part of every action and activity, he continued. In stepping down as Chairperson of COMEST, Mr. Fenstad noted with satisfaction the level of maturity that COMEST had achieved. He expressed his great confidence in the new leadership and all the members of COMEST and gave the floor to Ms. **Pilar Armanet Armanet**, new Chairperson of COMEST.

Ms. Pilar Armanet Armanet expressed the honour and sense of responsibility she had at being appointed Chairperson of COMEST, and her confidence that, together with her bureau - comprising Mr. Alain Pompidou, Mr. Sang-yong Song, and Mr. Johan Hattingh - and with UNESCO's Division of Ethics of Science and Technology, the mandate of COMEST would be accomplished. The last century provides amazing evidence of the benefits and harms that science and technology can bring, she said. Today, society is asking scientists some difficult questions such as 'What is happening to the global climate?' and 'What is most important to absorb from this immense and ever-changing body of knowledge with which we are faced?' Ms. Armanet Armanet noted the increasing prominence of scientific and technological news and highlighted the role mass media is playing in expanding the dialogue between people at large and the scientific community. Everyone understands today to what extent our lives are touched by science and technology, she continued. A new challenge has emerged for scientists: to work within a much more informed society that demands accountability. Ethics is deeply associated with social responsibility, she said. For those whose primary interest is in developing and expanding knowledge, being conscious of limits and being honest in informing the public about both good and bad implications of science is difficult

and demands strong moral integrity. Ethics education, debate, exchanges of information and experiences among researchers in this domain is, therefore, of utmost importance, she argued. Over the past three days, we have learned a lot, Ms. Armanet Armanet said, by thinking, working and discussing the ethical dimensions of science and technology. Introducing ethics into the lives of everyone the world over is the main task of COMEST, she said. Ms Armanet Armanet applauded the work achieved by COMEST in its first eight years. She observed that this session, in which society had participated through academic discussion, a youth forum and a ministerial meeting, gives an idea of the expanding importance of the ethical dimension for human beings. She expressed gratitude for having had the opportunity to participate in this session in Bangkok and reiterated her deep sense of commitment to continuing the achievements of Mr. Fenstad and accomplishing the important mandate that UNESCO had entrusted to COMEST.

Mr. Korn Thapparansi expressed the view that the closing of this session was not the end but rather the beginning of an era that would take us to another dimension in ethics in science and technology. Leaders around the world must ensure that scientific innovations be used for the benefit of mankind rather than for commercial benefit, he said. Mr. Thapparansi announced that the signatories of the Bangkok Declaration had decided to submit the report of the Declaration to the Director-General of UNESCO at the next General Conference in 2005. He expressed delight at the presence and participation of the youth at this session of COMEST and asked that the new Chairperson of COMEST continue to provide such a platform for youth to air their views. They will be the future guardians of humanity and we must give them the opportunity to lead the UN to a more peaceful and healthier life on the planet, he insisted. The use of innovations for purely commercial ends would be a shame, he said. Scientists may provide the means to eradicate poverty, he observed, but the final decision on how science is applied rests in the hands of politicians who see things in political terms. It has been repeatedly shown that politics inevitably overpowers the pure rationale, pure minds and pure hearts of scientists, he claimed. If a politician were presented with innovations that made it possible to eradicate cancer and HIV/AIDS, Mr. Thapparansi hypothesized, his or her inclination would be to turn it into commercial intellectual property and use it as a political bargaining chip. Bearing these facts of life in mind, we must each understand and work with the reality of life, he advised. The Bangkok Declaration is a message to the world that the scientific community is calling for the four points elaborated in the Declaration to be followed by the leaders of the world. He expressed his hope that UNESCO would communicate that message. He thanked all who participated in the conference for spending these past days in Thailand and expressed his interest in participating at the next session of COMEST.

ANNEXES

Koïchiro Matsuura: Opening Remarks

Director-General of the United Nations Educational, Scientific and Cultural Organization (UNESCO)

Your Royal Highness,
Mr. Deputy Prime Minister,
Ministers,
Mr. Chairperson of COMEST,
Members of COMEST,
Ladies and Gentlemen,

Allow me first to express my great pleasure at being here with you today. One of UNESCO's key priorities is the promotion of ethics in science and technology, and this fourth session of the World Commission on the Ethics of Scientific Knowledge and Technology, COMEST, is an event of central importance in determining UNESCO's actions in this domain. By inviting us to hold this fourth session in Bangkok, the Kingdom of Thailand has also provided a privileged platform for UNESCO and COMEST to exchange views with representatives from the Asia-Pacific region. Let me express my gratitude to the Kingdom of Thailand for giving us this excellent opportunity. I am also particularly pleased and honoured at the presence of Her Royal Highness and for the personal interest she has expressed in the work of COMEST and in this event.

We are living through times of rapid changes and developments in science and the nature of its applications. The potential benefit of these new innovations to society is astounding. We are naturally led to ask ourselves how we may – and, crucially, how we *should* – harness this latent power. Here, the Charter of the United Nations gives us direction. It stipulates that science should promote "social progress and better standards of life in larger freedom".

In striving for "social progress", we must bear in mind that equity is central to that concept. The accumulation of the scientific knowledge and technological applications that flow from it have transformed human life in modern times. However, the benefits have accrued to the privileged, causing yawning gaps in wealth and opportunity to widen still further.

The issue of how we should manage scientific and technological advancement straddles all realms of society, from politics and economics to religion and culture, each of which is in itself a heterogeneous domain containing a multitude of views and perceptions that should be taken into account. Our world is a patchwork of different communities that, with the development of science and technology, are being sewn ever more tightly together. With this greater interconnectedness, our actions are having even more far-reaching impacts. This is why it is becoming increasingly necessary to draw up generally accepted standards that will guide our actions in the area of science and technology. However, this calls for the reconciliation of differing views and conflicting principles, a task that defies easy resolution.

UNESCO recognizes that norm building is a long-term endeavour. However, I believe principles set out in normative instruments cannot be achieved or properly implemented without a better understanding of the ethical implications of scientific and technological developments. In this regard, we should foster all forms of ethics education and training at all levels, as well as public information and knowledge dissemination programmes about ethics in science and technology. UNESCO therefore attaches great importance to the involvement of our youth - those who will be the actors in the world of tomorrow. The Youth Forum that will be taking place in

conjunction with this COMEST session is aimed at focusing the attention of young people on science and encouraging them to take into account the ethical considerations that must accompany science.

I look forward to the outcome of this session of COMEST, which I am sure will be fruitful. In my keynote address, I will elaborate on the various activities that UNESCO is carrying out in the area of ethics in science and technology.

I wish you a pleasant and fruitful meeting.

Jens Erik Fenstad: Opening remarks

Chairperson of COMEST

Your Royal Highness,
Director General of UNESCO,
Ministers,
Excellencies,
Dear Friends,

It is with great pleasure that I join the Director General in expressing my gratitude to the Thai Government for its generous offer to host this meeting.

I also note with equal pleasure the emphasis the Director General places in his remarks upon the role of ethics in science and technology. As was clearly stated in the Declaration adopted by the 1999 *World Conference on Science*, which was arranged by UNESCO with the cooperation of the *International Council for Science*, developments in science and technology have led to remarkable advances to the general benefit of the human race. But there are dangers involved. Science and technology have sometimes led to environmental degradation and technological disasters and have also contributed to social imbalance and exclusion. Thus, it is not only the efficient use of science that is called for - it is the responsible use mankind needs. This, in our context, means a new emphasis on ethics in science and technology.

I interpret the Director General's remarks as strong support for COMEST's mission. As part of the UNESCO's mission in education, culture and science, value questions shall play an important role, not only as an added-on decoration, but as an integral part of every action.

COMEST is still a young body; it is eight years old, and this is but its 4th regular meeting. At times the general rhetoric has been splendid, and expectations have been high - perhaps a bit too high when compared to the resources available to translate the many good intentions into solid actions. But, thanks to a committed membership and to the expert and dedicated support from the *Division for Ethics of Science and Technology*, our base inside UNESCO, we have started to produce.

In the first phase, COMEST decided to focus on specific issues such as value issues in fresh water management, to mention one example. I recommend our publication *Best Ethical Practices in Water Use* as an example of this work. It was our contribution to the World Water Forum in Kyoto, March 2003.

After the Johannesburg *Summit on Sustainable Development* in 2002, COMEST decided to widen its concern to a broader area of environmental ethics and development. We did not totally abandon our focus on specific issues, as the COMEST study on the Precautionary Principle bears witness to. However, the net is cast wider, as will be apparent from one of the sessions of this meeting (Session on Environmental Ethics).

Ethics, to fullfil its goals, cannot be a top-down activity. It needs a common understanding built on participation and insight. That is why *education* and *dialogue* are so important.

Education has always been an important part of the COMEST mandate. The commission was specifically asked by the 1999 World Conference on Science to take a lead in this matter. This resulted in the COMEST Report on *The Teaching of Ethics*, which in turn has led to a wide-spread and extensive activity. This is

also the topic of a special session of this meeting (Session on Ethics Education).

The COMEST mandate, as adopted by the UNESCO General Conference, asks the Commission to promote *dialogue* between scientific communities, decision-makers and the public at large. I shall later comment on one aspect of this in the session on "Good Governance" (Session on Good Governance of Science and Technology). Here I note the important role of a *Youth Forum* as part of every COMEST meeting. I hope that this activity, combined with the teaching activities, will contribute to a "bottom-up" pressure to keep the ethical issues alive in public debate.

This is needed if we shall achieve the goal of a responsive and responsible science as called for by the World Conference of Science in 1999.

Her Royal Highness Princess Maha Chakri Sirindhorn

Princess of the Kingdom of Thailand

It is a great pleasure to be here at the opening of "The Fourth Session of the World Commission on the Ethics of Scientific Knowledge and Technology – COMEST". I wish to congratulate UNESCO and the Government of Thailand on its successful cooperation in the Asia-Pacific region in promoting scientific and technological development on the basis of ethics, equality and human rights.

This conference will provide opportunity for scientific and social communities, along with the political sector, to exchange knowledge and experiences in developing and promoting ethics in the application of science and technology for the benefit of mankind. At the same time, this conference will serve to build a scientific and technological development network.

In the age of globalization, science and technology progress rapidly and their impact is felt far and wide. Scientific development and application should be instrumental in solving the problems of production, creating economic prosperity and improving the standard of living. But this application should be carried out without prejudice and selfishness and with respect for nature and culture. Future scientists and technologists should be trained to integrate their expertise with natural and cultural resources in order to achieve their highest goal: helping mankind and preserving the world.

I now declare the conference open and wish you all successful collaboration.

Koïchiro Matsuura: Keynote Address

Director-General of the United Nations Educational, Scientific and Cultural Organization (UNESCO)

Your Royal Highness,
Mr. Deputy Prime Minister,
Ministers,
Mr. Chairman of COMEST,
Excellencies,
Ladies and Gentlemen,

I would like to express my deep gratitude to you, Your Royal Highness, for having inaugurated the Fourth Session of COMEST. As I said in my opening remarks, in holding this event, UNESCO and the Government of Thailand are highlighting the important role of ethics in science and technology in society today; calling attention not only to the positive attributes and beneficial consequences of scientific research and knowledge but also to their potential risks.

New scientific discoveries are a source of wonder and pride, and the application of scientific advances in and through technological innovations is bringing many benefits - transforming how we live and work in the process.

However, the 21st century does not have a naïve or simple view of scientific and technological "progress". On the contrary, there is mounting concern about the possible adverse consequences of scientific development in general and certain scientific advances in particular. If left unattended, this concern may undermine popular support for and trust in the whole enterprise of modern science.

Some of that concern, furthermore, is focused on the ethical aspects of science and technology. With regard to some fields, such as the life sciences, there is an uneasy feeling that science is developing so rapidly and radically that the ethical compass we normally use can no longer tell us where we are, where we are going or, most important of all, where we should be going. In some cases there may also be a growing gap between the complexity of new ethical issues and the popular understanding of those issues.

Such a gap is fraught with danger for science because, ultimately, it must be responsible to society, not just itself. If science is ever cut adrift from society, it will lose its ethical bearings. Science must be accountable for its actions and for the consequences of those actions. This requires ethical engagement by the whole of society. Scientists themselves are keenly aware of this, as was made quite clear at the discussions and debates at the 1999 World Conference on Science in Budapest, whose recommendations we continue to follow.

Today, it is by no means clear that what is scientifically possible and technologically feasible is ethically desirable. In saying this, I am not suggesting that science and technology are 'inherently bad' or 'ethically suspect' but that the ethical question must be raised. This will require that both science and society become both more reflective about their relationship and more responsible for its outcomes.

It should not be thought that ethics in science and technology is mainly confined to esoteric or 'cutting-edge' scientific discoveries. On the contrary, it is vitally relevant to the 'bread-and-butter' issues that face the world today. Thus, ethics in science and technology is highly pertinent to discussions of poverty, public

health, agricultural productivity, urban development and environmental degradation.

It is also important for detecting the early signs of risk situations related to advances in science and technology. UNESCO, with the assistance of COMEST, has a special role to perform in advising Member States in this respect, especially to promote dialogue between scientific communities, decision-makers and the public at large. This is an opportunity for UNESCO and COMEST to reaffirm the vision of ethics in science and technology as a tool for promoting reflection on the social, cultural and economic development of nations and peoples as well as fostering the prospects for peace and a sustainable future. In order to meet this challenge, I am proposing to our Member States that ethics in science and technology remain the principal priority of the Social and Human Science Sector in the next biennium (2006-2007). I trust this orientation will allow us to strengthen our capacity-building and awareness-raising role at all levels and to implement international standards through policy, research and scientific activities.

As I said in Berlin in December 2001, at the opening of the second session of COMEST, "Ethical reflection is a perpetually renewed process, a constant questioning of the reasons and consequences of our acts. It means more than defining a code of ethical practice. It implies that the debate should be conducted in public with the informed participation of citizens and decisions-makers, and should thus be regarded as a matter of democratic necessity. Ethical reflection, moreover, must be seen in a proactive perspective. At the international level, it calls for broad vision and foresight, drawing upon the world's major ethical systems and the participation of the intellectual community everywhere". I'm glad COMEST has been adopting that approach.

In fact, COMEST is now eight years old, and I think it is entering its maturity. One aspect of this maturity is the regional approach that the Commission has embraced since its last session in Rio de Janeiro, Brazil, in December 2003. By meeting in the different regions of the world, COMEST not only disseminates the debate on ethical issues related to science and technology, but also demonstrates that it is receptive to distinctive regional concerns on these matters. Meeting here in Bangkok is an opportunity to have a fruitful exchange of views with local experts. It is also particularly useful in order to strengthen our networks and to set up a platform for future activities in the region. The next session, in 2007, hopefully will take place in Africa. I am sure that this prospect will have an impact on COMEST's thinking.

Another sign of COMEST's maturity is its reinforced interaction with all stakeholders internationally. One example is the meeting held early this month in Paris on the feasibility of an ethical code of conduct for scientists, held as a follow-up to the session dedicated to this subject in Rio de Janeiro in December 2003. The Paris meeting brought together representatives of several UN agencies, IGOs, NGOs and universities. This method of wide consultation and participation by all stakeholders ensures both the relevance and the credibility of COMEST's work.

Speaking of wide participation, it is also commendable that, despite its maturity, COMEST has retained its enthusiasm for youth. All sessions of COMEST include a youth forum. This meeting in Bangkok is no different. We know from past experience that the contribution of young scientists to the ethical debate can be rich and stimulating.

I should equally commend the commitment of COMEST to provide action oriented recommendations. I also commend the decision to hold its ordinary sessions just long enough before each UNESCO General Conference so I can take its recommendations into account for the decisions I propose to Member States in the autumn. Another aspect of the maturity of COMEST is to be seen in its

working methods and clarity about its role. As a world ethics committee, COMEST addresses a topic that is both very specific and very important. The development of science and technology raises a broad range of issues: not all of which are ethical and not all of which are to be addressed by COMEST. It is the ethical dimension of these problems that the Commission considers.

This is why, on issues such as environmental ethics or outer space ethics, COMEST adopted a strategy to focus at first on the ethical dimension, as such, before widening the debate to all stakeholders, in particular scientists and policymakers.

This approach ensures that the more obvious issues do not overwhelm the specifically ethical considerations. In the case of environmental ethics, for example, the world is facing urgent environmental problems such as global warming and the loss of biodiversity. However, the importance of their ethical dimension, such as the value of life or the rights of future generations, tends to be neglected in international action because of the urgency of these problems. I think that through environmental ethics there is an opportunity for UNESCO to play its own important role in approaching and solving environmental problems. I look forward to the recommendations that the Commission will make in this regard.

However, ethics neither begins nor ends with the production of norms. Discussion and debate about ethical issues and moral action are important in their own right and UNESCO does much to promote such ethical debate. In addition, UNESCO is keen on strengthening ethics education as vital for encouraging lively, relevant and informed ethical debate. By adopting the report on teaching ethics, COMEST provided useful guidance to UNESCO in this area. The implementation of the report's findings and recommendations on ethics education has started with two experts meetings in Europe, Budapest and Moscow. In the coming years, other regions of the world will gradually be incorporated into this effort. I trust the process will speed up with experience.

An important role of COMEST is indeed to simply clarify debates. The group of experts on the Precautionary Principle is presenting a report that aims at delineating this widely discussed principle and its applicability. Such effort of clarification is, in my view, a significant step towards the construction of an international consensus, which is the *raison d'être* of multilateral organizations like UNESCO. It is often true that disagreements actually rest on misunderstandings. I am confident that COMEST's work will help dissipate such misunderstandings and build international consensus on the precautionary principle and other matters as well.

This session will not only address the ongoing activities of COMEST and UNESCO, but will also explore future new activities. In my judgement, the following issues require attention from the international community in terms of their ethical dimensions: nanotechnologies, the rapid obsolescence of technological objects, and the use of technologies for development that are more appropriate and affordable, as well as problems related to the ethical evaluation of emerging technologies. Hence, I have asked the Commission to consider them and to advise the Organization in due course.

Unfortunately, it is uncommon for ethical issues related to science to be addressed prospectively. The example of bioethics thirty years ago showed us that prospective ethics is usually received with scepticism. It is only when problems actually happen that everybody agrees on the need to address them. The work of COMEST and its mandate to give early warning signs of risk situations testify to the progress made by the international community on this matter. It is, for me, a source of confidence in the future that COMEST can raise ethical issues we had not thought of, thereby helping UNESCO to fulfil its often

ascribed role as the "conscience of the United Nations System."

Your Royal Highness,
Ladies and Gentlemen,

Before closing, allow me to pay tribute to the Chairman of COMEST, Professor Jens Erik Fenstad, whose term is coming to an end. He has done much to bring COMEST into the current state of maturity I referred to earlier. After his successful work as Chairman of the COMEST sub-commission on outer space ethics, Professor Fenstad was elected Chairman of COMEST in Berlin in 2001. During the past four years, he has shown an exemplary commitment to the Commission and has participated in many "Ethics around the World" conferences to disseminate the work of COMEST and UNESCO. He has been a very active and persuasive promoter of COMEST's cause, including in my own office! Allow me then, to thank you, Professor Fenstad, for your dedication, your untiring efforts and your many achievements.

There are other members of COMEST whose mandates expire at the end of this year. I wish to thank them also. They are Professor Hamish Kimmins, from Canada, who was very active on the ethics of energy and environmental issues; Professor Lu Yongxiang, from the People's Republic of China, who was involved in virtually all of COMEST's domains of activity and brought his wisdom and social awareness to bear upon the implications of science and technology; and, finally, the First Lady of Egypt, Mme. Mubarak, former member of the bureau, who hosted the extraordinary session of COMEST that was held in Alexandria in December 2002.

Dear friends,

I hope that, even when you are no longer members of the Commission, you will continue to advise UNESCO and participate in its activities. Let me conclude by expressing once again my deepest gratitude to Your Royal Highness, to Mr. Deputy Prime Minister and to Mr. Minister of Science and Technology of the Royal Government of Thailand for your generous invitation to host this meeting. I wish everyone every success in the important deliberations of this meeting.

Thank you.

Yongyuth Yuthavong: Ethics in Science and Technology - A Scientist's View

Professor of Biochemistry, Former President of the Thai Academy of Science and Technology, Senior Researcher at the National Center for Genetic Engineering and Biotechnology, NSTDA (Thailand)

Your Royal Highness,
Mr. Director-General,
Ladies and gentlemen:

First of all, let me thank the organizers for inviting me to join in this important meeting on an important subject: Science and Technology Ethics. This is a very timely subject, with an increasing potential to affect our society and environment. As a matter of fact, this subject has been timely at least since the time when science and technology reached prominence in human life - before we had even read of Frankenstein, through the horrific experiences of the atom bombs, the present threat of bioterrorism and into the future world of robot humanoids. It is a subject in which the public should be engaged. Scientists and technologists should especially be involved.

For a practicing scientist, like myself, I must admit that I do not normally start my daily business with the question "Is what I am going to do today moral or ethical?" I think I can speak for my colleagues in saying that we normally assume that the quest for new knowledge and the building of new gadgets are virtues in themselves. We realized long ago that with more knowledge and ways to apply our knowledge, we are empowering ourselves more while the implications of such empowerment are still little understood. With knowledge of how to split the atom, we can release immense energy from materials; with the capability to manipulate genes, we can practically create new life forms. To be sure, we realized also that the power that we got from science and technology could be put to good or bad use. Then one day – no, indeed on many, many days - we were shocked to discover that our power was used in immoral, unethical ways. True, the abuse of science and technology products – as weapons and tools for terrorism, and crime – is by and large not the work of the scientists and inventors themselves. We are only the tool makers. The people who use them in bad ways surely should be blamed. This is all good and well, but are all scientists and inventors absolved from blame? Worse yet, in many cases we do not know whether our inventions are good or bad, simply because they are so new we have not had enough time to ponder over them. For example, while it is surely bad to create and use weapons of mass destruction, is it good or bad to create new life forms, to clone parts of, or even whole human beings?

Our dilemma is made more urgent by the fact that we now have the technical capability to do many things that we do not yet know for sure are good or bad, right or wrong. Our sense of right or wrong can guide us in many cases. However, in other cases, we simply do not yet know the consequences and implications. It is surely right to use our knowledge of cloning to make spare organs from our own stem cells. But how about using the cells from human embryos? Are we in effect killing others for our own survival? Are embryos human beings? The debate has become more urgent now that the technology to grow nerve, liver, kidney and other tissues is at our doorstep. And, it will be technically easier to use embryonic cells, rather than stem cells from adults who will need the tissues for repair. The Bush Administration, relying on a law amendment which prohibits the use of US federal funds to support any research that

destroys human embryos or puts them at serious risk of destruction, barred the support of research on new lines of stem cells by arguing that that federal taxpayer dollars should not be used to encourage the exploitation or destruction of nascent human life, even if scientific and medical benefits might come from such acts. Many see this as seriously delaying the emergence of new therapeutic avenues to rehabilitate such patients as the late Christopher Reeve. They argue that since the embryos created from in-vitro fertilization clinics will have to be destroyed anyway, what is wrong in using them for research for medical benefits? At the global level, the debate on cloning has taken on importance in various countries and in the international arena, with no simple consensus in spite of declarations at the UN and other levels.

The struggle may not be futile, and some issues may be settled in the future. Our ethical sense has indeed evolved over the last few decades. When in-vitro fertilization first became possible, giving rise to Louis Brown and other test tube babies, there were a lot of doubts about the ethics of such an undertaking. Although some controversies still remain, the issue has been mostly settled, now that the world has become familiar with the technology and, more importantly, has developed a greater understanding of the ethical problems involved. As far as cloning is concerned, we need to understand more about the technologies involved and consider the ethical implications on a continuing basis. While it is generally agreed that whole human cloning should be off limits for the present, the area of therapeutic cloning, cloning of cells and organs for therapeutic purposes, is now the crucial testing ground. Understanding and conclusions from this area should help in tackling the more difficult area of whole human cloning.

Cloning is but one issue among many for which ethical consideration needs to be given. Many other issues which have arisen through advances in science and technology require rigorous debate on the ethical aspects. From genetic sciences alone, we need to consider issues such as: who has the right to the genetic information of individuals, whether genetic improvement or correction should be made to offspring, and how the rights of parents versus those of the unborn children should be weighed. In the future, not only can the genetic characters of the unborn child be known and defects corrected, but they can also be designed in advance, so as to improve the looks or possibly even intelligence. In his book, "Our Posthuman Future", Francis Fukuyama raised serious questions on how far society should let biotechnology go. Are "designer babies" dreams come true or nightmares in the making, once this is practiced on a large scale? Should we allow the manipulation of genes which modify behaviour? Apart from genetic interference, how far do we allow the use of drugs which alter moral character? Even in extending life, which is surely a worthy goal for everyone, what long-term, overall impacts will be made on economies, international relations and new ideas generation? Fukuyama's concerns indeed echo those of Aldous Huxley long ago in the famous science fiction "Brave New World", or closer to home and more recently, of the Thai author Wimol Sainimnuan in "Amata". These books and other media reflect the concerns of society on the new advances in biotechnology, which promise so much for our quality of life yet evoke some suspicion on whether some bad news may be carried with them.

I have used an aspect of biotechnology to raise a number of issues for ethical consideration. Obviously, there are many other aspects, many other areas of science and technology in which technical advances have raised new ethical issues, or indeed in which old ethical issues still have to be settled. The fact that we can now store and process vast amounts of information about individuals, of which genetic information is only a part, raises many issues on human rights, privacy and freedom. Some governments are employing the "smart card"

as a means of keeping tabs on their population and as a means to increase government efficiency. But what limits should governments or employers have to legitimately store and use such information? Who should have access to such information? Most importantly, when is it right and when is it wrong to access and use such information?

Another area of potential concern for ethics in science and technology is that of nanotechnology. This is a new area, and therefore it is fitting to raise the issues early so that we do not repeat the history of the GMO controversy which arose from advances in biotechnology. We should think about the potential liabilities of nanotechnology products, both to human health and the environment. The issues of "nanosafety" should be addressed as early as possible, so that preventive and other measures can be taken to make this new technology, as well as its products, both beneficial and safe for all.

I can go on to raise ethical issues in other areas of science and technology, or areas on which science and technology have great impact. The organizers of this meeting have already planned for extensive debates on these other areas, such as environmental ethics, benefit sharing in collaborative research and the ethics of animal use. I felt a need to find guiding principles to deal with these diverse issues. After considerable struggle, I found that my own root in Buddhism has helped me find these guiding principles. Let me share some of my thoughts with you.

A full moon day last month, February 23rd, was Makabucha Day. It is a day on which Buddhists are reminded that some 2,500 years ago, after travelling around to teach about Buddhism, 1,250 monks, all of whom were ordained by Lord Buddha himself, decided to come back to see him without prior appointment on the night of the full moon of the third lunar month. On that auspicious occasion Lord Buddha gave them a sermon, Owata Patimok, which is considered to embrace the core principles of Buddhism. Three core principles were given: refraining from committing evil, being good and doing good, and purifying the mind. Elementary Buddhism tells you that refraining from committing evil covers both physical and mental acts. The same goes with being good and doing good. Purifying the mind is achieved when the mind is at peace, free from greed, hatred and delusion – "the roots of evil".

Can these core principles of Buddhism be applied as a guide towards the ethics of science and technology? I found no difficulty in agreeing that the first two can provide good guidelines, although real cases will be complex and need to be considered from various angles on a case-by-case basis. For example, on gene-based diagnosis, considerations will have to be given concerning: for whom it is good and for whom it is bad, both for individuals and for the society. For some people, it is good to know whether they will have breast cancer, while others may not want to know. How much will this prior knowledge of our fate benefit or cost society? If a product from science and technology, such as a gene-based diagnosis, is of reasonable cost, and people have a choice whether to use it or not, together with the choice of a follow-up action, then on the whole I think everyone would agree that this is good. On the other hand, if a product such as a smart card is used by an authoritarian government to exert controlling influence over its population, then the product and the way it is used should be judged as bad.

Application of the third principle, purifying the mind, gave me more difficulty in pondering and interpreting in relation to science and technology ethics. I would propose that this principle, applied to ethics in science and technology, makes us reflect on whether a science-and-technology based action or product gives you peace of mind. We need to reflect on the basic reason and the ultimate consequence and implications of our action, including the benefit-risk consideration of its

effect on the future. Let us consider an example. We know that global warming is due to the increasing level of carbon dioxide emitted from industry and other sources. Suppose someone comes up with an ingenious scheme to capturing carbon dioxide in liquid form and containing it in the deep ocean or deep geological formations. We may think that this is a wonderful solution. But, on second thought, how can we be sure that the captured carbon dioxide will stay inertly where we put it? What is the risk of it escaping or reacting adversely with its surrounding environment? And even if everything goes according to plan, is this just an ingenious way of industrial pollution dumping? It is the difficulty in analyzing this kind of complex scenarios that makes scientists and technologists, so clear about the underlying principles of their trade, so unclear and tentative about many possible consequences of their products. The main point here is that scientists and technologists should not only go about their work in a business-as-usual manner, and not be too attached to the technical wonders of their products, but should also consider the consequence of their actions and their products in relation to their effect on society and the environment. They should furthermore seek the opinions of a wide range of people before making up their mind and be ready to change when new information points in a new direction. Purification of the mind, therefore, is not just for individuals but for the mind of the public as a whole. This, I would like to propose, is the essential task in purifying the mind.

I have been giving my own interpretation of ethics in science and technology in relation to Buddhism. However, I am sure that other religions and wholesome systems of belief can also be invoked to examine ethics in science and technology. Broadly speaking, new actions and consequences stemming from science and technology should be examined in the light of possible overall risks and benefits to the human society and environment, with broad participation from the public as well as scientists and technologists. Scientists and technologists, being close to the action, can point out possible effects and scenarios, but the public, including people from various backgrounds and professions, need to be involved because a complex interlinked chain of events is possible and cannot be foreseen by only a few individuals.

I would like to end my talk with the story of Godzilla. How is this related to the ethics of science and technology? The monster first came out of its peaceful territory as a consequence of repeated nuclear bomb experiments, already a lesson in ethics for us all here. A young scientist found a way to destroy Godzilla, but unfortunately his invention could also be used as a weapon of mass destruction. In an attempt to solve the dilemma, he eventually decided to burn all his documents and end his own life by facing Godzilla under water. Are there stories similar to Godzilla in real life? Yes, if we equate it to the unintended consequences of our actions. Yes, if our solutions are double-edge swords which can cut both ways, solving one problem as well as creating others.

In his elegant critique, On Ethics and Economics, Amartya Sen argues that economics can be enriched by paying more explicit attention to ethics and that modern ethical study can also benefit from a closer contact with economics. I would like to reflect his views here by saying that science and technology can also be enriched by paying more attention to ethics, and vice-versa. Modern ethical studies should take into account new developments in science and technology. In a world in which science and technology are playing an increasing role in all aspects of society and the environment, their ethical implications should receive greater emphasis and their impact on ethical principles themselves should not be ignored.

Diego Gracia: Education and Ethics Progress

UNESCO has assumed the promotion of social and ethical responsibility in issues related to science and technology as one of its main goals for the coming years. There are different ways of doing that. One is through legislation. But another, perhaps the most important, is through education. Science and technology are not "value-free" activities, but "value-laden", and therefore must be done and applied with responsibility, that is, taking into account their social and ethical implications.

Science and technology are social phenomena, and for that reason their development and use must be taken care of not only by scientists, but also by society. Science and technology have the need of social and collective control. It was during the Second World War that people realized the lack of "neutrality" in science and technology. During the 19th century and the first half of the 20th, scientists assumed the roll of priests of the new era, one in which science would transform reality, creating a new world with plenty of goodness, beauty, pleasure, and perfection. This was a new religion and also a new ethics, with scientists as the main actors. As a consequence, they were considered, using the words of Nietzsche, "beyond good and evil".

This changed dramatically during the Second World War. Hiroshima and Nagasaki on one hand and Auschwitz and Dachau on the other, showed the world that science and technology were not neutral; that "science" meant "power", and that this power could not be left solely in the hands of scientists. Society has the responsibility to control its development and use: therefore, the need for moral or ethics education. This is one of the goals of UNESCO. In fact, this was the conclusion of the World Conference on Science and the Use of Scientific Knowledge, which took place in 1999. UNESCO's World Commission on the Ethics of Scientific Knowledge and Technology (COMEST) has committed itself to put this Declaration into action. On the other hand, the need for sustainable education was expressed at the world conference on sustainable development organized by the UN and held in Johannesburg in 2002. UNESCO was designated as the leader agency for the promotion of the Decade of Education for Sustainable Development, starting in 2005.

COMEST worked throughout the first half of 2003 in an attempt to respond to this challenge. The result was the report entitled *The Teaching of Ethics*. This document ended with nine recommendations, encouraging universities and other institutions of higher education to promote ethics courses and PhD degrees in Science and Ethics, and urging UNESCO and other international organizations, for example the World Bank, to support teaching ethics in developing countries.

It is impossible to stress enough the importance of this document and the need to implement its recommendations. In any case, it gives more importance to the organization of teaching than to how to teach. This report pays no attention to the *process* of teaching, in favour of other aspects of the problem.

But the process of teaching is essential. There have been in history, as there is today, two extreme and opposite models of teaching ethics. They can be called the "indoctrination" model and the "toleration" model. To indoctrinate somebody means to make him have a particular set of beliefs, especially by teaching, which excludes all other points of view. The traditional way of indoctrinating people has been catechisation. This has been the classical method of teaching ethics and it continues to be a very frequent way, especially among some religious, philosophical and political groups.

The main concepts of the opposite model are "toleration" and "neutrality". This was the ideal promoted by the Liberal thinkers of the 17th and 18th centuries, especially in Western Europe. Personal beliefs and values are now protected by the new right to "liberty of conscience". These are private matters, the reason why public teaching must remain neutral in these types of issues. Public schools can not predispose students towards any given concept of good life or towards a particular moral character. The only thing permitted is what has been called "value clarification", that is, to help students understand and develop their own values and to teach them respect for the values of others. There is not a "right" set of values. The problem with this method is that treating every moral opinion as equally worthy encourages students in the false subjectivism of, "If I have my opinion and you have yours, who is right?" "If someone says that 'blacks, Jews, Catholics, and/or homosexuals are inferior beings who shouldn't have the same rights as the rest of us, then it is criticism, not just clarification, that is needed." (Amy Gutmann)

This second mentality, opposite to the first, has been the most pre-eminent over the last two centuries. In 1918, immediately after the First World War, the German thinker and sociologist Max Weber wrote: "One can not demonstrate scientifically what the duty of an academic teacher is. One can only demand of the teacher that he have the intellectual integrity to see that it is one thing to state *facts,* to determine mathematical or logical relations or the internal structure of cultural values, while it is another thing to answer questions of the *value* of culture and its individual contents and the question of how one should act in the cultural community and in political associations. These are quite heterogeneous problems. If he asks further why he should not deal with both types of problems in the lecture-room, the answer is: because the prophet and the demagogue do not belong on the academic platform."

The poet William Butler Yeats wrote these two verses:

"The best lack all conviction, while the worst are full of passionate intensity."

This is the model which entered in crisis during the days of the Second World War. There are no "pure facts"; there is not a "value-free" science. Everything in our lives is "value-laden". Discussions about values are not only possible but also necessary. Values and beliefs are not completely rational. They are influenced by emotions, hopes, desires, education, traditions, etc. They are not completely "rational", but they must be, at least, "reasonable". And, they must test their reasonableness through the process of deliberation. This is the key word, "deliberation." Deliberation is the way of analyzing the rational consistency of values and beliefs. Its goal is not to reach a consensus, choosing one value and banning the others. Its aim is to favour a debate between all the people concerned with a problem, in order to increase the wisdom or prudence of our decisions. Different people can reach different conclusions. The aim of deliberation is not to reach one and only one decision, but to increase the wisdom and prudence of all the conclusions reached by the participants at the end of the process.

Deliberation is a difficult task and it needs some preconditions: first, the capacity to assume that in value questions nobody has all the truth, and that others may have at least as much truth as I have; second, to think that others can help me find the way towards the truth, or in other words, towards the way of being wise and prudent; and third is that we must have the unusual capacity to listen to others. Deliberative skills are not natural but cultural, and therefore they must be trained. Naturally, all of us are prone to deny value to the arguments of others, especially when they say things opposite to ours.

Aristotle considered deliberation as the main method of practical reasoning, and more specifically, as the method of ethics. In fact, his great work *Nicomachean Ethics* consecrated deliberation as the right way to make wise decisions. As he said, "deliberation is about the actions a human being can do." And he added, "What we deliberate about is the same as what we decide to do, except that by the time we decide to do it, it is definite, for what we decide to do is what we have judged to be right as a result of deliberation. We have found, then, that what we decide to do is whatever action among those up to us we deliberate about and desire to do."

Deliberation is the best alternative to not only indoctrination but also neutrality. There is a plurality of values, and homogeneity in this field is neither possible nor desirable. But we must give reasons to support our own values and beliefs. We must give reasons, first of all, to ourselves, and afterwards to all others. Only by testing the reasonability of our values can we be sure that they are, at least, wise and prudent. This is everybody's moral duty. We all have the moral duty to assume the more reasonable values. Because they are only reasonable, and not completely rational, we must be convinced that we do not have all the truth, and that the others, defending different values, can have at least as much truth as we have. Nevertheless, they are also obliged to test the reasonability of their values, looking for wisdom and prudence as well. By all discussing together, we will be capable of establishing a core set of values which can be peacefully assumed by all, another set of values to be freely managed by each one of us, and a third of things prohibited to all. Deliberation is the way to define, not only our personal duties, but also the common or collective ones. It is the way of managing our practical life, and more precisely, private and public morality.

Deliberation is a complex method of reasoning and making decisions. It not only takes into account universal principles and values, but also the specific circumstances in which a specific decision must be taken. Its aim is to make the best possible decision in a specific situation. To reach this goal, it is necessary to balance all the values concerned as well as the circumstances and consequences. A wise decision must balance all these elements, looking for the best possible solution. That is, the one that optimizes the promotion of the values involved, or at least the one that damages them the least.

Deliberation was the method used by Socrates, the father of Western ethical tradition. He did not impose his values on the others, but he deliberated with them in order to deliver the best out of everyone. Deliberation is maieutic. Its goal is that everyone may give the best of himself.

Describing his own method, Socrates said: "My art of midwifery is in most respects like theirs […] The triumph of my art is in thoroughly examining whether the thought which the mind of the young man brings forth is a false idol or a noble and true birth. And like the midwives, I am barren, and the reproach which is often made against me, that I ask questions of others and have not the wit to answer them myself, is very just, the reason is, that the god compels me to be a midwife, but does not allow me to bring forth. And therefore I am not myself at all wise, nor have I anything to show which is the invention or birth of my own soul, but those who converse with me profit. Some of them appear dull enough at first, but afterwards, as our acquaintance ripens, if the god is gracious to them, they all make astonishing progress."

Ladies and gentlemen, this procedure, which was in its very beginning the real method of ethics, disappeared shortly after, being substituted by the other two: indoctrination and neutrality. It is time to amend that situation and promote its use, training people in the deliberative skills from the very beginning: from the years of primary school until the highest levels of the educational process. We are in need of a deliberative society. In my

opinion this should be UNESCO's lemma during the decade of ethical education which is now beginning. The UN has established the promotion of "sustainable development" as one of its goals, being the only possible way to surpass the untenable development of the First World as well as the untenable underdevelopment of the Third. I think that UNESCO should design another program which attempts to avoid both historical untenable extremes in value education: indoctrination and value neutrality, and which promotes "deliberative education" as a third way. Sustainable development and deliberative education: these are, perhaps, two of the most important goals to be achieved during the next ten years. Bringing them both together is probably the best way to implement the mandate of the UN to UNESCO to be the leading agency for the promotion of the "Decade of Education for Sustainable Development," started this January. Promotion of Sustainable Development through Deliberative Education: this is, in my opinion, the goal. That is, at least, my proposal.

Ruben Apressyan: Ethics Education

Professor Gracia distinguished in his speech "two extreme and opposite models of teaching ethics" and marked them as "the «indoctrination» model and the «toleration» model". This distinction is important when one speaks on value oriented ethics education. It is clear that one cannot expect anything different than the indoctrination model of teaching ethics at theology seminaries or departments of theology in universities. Meanwhile, an intermediary model is possible as well. I know that in Orthodox higher education institutions in Russia, Moral Theology and Ethics are taught as Moral Philosophy. The latter tells about different types of moral theories. Normative ethics is given either within the course of Moral Theology or within Ethics, but then in the spirit of Christian Ethics, specifically in its Orthodox version.

Teaching ethics is not only about "values and beliefs". It is also about understanding the phenomenon of morality, its nature and function, rules and reasoning, criteria of evaluation, and main moral concepts with their further normative and applied implications. Such is a *traditional* approach to teaching ethics. I mean teaching ethics in universities. Secondary and high school ethics, as far as it is present, is usually reduced to teaching values and how to make practical decisions. However, during the last four to five decades, ethics has changed considerably as a university discipline. It has ceased to be exclusively a *philosophical discipline* and has become part of *humanities education*.

A modern and much more popular approach presents ethics as Applied Ethics, usually in one of its versions: Bioethics, Business Ethics, or any other "minor" version of professional ethics. In its applied versions, ethics has become more and more an integral component of *professional education*.

I see a difficult quandary in teaching ethics, determined by a divergent understanding of the aims and tasks in teaching ethics: should ethics be taught as a part of humanities or a part of professional education?

The changes in role and function which ethics has survived during the last decades is significant. I consider the increasing share of Applied Ethics in the various modes of teaching ethics a result of a deep transformation in the moral practice and requirements of post-modern society. It is still post-*modern* in the sense that it is still ready to appeal to an individual, personal dignity, sense of freedom, and conscience. However, it is *post*-modern for it is a perplexed society with the radically transformed institutions of family, parenting and family education. It is a post-modern society in the sense that it is complicated and intricate in its structure and function and, hence, requires a growing role of the formal, inner-corporate and inner-professional means of regulating public and private behavior.

Modernity ultimately manifested itself in the *ethics of categorical imperative*, which was called to extricate an individual from the tenets of family, church, local community, given education, particular fashion, etc., and thus individualize him. Post-modern society is the society of plural standards, different types of families, varied confessions and denominations, amorphous community, loose education, licentious fashion, etc. Such a society needs a different type of social discipline or *social ethics*. Modern ethics was content with an atomized individual – an individual given to himself. Although Kant was speaking about duties to oneself and to others, there were no

personalized others in the ethics of categorical imperative. Modern moral philosophy was concerned about *Self* but it almost did not know *Self* in its attitude and relation towards the personalized *Other*. It was presenting virtues, duties and happiness out of the context of communication.

The postmodern era became a kind of nutrient broth for different concepts of morality: *ethics of discourse*, or *communicative ethics*, *ethics of care*, *communitarian ethics* and so forth. All these types of ethics take stock in the role of human relations, community, solidarity, mutual trust and collaboration. This shift in moral experience has required special means of normative regulation - its institutionalization and sanction. This requirement was accomplished by various kinds of professional ethics.

With the decay of the traditional institutions of modern society, which seemed to be natural and worked almost invisibly, the necessity of new forms of 'soft' (as opposed to 'hard', i.e. based on law) regulation of conduct became imperious. I consider the multiplying variety of practical ethics systems as the embodiment of this social demand. The purpose of all these different codes of practical ethics is to adapt individual behavior to legitimate forms of activity, in particular social spheres, and in this sense make it effective and equally advantageous to all involved parties and stakeholders. By codes of practical ethics, I mean: business ethics, biomedical ethics, research ethics, engineering ethics, teaching and education ethics, management ethics, computer ethics, accountancy ethics, counseling ethics, and even such exotic codes as conference interpreters ethics.

It is evident to me that the above mentioned divergent tasks of teaching ethics – ethics as a part of humanities or professional education – should be converged. But there is evidence of one more role ethics should play in universities. I mean moral and social education, which would give students orientation towards good and right living in a society and working collaboratively in a professional community for the sake of public good. But, moral and social education is vain if it is restricted to the auditorium. It is strongly correlated to the principles of teaching and learning, the values a university curriculum is based upon, the ethos of a university including the level of academic freedoms for teachers and students, and the character of academic relations between teachers and students. I realize that in saying this I am indicating a turn in our discussion from the given topic, 'Ethics Education', to a much broader topic – 'Ethics of Education', but this is the overwhelming logic of thinking on the subject: ethics education may be efficient and successful only in an appropriate academic environment or, applying a word which Professor Gracia used, a *sustainable* academic environment.

Soraj Hongladarom: Ethics Education - A Response to Diego Gracia

Ladies and Gentlemen, I am very honoured and delighted to have been invited to present my thoughts at the Fourth COMEST meeting, where the world leaders in science and technology ethics convene to discuss what I take to be one of the most pressing tasks for humankind in the early twenty-first century—devising a way to govern scientific and technology progress in such a way that really benefits humankind. I am doubly delighted to be able to respond to the insightful paper by Professor Diego Garcia.

In his paper, Professor Garcia stressed the importance of ethics education in science and technology in that it fosters, or should foster, the mindset of 'deliberation' and not 'indoctrination' or 'pure description'. It is impossible to overestimate the importance of the point he is making. What Professor Garcia is saying is that one should not aim at just imposing a set of normative ideas on the students, no matter how much one believes them to be true. One also should not avoid making any normative judgments whatsoever: believing that anything can be right or wrong and that no definite answers can be given. To subscribe to either side would fall into the trap of thinking that the questions of value admit no real answers. One either believes in one set of values mindlessly or does not believe anything at all. Either way, ethics itself becomes impossible. Normative statements become 'true' and 'objective' simply because they are imposed, perhaps by force (in which case they don't have the binding force that only comes with freely given assent), or they can admit to no truth or objectivity at all. The normative then ceases to be normative.

Unfortunately, such kind of thinking is still prevalent in many educational circles today. Believing that questions of value admit to no objective answers, the typical attitude of policy makers in educational matters, is something like, "We should impose or instil one set of values on the students." or something like, "Let's forget about all this 'moral education' and focus more on the technical side of education, one that produces results!" But this way of thinking has become obsolete in the face of the rapid advances of science and technology in today's world. These advances are so deeply connected with our values, and indeed our sense of whom and what we are as human beings, that we cannot simply avoid seriously tackling the questions of values that inevitably follow from these advances.

So, my more concrete proposal would be that to find a way to nurture the kind of deliberative thinking that avoids the trap of absolutism and relativism. One can only do that in a system of education that encourages free, informed, and rational enquiry. Students should be given the opportunity to explore questions of value on their own – with the serious sense of sincerely desiring to know the truth of the matter while realizing that the method of finding this truth is utterly different than that of empirical science. Another thing is that we should all support attempts to set up a kind of formal training program on the ethics of science and technology. Without educating the public on this issue, it is hardly conceivable that the goals and ideals of deliberative ethics that Professor Garcia talked about so wonderfully will materialise.

Having said all this, what I would like to contribute further is regarding the issue of how an educational program on ethics in science and technology should be implemented. Right now my colleagues at Chulalongkorn University and I, together with colleagues from other relevant organizations, are trying to push

forward a new degree program on bioethics. The project, called ASEAN-EU LEMLIFE (www.asean-eu-lemlife.org), is a collaborative project supported by the European Commission through the ASEAN-EU University Network Programme (AUNP). The main objective of the Project is to develop a program of study as well as teaching material in bioethics. The eventual aim is to convince enough people so that the degree program actually comes into being.

There are many challenges in such a program of study. First, it has to be interdisciplinary. Within the institutional setting of a large and diverse university like Chulalongkorn, this is a real challenge. This is true because Chulalongkorn consists of many different "Faculties", each of which is assigned an academic discipline. After some time, these Faculties developed into highly autonomous organizations within the university itself. So, an interdisciplinary program such as this one could find no 'home', being that no Faculty wanted to claim it as their own.

I think a way to answer this challenge is to set up a new and independent unit within the university to take care of this task. If the departmentalization of the university reflects the departmentalization of knowledge as it existed in the past, then to reflect today's much more fluid structure of knowledge the organization of the university needs to be more fluid too.

Second, in the climate where universities have become 'global businesses', the program has to convince people that it can survive on its own. More specifically, it has to demonstrate that it can attract enough students who would be willing to pay the fees.

However, I don't think this challenge is too difficult to meet. For one thing, one can perform a kind of 'customer or market survey', so to speak, in order to discover the potential market in the area. The hypothesis is that the demand for ethics in science and technology is in fact overwhelming. It is a result of the advances in science and technology. As for attracting students, one needs to bear in mind that good students will be attracted to good programs, making quality very important indeed. One thing a program can do to ensure quality is to become international. Universities do not exist in a vacuum and they need to form networks among themselves and students. Teachers should be given opportunities to move around so as to expand their horizons and their experiences.

It is here that I find the newly created European degree programs very interesting. These programs exist *across* a number of institutions in many countries. They link various centres of excellence together to create a larger network which entails even more excellence. It also creates a wider pool from which to select good students, and the students themselves have wider choices. So Chulalongkorn, for example, could link up with other universities in the region and create a degree program organized with these consortia. This will also combat the problem of the shortage of qualified teachers in the field too.

Ladies and Gentlemen, we are now faced with a difficult and important challenge – how to devise a program for the study of ethics in science and technology that does justice to the deliberative ideal that Professor Garcia talked about, and how to devise the best institutional setting which would enable the program of deliberative ethics to develop to the fullest extent. Thank you very much for your attention.

J.P. (Hamish) Kimmins: Environmental Ethics
- Introductory Comments for the Session on Environmental Ethics

We live in one world and the life support system – the biosphere and its associated atmosphere – is thinner than the skin of an onion. This thin but surprisingly robust biological-physical veneer over the inanimate physical core of the earth is the environment in which life as we know it today evolved and is supported. It is a veneer that was in part created by this life and which in turn depends on it for continued existence.

The biosphere supports many life forms and many species but does not need any individual one of these species to continue its overall life-giving function. Nature has evolved a robust insurance of life through the development of considerable biological redundancy at the level of the overall global ecosystem function. This redundancy can also be seen on smaller spatial scales, but only variably so when one examines relationships between some individual species. This biological redundancy is expressed as the world's biological diversity.

Humans have an ethical responsibility with regards to the biosphere – otherwise known as the *environment*. Individuals have an ethical responsibility to sustain the life support systems of other individuals and the communities they live in. Communities and countries have an ethical responsibility not to damage the biosphere and thereby reduce the life support systems of other communities and countries.

We share the biosphere with many other species. Humans are but one, albeit the currently dominant, member of the global biotic community. This status raises ethical questions about our right to alter the biosphere in ways that harms the life support systems of the other species. However, "nature" – both the physical and biological components thereof – is continually altering the environment in ways that change the relationships between species and causes the local or global demise of some. Is "nature" unethical in this? Are humans more or less ethical than "nature" when they cause such species loss? If humans are accelerating this process in comparison to "nature", does "nature" have a plan that determines an ethical rate of species loss? Would human-caused species loss be ethical if it sustained this rate?

Diseases, parasites, herbivores and predators play a vital role in regulating the population of the organisms they prey on. This is vital in determining the dynamic "balance of nature" (if this exists?). These biological agencies act to prevent populations from reaching levels at which they damage their own life support systems and that of other species. Is it therefore unethical for humans to reduce predation and disease in plant and animal populations? Is it ethical for humans to prevent human disease, prolong human life, practice medicine and try to prevent population reduction through conflict when such agents of mortality and population regulation have historically prevented the human population from rising to levels which damage the biosphere and the life support systems for humans and other species? In terms of the environment, is it ethical for society to save the lives of millions in over-populated areas from flood, drought and starvation when these problems are exacerbated by having too many people? From a human perspective it is clearly unethical to fail to do this. But, what is ethical from an environmental perspective? Is it ethical for the wealthy nations to impose their view of environmental ethics on crowded developing nations? How do we balance the ethics and right to life of the individual against the ethics and survival of the community that individual

lives in, the ethics of that species, and the ethics of the other species that it is affecting?

These questions and many others pose enormous challenges to environmental ethicists. They also raise difficult questions with respect to other aspects of human ethics as well as the ethics of science and technology in support of the expansion of human population and its domination of the biosphere.

In the visual presentation accompanying this introduction, the origins of the modern environmental ethic are explored and the question is raised about how we balance the ethical perspectives on the environment in wealthy, developed nations and societies against those of poor, crowded and developing nations. The biosphere is remarkably robust. Even after millennia of environmental alteration by human activities, it continues to function and the majority of species have survived, in spite of dire warnings to the contrary. Against this optimistic view, there are many examples in which the capacity of local ecosystems and the broader biosphere to absorb human impacts has been exceeded. Species loss and degradation of the ecosystem and landscape function has occurred and the carrying capacity for humans has been reduced. Environmental ethics should clearly be concerned about questions of individual species' rights, cruelty to animals and similar issues. But, it must also be concerned with the ethics of the continued human population growth that threatens to exceed the resilience of the biosphere, with potentially grave consequences for humans and many other species. However, other species would benefit from the biospheric changes that caused the demise of the human race. Clearly, environmental ethics is very complex and exceeds even the complexities of human ethics.

I close these introductory notes with the message Aldo Leopold conveyed in his essay, The Land Ethic.

"*A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise"*

But

"The evolution of a land ethic is an intellectual as well as emotional process. Conservation is paved with good intentions which prove to be futile, or even dangerous, because they are devoid of critical understanding either of the land, or of economic land-use"

We must understand the biophysical foundations for an environmental ethic if it is to serve humans in their quest for a sustainable and ethical relationship with their environment.

Johan Hattingh: Human Interests, Intrinsic Value and Radical Questioning - Three Necessary Aspects of Environmental Ethics as International Action?

1. Introduction

In this paper I would like to say a few words about environmental ethics both as a practical and a theoretical enterprise. There is a very close link between the practical and theoretical dimensions of environmental ethics, although the practical dimension is often not recognized as such. I would like to start with a short sketch of three "snapshots" of environmental ethics as a practical enterprise within the context of international action. In these snapshots, a picture will emerge of some of the practical things that have already been done in the international arena to address environmental problems. In the second part of my paper, I will give an interpretation of these actions from the perspective of environmental ethics (or environmental philosophy, for that matter, to use a wider term) as a broader theoretical enterprise.

2. Three snapshots of practical environmental ethics in action

2.1 Snapshot 1: The Kyoto Protocol

The Kyoto Protocol came into effect a little more than a month ago on February 16, 2005 [1]. Since it was ratified by Russia in October 2004, enough industrialized countries have endorsed it for it to become a fully functioning international treaty. This treaty legally binds the industrialized countries (Annex 1 Parties) among the 128 signatories to cut or limit their collective emissions of six key greenhouse gasses, during the commitment period of 2008 to 2012, to 5% below 1990 levels. Mechanisms have also been created for industrialised countries to assist other countries in the reduction of emissions. The aim of the Kyoto Protocol is to stem global warming by reducing greenhouse gas emissions in the most cost effective manner, while addressing issues of environmental integrity and equity. The main instruments for achieving this reduction in emissions are the following:

Emissions trading: The Kyoto Protocol created a free market in Carbon Reduction Credits. A country gets credits for reaching certain national emission reduction targets. The lower the emissions, the more these credits will be. However, if a certain country cannot reach its emission reduction targets, it will be able to buy credits from countries that have a "surplus" they do not want to use. Thus, a market is created in which polluters are penalized for exceeding their targets and those with low emissions are rewarded for keeping them low.

The Clean Development Mechanism (CDM): This makes provision for a system in which industrialized countries can earn emission reduction credits by helping developing countries reduce their greenhouse gas emissions.

Joint Implementation (JI): This takes place on the same basis as the CDM, but allows only for cooperation between developed countries.

2.2 Snapshot 2: The World Summit on Sustainable Development of Johannesburg in 2002

In 2002, the World Summit on Sustainable Development (WSSD) was held in Johannesburg to assess the progress that had been made in the implementation of Agenda 21 – the comprehensive agenda for environmental

protection and sustainable development adopted at the United Nations' World Conference on the Environment and Development, held in Rio de Janeiro in 1992.

At the Johannesburg Conference, the world's nations agreed on the following diagnosis of our environmental challenges: The global environment continues to suffer. Loss of biodiversity continues; fish stocks continue to be depleted; desertification claims more and more fertile land; the adverse effects of climate change are already evident; natural disasters are more frequent and more devastating with developing countries more vulnerable; and air, water and marine pollution continue to rob millions of a decent life [2].

Equal concern was also expressed about the growing gap between the world's rich and poor – meaning that the costs and benefits of globalization, opening of new markets, mobility of capital, significant increases in investment flows and advances in technology are unevenly distributed between the countries and the people of the world [2]. It was thus agreed that issues of justice and equity are part and parcel of our environmental problems, and not something separate from it [3].

Acknowledging that this dismal picture is the result of unsustainable production and consumption patterns, the nations of the world recommitted themselves at the Johannesburg Summit to the implementation of sustainable development, and in particular to the definition of it coming from the 1987 Brundtland Report [4]. There, sustainable development was defined as development that meets the needs of present generations without compromising the ability of future generations to meet their needs. It is important to note that two qualifications to this definition are given in the Brundtland Report: the needs of the poor are central in sustainable development; and the only constraint on sustainable development is the state of technology and social organization in society.

According to the Johannesburg Declaration, sustainable development should be seen as the creation of a new and brighter world of hope. With a view to achieving this, the Johannesburg Plan of Implementation was drawn up, detailing specific programmes, plans, and target dates.

2.3 Snapshot 3: The Millennium Development Goals

On the eve of the new millennium, the Secretary General of the United Nations launched the Millennium Development Goals in the United Nations Millennium Declaration (UNMD) [5]. Within this Declaration, six fundamental shared values were stipulated as essential to international relations in the twenty-first century. Respect for nature was listed as one of these values, along with freedom, equality, solidarity, tolerance, and shared responsibility. In order to translate these values into action, protecting our common environment was singled out as one of the key objectives which is assigned special significance, aside from others like peace, security and disarmament; development and poverty eradication; human rights, democracy and good governance; protecting the vulnerable; meeting the special needs of Africa; and strengthening the United Nations. Spelled out in terms of targets, the Millennium Goals states that a new ethic of conservation and stewardship should be adopted and that the first steps towards this should entail:

Ensuring that the Kyoto Protocol on measures to curb global climate change is put into force by 2002 and embarking on the reduction in greenhouse gas emissions, as required by the Kyoto Protocol. [It should be noted that at the time these development goals were launched – September 8, 2000 – the Kyoto Protocol was not yet in force.];

Intensifying collective efforts for the management, conservation and sustainable development of all types of forests;

Pressing for the full implementation of the Convention on Biological Diversity and the Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa;

Stopping the unsustainable exploitation of water resources by developing water management strategies at the regional, national and local levels, which promote both equitable access and adequate supplies;

Intensifying cooperation to reduce the number and effects of natural and man-made disasters:

Ensuring free access to information on the human genome sequence. [5]

3. The normative basis of a practical environmental ethics

These three snapshots of international action, I believe, capture important dimensions of environmental ethics as a practical enterprise. In all three of these snapshots, a clear normative distinction is made between what is and what isn't morally acceptable in international action. In ethics, these distinctions are usually captured in terms of normative categories such as right and wrong, good and bad, and what deserves respect and what doesn't. The distinction between right and wrong underlies what has been sketched in the three snapshots above as the duties and obligations we should accept as nations, individuals or corporations: to reduce greenhouse emissions and fight climate change; to pursue sustainable development, the eradication of poverty, and a more equitable distribution of resources in the world; and to embark on a wide spectrum of development goals that, if taken seriously, could change the lives of billions of people for the better while protecting the environment from destruction.

The distinction between good and bad underlies what has been sketched above, albeit implicitly, as the good life that we should embrace and strive for. Stated in general terms, our three snapshots reveal a good life as one of dignity and justice for all, peace and prosperity, and freedom from terror, disease and manmade disasters. It furthermore reveals a whole number of prerequisites for such a life, ranging from access to clean water through access to information to technology transfer between developed and developing nations.

Similarly, the distinction between what deserves respect and what doesn't underlies what has been suggested in the snapshots sketched above as that by which we can identify ourselves as human beings and even accept as the sources or our very being. In the practical ethics reflected above, we find, albeit on an implicit level, a normative image of humans emerging as caring beings. Caring not only for themselves and their own children, but also for others, human and non-human alike, who have become the victims of injustices and unwise choices we have made in the past. What emerges from this is the normative image of the human being as a care-taker – in the literal and the widest sense of the word. What deserves respect, in terms of this, is care-taking. What elicits disrespect is careless, unthinking behaviour for the sake of narrow individual or national interests; not being prepared to proceed in an informed and cautionary fashion in every decision we make, every policy and programme we adopt.

Within the practical realm, ethics also has to do with the quality of the justifications we offer for our actions. In this regard, the three snapshots given above also provide an abundance of information about the values and normative principles that are accepted today in the international arena as a basis for action. I mention but a few, without claiming to be exhaustive in this regard:

In the snapshot of the Kyoto Protocol, the value of preventing harm to people – living now and in the future – seems to be central. This harm will come from the effects of global warming and climate change if we sit back and do nothing to curb greenhouse gas emissions.

These harms include rising sea levels, the contamination of fresh-water supplies, mass population migrations, declining agricultural production as continents dry out, and abnormal weather conditions [1].

In the snapshot of the World Summit on Sustainable Development, the central values of equity, human dignity, social development and caring for future generations are the central moral principles that were taken as points of departure.

In the snapshot of the Millennium Development Goals, the values of freedom, equality, solidarity, tolerance, respect for nature, and shared responsibility stand central with protecting our common environment, among others, as one of the key objectives to turn these values into concrete reality.

4. Looking at the world from three positions in theoretical environmental ethics

In the second part of this paper, I would like to evaluate the above from what I interpret as three complementary perspectives in theoretical environmental ethics. As a theoretical enterprise, environmental ethics is often divided into three separate approaches and portrayed as operating from different and opposing assumptions – which explains the intense debates that are often found between what can at best be described as three separate normative positions [6]. For our purposes here, I would like to treat these three normative positions as mutually supportive of one another in the sense that they focus on different aspects of the world's environmental problems as well as explore different levels of analysis and thinking about overcoming these problems.

Probably the most widespread normative position in environmental ethics has been labelled as anthropocentrism. Different versions of an anthropocentric environmental ethic exist. What they all have in common is that their calls for the conservation of nature or the preservation of some parts of nature in its pristine natural state are all based on a form of enlightened self-interest [7]. In terms of this, the basis of our concern about a deteriorating natural order is the fact that it will eventually harm humans, either those living now or those living in the future. Accordingly, nature is valued instrumentally, as a means to human ends – and treated as such: a treasure house of actual and potential resources that are available for human use and development.

Within this framework, debates exist between those who lay more emphasis on the consumptive use of our natural resources and those who focus more on the non-consumptive use of nature, including untouched nature for its aesthetic, spiritual or psychological value, to mention but a few examples. These debates, however, take place within the framework of an instrumental value theory about nature. They differ not on the use value that nature has for humans, but on the nature and extent of the use that we can make of nature.

Having said this, all three of the snapshots given can be appreciated from the anthropocentric environmental ethics point of view. The Kyoto Protocol, emphasizing the need for reductions in greenhouse emissions, the Johannesburg Declaration focusing on the need for sustainable development, equity and justice, and the Millennium Development Goals are in fact all concerned with overcoming harm or negative impacts to humans and providing humans with a better life. The concern for nature and the fight against climate change and unsustainable development that emerge from these three snapshots all display the position of enlightened self-interest: we care for nature and promote wise use of resources because it is in the best interests of humans to do so.

While such an approach may currently be the best place to start when engaging governments and multi-national companies regarding environmental issues because of the emphasis it places on the benefits that humans will receive

from environmental protection and ecologically sustainable development, a different, nature centred position on environmental ethics will argue that the instrumental value theory is not strong enough to protect nature from human induced destruction [8]. Their point would be that human interests will always tend to win in situations where trade-offs between humans and nature are made, and that we rather need a theory that will change our attitude towards nature and what we can legitimately do with it. Such a different attitude, this approach would argue, is possible within the framework of an intrinsic value theory about nature.

According to this approach, the whole of nature, or at least some parts of it, has intrinsic value – that is: value in and of itself, regardless of any use value it may or may not have for humans. This approach further states that entities with intrinsic value should be accorded a dignity and respect for the mere fact of being there, or being alive, and accordingly, that we as humans cannot do with them as we wish. Instead, we have a moral duty, if not to promote that intrinsic value, to at least preserve it by preserving the conditions under which these intrinsic values emerge. As such, intrinsic value theorists plead for a change in perspective and attitude, entailing an expansion of our moral horizons where we not only *morally* consider the interests of humans, but also that of non-human entities.

From the position of the intrinsic value theory, the three snapshots provided above could be appreciated for the emphasis they place on efforts to prevent climate change and to promote sustainable development and environmental protection. This at least moves us away from the position of ruthless or unthinking exploitation of the natural environment. However, exponents of the intrinsic value theory would argue that environmental protection based on the instrumental value theory alone can only provide for weak forms of protection and weak notions of sustainable development. Having taken the first steps towards global environmental protection in measures such as the Kyoto Protocol, the Johannesburg Declaration and the Millennium Development Goals, they would argue, we have to move on and develop even stronger measures of protection, based on the notion of a moral respect for nature which stems from its intrinsic value.

In a third position that is often distinguished in the field of theoretical environmental ethics, the focus falls more on efforts to understand the root causes of the world's environmental problems, and to address them on a fundamental, radical level. For many theorists within this framework, the root causes of our environmental problems have to do with the manner in which the world's economy is organized, or stated in more specific terms, the manner in which economic and political power is distributed and functioning in the world today [9, 10, 11, 12]. Accordingly, they would argue for a radical analysis of the political economy of decision-making in the world today regarding resource use, economic policy, and distributive allocation, making the basic point that we will continue on our path of ecologically unsustainable development and the destruction of nature unless we radically transform society as we know it. This would include the world's international political and economic structure, as well as power relations between and within nations.

Within this transformative framework, much attention is given to analyses of the social and cognitive structures informing the organization of the world order today, taking it right down to analyses of the dominant ways in which we think about ourselves as human beings and how we realize ourselves as such. Deep Ecology [9], for instance, draws our attention to the narrow, egotistical notions of self and self-realization that are prevalent in current consumer society, arguing for an expansion of the self and forms of self-realization that treads more lightly on the earth than we currently do. At the same time, some eco-feminists [11, 12] focus on unmasking, challenging and

overcoming the logic of dualistic and hierarchical thinking that not only underlie, according to their analysis, the domination and exploitation of women in this world, but also the domination and exploitation of nature.

There may be many sceptics who will argue that a total transformation of economic and political relations in the world is impossible and that any effort to radically change our notions of self and self-realization is futile. The momentum of current trends in political and economic development in the world, they would say, and the power of the consumer society to establish and perpetuate itself globally is too strong to challenge. From an ethical perspective, though, the value of these radical perspectives lies in acknowledging that our environmental challenges have to do with the impacts the development paths we have chosen to implement in the past have on people and nature, and that these development paths have been chosen on the basis of notions of self and self-realization that, in all probability, are not fully transparent to us, and are in desperate need of clarification and critical questioning.

With this in mind, theorists of a radical persuasion in environmental ethics would characterise our environmental predicaments as a crisis of culture and character [13]. As they see it, what is at stake is not merely human survival or social and economic development within the constraints of supporting ecosystems with a view to overcoming poverty, distributive injustices, and stumbling blocks to human indignity. They are the very notion of who we are as humans in this world and how we endeavour to realize ourselves as such in this world. Unless we ask radical questions about ourselves, our self-realization and the kinds of lives we claim are meaningful, they would argue, we will not even begin to resolve the environmental challenges being experienced in the world today. Unless we use radical questions about who we are to confront ourselves with the crisis of culture and character we are faced with today, measures like the Kyoto Protocol, the Johannesburg Declaration and the Millennium Development Goals may turn out to do little, if anything, about the deeper-lying trends and thinking patterns that lie at the root of our environmental problems. In fact, they would intimate that unless we radically question and challenge these deeper-lying trends and thinking-patterns, the Kyoto Protocol, the Johannesburg Declaration and the Millennium Development Goals may create the dangerous illusion that we are effectively addressing our environmental predicaments, while we in fact are not.

5. Conclusion

In this paper I have started by giving three snapshots of international initiatives that all display elements of environmental ethics as a practical enterprise. In the Kyoto Protocol, with its measures to address global climate change, in the Johannesburg Declaration, with its commitment to sustainable development and its associated Plan of Implementation, and in the Millennium Development Goals, with its focus on the eradication of poverty and establishing human dignity without destroying the natural environment, we find practical efforts to address the world's environmental problems.

I have then proceeded to show that these practical measures articulate in some way or another, very often on an implicit level, the strong distinctions that we make in ethics between morally right and wrong, morally good and bad, and what deserves respect and what doesn't. In this context I have also shown that each one of these distinctions can be related back, through an argument, to basic moral principles such as respect for persons, not to harm others, to do good, or to justice.

This was followed up by a short overview of what I regard as three complementary perspectives in theoretical environmental ethics. A short evaluation, from the point of view of each one of these perspectives, was

given of the three snapshots of the practical environmental ethics sketched above. Within this context I have shown that these three snapshots basically fall within the framework of anthropocentric environmental ethics, in which concern for the environment and protective measures can be justified from the benefits they will bring to humans.

I have also, shown, however, that exponents of the intrinsic value theory and radical positions would criticize enlightened self-interest as too weak a position to really address our environmental problems. The intrinsic value theory argues that we could develop a stronger position by acknowledging the intrinsic value of nature, thereby changing our perspective of nature and our attitude towards it. Radical positions on the other hand, do not argue for an expansion of our moral horizon, but rather a radical questioning and challenging of the dominant structures and thought patterns in society that brought about our environmental problems.

My contention is that all three of these positions in theoretical environmental ethics are vital to better understand the nature and scope of the actions and measures we need on a personal, societal, organizational and international level to overcome the world's environmental problems. On all four of these levels, it is highly important to acknowledge that if humans do not see benefits flowing to them from measures to protect the natural environment, they will not support it. In fact, if protective measures increase world poverty, and entrench current patterns of distributive injustices, then international initiatives, such as those sketched above, will be rejected as clever ideological ploys to further the sectional interests of the dominant political and economic power in the world.

It is also highly important to acknowledge that use value (or: instrumental value) is not the only value that things or nature may have. The notion of intrinsic value introduces another important aspect from which things and nature should also be valued – emphasizing that we have a duty to morally consider the value that non-human entities may have in and of themselves, regardless of the use that humans can make of them.

Lastly, it is highly important to note that the state of the world today, of which environmental problems are but one of the symptoms, reflects a crisis of culture and character that we as humans have not yet fully grasped and still do not know how to respond to adequately. Environmental ethics in its practical and theoretical formats, I believe, is a sincere effort to find a language within which we can articulate this crisis of culture and character, its meaning, and how to respond to it. These are still early days for environmental ethics in the world today, both as a practical enterprise and a theoretical endeavour. Given current development trends and thinking patterns in the world today, I reckon that we will hear much more of it in the future.

Bibliography

United Nation Framework Convention on Climate Change Website. (http://unfccc.int)

Johannesburg Declaration on Sustainable Development. (http://www.un.org/jsummit/html/documents/summit_docs/0409_l6rev2_pol_decl.pdf)

The Johannesburg Plan of Implementation. (http://www.un.org/jsummit/html/documents/summit_docs/0309_aconf199_crp7.pdf)

World Commission on Environment and Development (WCED), *Our Common Future*. Oxford University Press: Oxford. 1987.

The United Nations Millennium Declaration (UNMD)–55/2. (http://www.un.org/millennium/declaration/ares552e.htm)

Fox, W., *Toward a Transpersonal Ecology: Developing New Foundations For Environmentalism*, Totnes, Devon: Resurgence. 1995.

Norton, B.G., *Toward Unity Among Environmentalists*, Oxford: Oxford University Press. 1994 [1991].

Rolston III, H., *Environmental Ethics. Duties To and Values In the Natural World*, Philadelphia: Temple University Press. 1988.

Naess, A., *Ecology, Community and Lifestyle: Outline of an Ecosophy*, Translated by D. Rothenberg. Cambridge: Cambridge University Press. 1989.

Bookchin, M., *Toward an Ecological Society*, Montreal: Black Rose. 1980.

Plumwood, V., *Feminism and the Mastery of Nature*, London: Routledge. 1993.

Warren, K.J., *The Power and Promise of Ecological Feminism*, in VandeVeer D. & Pierce, C. (Eds.), *The Environmental Ethics and Policy Book*, 3rd ed. Belmont CA.: Wadsworth.

Eckersley, R., *Environmentalism and Political Theory, Toward an Ecocentric Approach*, London: UCL Press. 1992.

Lu Yongxiang: Challenge and Cooperation

In the 21st century, modern science and technology, primarily represented by information science and technology as well as life sciences, are developing rapidly with each passing day. While human society enters an era of a globalised and knowledge-based economy, science and technology plays an increasingly leading role. In coming decades, significant original innovations and breakthroughs in scientific research and technological development will keep emerging. This will lead to fundamental changes in productivity, production modes and human living, thus providing a bright future for human society while bringing new opportunities and challenges to the economic development of various nations and the advancement of human civilization.

Each historical period has had its new ethical concerns. While introducing great changes to human beings in production and way of life, information technology, life sciences and biotechnology, nanotechnology, cognitive science and space technology, which were greatly developed in the late 20th century, all bring about new challenges to the security of human beings and lay direct challenges on those existing ethical norms. These ethical issues concern human rights, privacy, ethical relationships among people, the ethical relationship between human beings and the eco-environment and ethical relationships between human beings and other lives. The above-mentioned important ethical norms as well as human life and traditional values were challenged by the development of new sciences and technologies in various levels and aspects.

Ethical challenges by the development of information technology

As information technology is further developed, information becomes one of the most valuable resources in the world. Primacy in information collection, analysis, integration, transmission (dissemination) and application ensure the edge in fierce competition. Meanwhile, rapid progress and wide use of computing technology, broadband network technology, software technology, virtual reality technology and natural voice and image processing technology can introduce internet-based fraud, hacker attacks, privacy leaks and data forgery, as well as trans-boundary gambling and the illegal spread of pornography. Disequilibrium in ICT (information communication technology) development and application between different countries, regions and individuals leads to a new gap between the rich and poor – a digital gap. Occurrence of these problems raises ethical questions such as the violation of private rights and interests and the illegal monitoring of individual behaviours, both of which harm the existing social credit system and fair competition. National and public security is facing new challenges.

Ethical challenges by the development of life sciences and biotechnologies

Advancement in life sciences and biotechnologies blazes new ways to solve the long-existing problems of food supply and health care. Technologies related to GMO, stem cell, cloning and man-made species made it possible for human beings to unprecedentedly improve the quality of natural species, change the balance of the eco-system and even change, for the first time, the natural endowment of human beings themselves. These scientific breakthroughs also brought

about ethical problems such as leaking individual bio-information and difficulties in individual social identity confirmation. Even worse, they can endanger the natural ecological system and result in new threats to human health genetics.

Ethical challenges by the development of nanotechnology

Nanotechnology enables human beings to study and control structural features of materials on the nano-meter scale, and to create new materials and devices with magic features. The combination of nanotechnology and life technologies could fundamentally change the current situation in modern agriculture and medical sciences. Human society will also see revolutionary changes in the process of combination between nanotechnology and computing science and bio-genomics. Present nanotechnology research is done only within laboratory bounds. However, once it is applied on a large scale, it may result in problems in human health, social ethics and the eco-environment. Research shows that some nano-materials obtain special toxins, nano-particles and carbon nano-tubes, which might create tumours and penetrate a creature's blood-brain barriers. Disposal of nano-waste will also be a new issue for human beings to face. Furthermore, once nanotechnology is used for developing lethal weapons, scientists have yet to find effective protection.

Ethical challenges by the development of cognitive science and technology

Development of cognitive science and technology makes it possible for scientists to discover the mystery of human intelligence and trace the nature, ruling law and mode of human cognition. The scientific and technological advancements in the field will improve education, the capability of information storage and processing; help break through the man-machine barriers and foster development of computing science. Cognitive science and technology provides more effective ways for human mental health system development and prevention and the rehabilitation of mental diseases. Abuse of cognitive science and technology might result in psychological inducement and traumatic effects and misled cognition, which contribute to controlling human thinking, feeling and behaviour, therefore bringing in new serious ethical problems such as violation of privacy and loss of behavioural autonomy.

Ethical challenges by the development of space technology

Development of space technology as well as improvement and extensive application of global positioning systems, geographical information systems and remote sensing systems, broaden the knowledge and vision of human beings and promote advancement in digital earth and resource science and technology. The latest developments in this field provide powerful scientific and technological support for agricultural production, ecological environment monitoring, and weather and disaster forecasting. But, in the meantime, the new space-based monitoring technology endangers individual privacy and business secrets. Those who master such advanced space-based monitoring technology naturally have information advantages, which will then result in information asymmetry, disequilibrium in fair competition and new threats to national security.

All the above-mentioned issues result from the inappropriate use of science and technology rather than the development of science and technology itself. Problems can not be taken as an excuse to give up or slow down development in science and technology. However, exploring the unknown is a permanent driving force for science and technology development. The appropriate application of science and technology to benefit the human being is a social responsibility of S&T. Ever since modern science and technology was developed, it has

been promoting social development. At same time, social structures, human civilization patterns and ethical morals have been adjusting and optimizing themselves in abreast of science and technology progress. Development of modern science and technology might bring human society more extensive and further-reaching ethical issues, which need to be addressed and solved by joint efforts, exploration cooperation and innovation among all of human society.

Only by strengthening international cooperation can we improve S&T innovation capacity building. Only by international cooperation can we explore ways to neutralise the negative effects of science and technology advancement. Only by promoting public understanding of S&T and knowledge dissemination can we narrow the digital divide and share application of scientific and technological achievements. Only by increasing cooperation in the research of natural sciences, engineering technology and social sciences, as well as humanities, can we alleviate developmental imbalance and disharmony in various disciplines. Only by fostering joint research and exchange on S&T ethics can we find the solution to problems.

The scientific community and academic circles should strengthen exchange and cooperation in S&T ethics to create common understanding and formulate world accepted S&T ethics norms, thereby ending the international S&T ethics convention.

The scientific community is supposed to work jointly to shape ethical rules for scientific research. The scientific community needs to make it known to the public that inappropriate use of the results of scientific research and technological development might threaten the basic human rights of existence, freedom, privacy, justice, ecological environment, human heath and genetic continuation and human reproduction. The inappropriate use of science and technology will also enlarge the gap between individuals and endanger social equality, harmony and stability. Together with concerned groups, we should jointly seek for pre-emptive measures and solutions in advance.

The following principles shall be abided by in international S&T ethics cooperation. Firstly, scientists, engineers, lawyers and social scientists shall join in the discussion in ethical issues related to science and technology. Secondly, principles of equality, equity, reciprocity and transparency should be insisted on and emphasized in the face of ethical issues. Society has the right to know and to be told about potential threats on the basis of equality and information symmetry. Thirdly, various communities in society should make joint efforts to realize a balance between scientific and technological development and the improvement of ethics. This is to ensure that S&T development should never harm social justice, harmonious and sustained social development, the ecological environment, the harmonious relationship between humans and nature, or the development of science and technology itself. History has proven that only by promoting development can problems be resolved. Fourthly, while focusing on science education and knowledge dissemination, S&T ethics education should be promoted, particularly among young students.

In the era of globalization, only by increasing international exchange and cooperation can R&D, training of advanced professionals, knowledge and technology dissemination, technology standards establishment, and the commercialization of scientific and technological achievements be promoted. Only by strengthening international collaboration, can we find the solution to the common issues that human beings are facing. Meanwhile, only by international cooperation, can we build a system of S&T ethics fit for a knowledge-based society.

Luiz Hildebrando Pereira da Silva: Benefit Sharing and International Cooperation in Research

In the last few years, COMEST and UNESCO have played an important role in the development of international scientific cooperation and the related ethical reflection, as a necessary step for guiding practical issues and applications of science and technology in favour of the developing world. With this same purpose, an important co-sponsored international workshop, "Promoting Life Science Research and Training in Developing Countries: A Need for Concerted Action", was held in Trieste in November 2003. The aim of the meeting was to discuss means to improve efforts of national and international funding agencies in favour of science education and scientific and technological research in third world countries. It brought together representative leaders from the Human Frontier Science Program (HFSP), Welcome Trust (WT), Third World Academy of Sciences (TWAS) and the European Molecular Biology Organization (EMBO) to dialog with the leading representatives of developing countries' scientists.

From the discussions taken place at the meeting, a consensual corollary emerged that social and economical development in the new millennium depends fundamentally on the promotion of science education and research activities, particularly in life sciences. The series of recommendations therefore proposed can be summarized as follows:

A clear commitment to scientific approaches to problem solving in developing countries;

The need to promote long-term research and training partnerships;

The need to convert "brain draining" into 'brain circulation";

Strong regional networks of scientists in the developing world are crucial;

Support and encourage Centres of Excellence as regional centres of training and research development;

Find ways to encourage the "diaspora" of developing world scientists to participate in the development of their home countries;

Improve coordination of donor and funding agency activities to adapt to local needs;

Better information about scientific programs in the developed world is required;

Improve access to scientific information and publications; and

Improve access to information and communication technologies (ICTs) to promote the world's integration into global science.

These ten recommendations could be certainly called the "Ten Commandments" for global sciences. However, their introduction into real world practices, mostly dominated by commercial interests and market laws, is not easy. Within our deliberations in the COMEST "Session on Benefit Sharing and International Cooperation in Research", we are discussing points that are sources of contradictory ethical conflicts. If the aim of scientific cooperation is to introduce a rational approach for socio-economic development, these conflicts of interest must be considered not only by scientists and scientific agencies and associations but also by the governments of both developing and developed countries. I will raise some points that could be emphasized in more detail by COMEST:

In the modern world, innovation, as a fruit of technological progress, plays a fundamental

role in the world's economy. New and/or renewed products enter a nation's market and are exported even less developed and developing areas. In industrialized countries, where innovation arises from scientific and technological activities, this represents a driving force for economic progress and social improvement, as well as a stimulating factor for science and technology. It should be remembered that the most active and dynamic area that genders innovation are exactly the industry sectors which generate new equipment and products for use in research itself. However, in the developing world, new and renewed products, in particular those that are used in scientific and technological research, are essentially dependent on imports from developed countries. The exchange must be compensated by the export of basic agriculture products, raw materials and commodities of relative low value. I would like to give a valid example from Brazil in the field of life sciences. The acquisition of a High Performance Liquid Chromatography (HPLC), an essential instrument for chemical and biochemical analysis of natural products used to identify new chemical products of interest for innovation in a series of industrial sectors (pharmaceutics, food and drink products, cosmetics, staining colorants, fibres, etc.), costs US$ 100,000.00. To compensate these resources, Brazil must export the equivalent of 400 tons of soybeans, an amount equivalent to the production of 200 hectares of rich agricultural land. This shows that innovation and scientific activity become extremely positive factors for social economical progress in an industrialized world and, in some way also, a parasitic factor that depends on the efforts of the productive sector of society with low-income conditions. International funding agencies and national policies must therefore find solutions to balance this contrast by creating mechanisms for supplying the equipment and products necessary for scientific and technological research activities in and with developing countries.

A second element to be discussed is the very nature of a partnership in the existing international cooperation related to scientific and technological research and development (R&D). International cooperation between developing and developed countries does exist and in some cases is very important and successful. It is also known that, in many developed countries, because of the lack of attractive financial positions designated for graduate or postgraduate students by universities and scientific institutes, these institutions look for young candidates in developing countries. In principle, this wouldn't be negative for developing countries and for international cooperation. However, it can became a real brain-drain, when the professional posts offered are for disciplines, subjects or projects not accessible for joint development in the young students' country or region when they return home. Ethical considerations must be elaborated in order to help developing countries avoid or minimize brain-drain. International scientific cooperation must give priority attention to areas that are strategic for developing countries and that have a perspective of development with sustainable and autonomous continuity after the interruption of the collaborative program.

Scientific and technological cooperation must always take into consideration basic differences in the manpower structure of developed and developing countries. In industrialized countries these days, we observe on one hand the unemployment of highly qualified and technically trained personnel and, on the other hand, a need for non or low qualified personnel, which is usually covered by immigration from developing countries. In the developing world we have the opposite situation. There is an excess of non or low qualified personnel that constitutes the mass of unemployed people. The introduction of some modern and super-qualified technologies can be harmful to the socio-economic development of the country if it is not prepared to form or recycle human resources. This phenomenon is quite clear in the agriculture and agro-industry

areas. In Brazil, the South and Centre-West areas are introducing modern technologies for soybean cultivation based on mechanization, automatisation and robots. The success of this modern agricultural technology as a guarantee to increase exports with a positive effect in the national economic-financial point of view is not always, however, a success in the social point of view of a country that needs to integrate marginal sectors of its population. This American style of agricultural technology is acceptable for the developed and industrialized areas in the South and Southeast areas of Brazil, but it has dramatic effects when introduced in the under developed areas of the Northeast and, especially, the Amazon Region where it also produces intense environmental degradation. This was also the case of the development of a modern fishery industry on Tanzania's Victoria Lake. On the other hand, some modern technological developments have been shown to produce the same national wealth and global NBP increase by promoting the socio-economic integration of rural populations and improving their living standards. A good example is the modern conservation agricultural technology recently developed in Brazil and Argentina, known as "zero tillage technology". This modern technology offers a series of advantages: tillage is reduced to almost zero, avoiding the need for large expensive machines; the vegetation cover after harvesting is maintained after seeding and, in consequence, humidity is preserved in the forest soils. Recent experiences in large degraded soil areas of Brazil and Argentina have shown a series of benefits for agricultural production, such as the decrease or elimination of soil erosion and compaction; increase of organic constituents in the soil; increase in micro-organisms and earthworms; much lower investments; and increased productivity.

COMEST has, therefore, an important role to play in scientific and technological cooperation as well as in the related ethical considerations in order to identify and indicate the real benefits of science and technology for the socio-economic development of third world countries:

By defining ethical principles to be followed in the promotion of informed choices of priority fields for international cooperation;

By helping developing and developed countries identify and select partner institutions and professionals that follow the same principles and purposes; and

By developing activities that favour the informed choice and adaptation of advanced scientific and technological tools, for the benefit of the less developed and the poorest social sectors in third world countries.

Korn Thapparansi: Good Governance of Science and Technology

During the last 3 decades, it is undeniable that progress in science and technology has created a powerful wave of global change. Information technology is advancing so much that the vision of a borderless world is now reality. The current stage of biotechnology development means that we can manipulate the genetic codes of living organisms to the extent that real applications in medicine and industry are now commonplace. This advancement clearly sets the present age apart from our past evolution. Within this new age, the development of science and technology has become a catalyst in international competition. Measures are put in place in all countries to accelerate their process of science and technology development because it is now generally accepted that science and technology are the leading factors of production - exceeding traditional assets, such as land and labour, in their significance.

Unfortunately, the advance of science and technology is not without costs. The over-optimistic perception of science and technology has now suffered a severe setback. Several areas of scientific progress, such as atomic power, fossil fuel, large-scale agriculture and genetic engineering, now generate genuine fears for wars, environmental degradation and the dominance of multinational corporations in the production of foodstuff. In addition, the benefits of scientific and technological advances do not seem to equally reach all quarters of human beings. Can the scientific community afford to continue its rapid pace of development - with the underlying drive of an insatiable appetite for wealth and conquest over the nature - without taking into consideration the suffering of fellow human beings? Does the law of the strongest apply to the process of knowledge creation and application? I personally believe that the vast majority of humanity can contribute to science and technology development, and that it is their fundamental right to reap the fruit of scientific and technological advances. Any exclusion is unethical. After all, science and technology development is truly a foundation of great social change, and there is nothing more unethical than to bar people from their struggle to change for a better life.

However, the problem remains the general public's distrust of scientists and policy makers. As a result, many governments and scientific institutions are now putting in place programmes on public understanding of science and technology. It is generally believed that the more people understand the nature of science, the more they will find it acceptable. Nevertheless, it must be accepted that science and technology still can, and do, produce unintended consequences. It is, therefore, absolutely necessary for governments and all quarters of the scientific community to go beyond mere dialogue with people. We must start to build a concrete framework to both support and, in some way, guide the development of science and technology. We need this kind of framework to ensure that scientists and policy makers consult the public and make their decisions openly, even though this difficult and uncomfortable measure may come with a high cost.

Let me share with you a little about Thailand's experience. For some time, the Thai Government has been putting the reform of our research structure and science and technology system at the top of its list of priorities. This reform movement is built upon the 4 pillars of science and technology development, namely: research and development, science and technology manpower development, technology transfer and science and technology infrastructure (including policy systems). In addition, the advance of science and technology in Thailand is guided along the developmental trajectories

based upon our indigenous strengths - biotechnology, agriculture, electronics and computers, health, etc. We are investing for our brighter future by modernising our research and development facilities, improving our laboratory and testing services, offering more science scholarships to students nationwide and removing management barriers. In other words, we are aiming to achieve twin goals: firstly, we are making our country a better place to work for people embracing scientific and technological careers, and secondly, we are distributing the fruit of scientific and technological advance to all sectors of our society. More importantly, our ultimate interests are not better economic statistics, but rather bringing about the wellbeing of all Thai citizens.

To achieve these goals, the Thai Government is pursuing 2 parallel approaches of action: firstly, applying more public control over science and technology and secondly, encouraging scientists to reach out to the public. Both approaches are the extension of the principle of good governance, effectively implemented in our government organisations, of all public, scientific and technological institutions. One of the most important aspects of the first approach is the practice of result-based management. This means that public-funded scientific and technological bodies have to adopt management contracts with the government. As a result, they are bound by the contracts to simplify their work processes. Their plans of action must be based on public needs and national agenda. In addition, their performance is closely monitored by the government. Despite costs and problems incurred by the scientific and technological institutions, good governance is an effective means to ensure that the public, the government and the Thai scientific community can maximise the greatest benefits from the firm and constant cooperation between the 3 parties.

The second approach opens the scientific community to the general public. Public committees on several aspects of science and technology, such as biotechnology, have been set up to incorporate industrialists, representatives of NGOs and experts in many disciplines other than science and technology into the decision making process. In this regard, advice is drawn from a wide variety of sources to capture the full diversity of thought and opinion. This kind of transparency also ensures that the public has access to the findings and advice of scientists as early as possible.

The Thai scientific community has been registering progress in cutting-edge research and state-of-the-art technology, such as in plant genome and disease prevention. We are pursuing even bolder objectives, as in nanotechnology, satellite technology and alternative forms of energy. However, we will never lose sight of those previously excluded from the wealth of scientific and technological knowledge, whether within and outside our country. In this respect, we believe that all countries should pay attention to the treatment given to science and technology in the context of international negotiations. Liberalisation of access to knowledge and its benefit is an absolute necessity. We must put all our effort towards the facilitation of science and technology development in less technological advanced corners of the world.

My biggest concern is that the fair distribution of benefits from recent advances in science and technology is being hampered by the current intellectual property regime. It seems that the international trade rules on intellectual property do not take into account the interests of developing countries. Efforts to promote developing countries access to much needed new technologies have always been countered by sanctions from those countries that hold proprietary rights. In the future, some trade agreements will be revised to accommodate the even more restrictive level of protection. Do they really want to close access to knowledge and abandon the tradition of addressing scientific knowledge as public

goods for the service of mankind? Because the current practices still assure competitive advantage for wealthy nations, and because developing countries will unlikely be able to catch up with their level of research support, I call for your action to defend the principle of ethics and good governance in international trade and the transfer of technology. All of us in the scientific community must not allow wealthy countries and their large corporations to subject knowledge and human creativity to their economic interests.

Ladies and gentlemen, this is my vision of the future in which all will be more prosperous, without the need to harm nature or force some people into poverty. We all have our views on the issue of good governance. I have already expressed mine. It is now your turn to contribute to this much needed area of debate.

Sukhit Phaosavasdi: Animals and Ethics

Animals can be friends to humans. They are living creatures that have a sense of belonging and pain. They have the same life cycle as humans. Although they cannot speak a human language, we know when they are sick.

Animals, to a human's eyes, can be ugly, dirty, awful, dangerous or poisonous. They can sometimes make annoying noises. Some are huge while others are so small they cannot be seen by the naked eye.

Animals can be very useful, although some can cause disease. Some are disease carriers such as mosquitoes, birds and fish. They can transmit diseases such as malaria, anthrax and AIDS, etc.

Many animals have a sixth sense which most people do not. They can have very sensitive noses, ears and eyes. They can instantly detect smells and sounds and see objects even in the dark, under water and under ground.

I cannot speak your language
But can merely make my animal noise
To tell my master that
My mind may be dull
But my body is powerful enough
To offer him my help
With innocent and unpretentious eyes
I offer my friendship to mankind

Animal Usefulness

History tells us of human slavery in which humans were treated the way we currently treat animals. At present, human slavery is no longer legal. But that is not true for animals.

Examples of these are:

1.	Pets for pleasure	
2.	Dogs as watchdogs	
3.	Animals for food	
4.	Hunting as a business:	whales and sea lions.
5.	Research:	drugs, medical instruments, cosmetics, etc.
6.	Entertainment:	circus, monkey shows, elephant shows, cock fighting, bull racing, dog racing, buffalo racing, fighting fish, etc.
7.	Transportation:	elephant, horse, ox, ass, sled dog, reindeer, etc.
8.	Symbols:	pigeons for peace, elephants on the flag, football teams lion shield, etc.
9.	Weapons of War	
10.	Clothes	
11.	Furniture	
12.	Communication	
13.	Agriculture	
14.	Education:	Sesame Street
15.	Advertisement	
16.	Biomaterial	
17.	Sports:	fishing, horse riding.

Ethical Considerations

Animals cannot ask us for their rights, justice or religious freedom. If they are cared for by supplying them with their needs, using tenderness and care, they show their respect and faithfulness to their masters. If they are treated badly, tortured, hurt and irritated, they react negatively. But they can never escape this bad treatment on their own. Whatever they do

to try to escape: changing their skin colour, running away or prolific breeding, many animal species will eventually vanish from this world. Only their names will be remembered.

We can live without animals, but God and nature created humans, animals and our environment (air, water, fire and earth) to be together. If men remain selfish and care for nothing, the world will be out of balance. How can men live in this world?

How can we treat animals ethically?

Many suggestions have been recommended.

Because we use animals as a food source, we must treat them well to maintain their usefulness to humans. Avoid inflicting direct and indirect torture or hurt, such as we see in the treatment of street elephants or sport fishing. Be responsible for good animal care as if we and they are equal partners.

All animals are living creatures. They have the same feelings as human beings. They need love, tenderness, a sense of belonging and appreciation. How would you feel if a puppy was treated merely as a boxed gift during holiday seasons?

Vaccinations and clean cages with adequate food and water supply are required. They need to be transported with caution; not crowded and stressed. Their living space must be natural.

Sometimes we kill a wild animal just to harvest a single organ, such as a bear for its feet, a monkey for its brain, or a tiger for its penis. We know that there are laws against this but they have been largely ignored.

Wildlife needs privacy

Laboratory animal research must meet world standard guidelines.

Most people have never owned a wild animal or been involved in an animal business or farms. But directly or indirectly we can be affected as with SARS and Avian Flu. Many aspects of both of these are not clear, especially the medical part.

Bird Flu is believed to be transmitted from birds to human. Wild birds move from cold places in winter to warmer places. They carry viral diseases with them and affect home or farm chickens, ducks, pigs, tigers, pets and many other wild animals. Many infected children and adults have been reported to have died of Bird Flu.

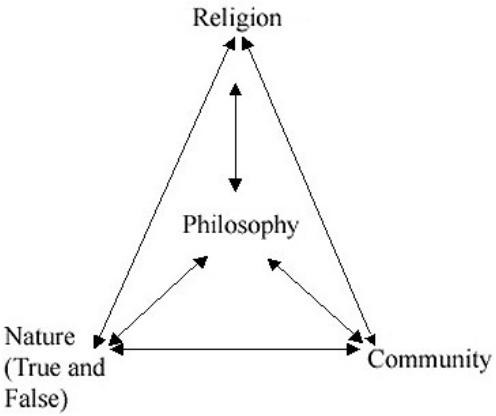
The Thai economy has been badly hit by this virus. Many people cannot earn their living; some have gone bankrupt. It has ruined their lives. Currently, people consider it an enemy to our economy. It has been said in the media that Bird Flu will be the number one disaster of the decade, worse than AIDS or the Tsunami.

The COMEST Perspective

The World Commission on the Ethics of Scientific Knowledge and Technology should try its best to persuade people to think and constantly behave ethically to animals. It is the responsibility of UNESCO: "How to implement ethics for animals at all levels of the educational curriculum."

Today's talk will not accomplish everything we wish but at least it can stimulate children to pay attention to the ethical issues of animals. Present action will bring a better future. The UNESCO fund should be allocated for teachers to attend meetings in order to set up schedule discussions on animals and ethics, and convey the outcomes of these meetings to the students in hopes that some from each corner of the world will develop their own ideas. Let them write reports which will be carefully evaluated step by step. Let them do the reports freely, fairly and in partnership, but not in a top down order.

FACTS (FIGURE I)



Religion's aim is for people to be good, to end the human life cycle (nirvana) or to be with God. Philosophy or ethics aims for people to do good and to attain a good quality of life. Community or democracy aims for people to have an adequate supply of materials, such as a home, a place to live, medicine and many other things to overcome nature for a better life.

Nature will not be changed; day and night, hot and cold. It is composed of water, wind, fire and earth. Very small amounts of data are found, but much remains unseen.

In Figure I, if the situation in a community is bad - full of crime, abortion, cheating, free sex, promiscuity, mafia business, even human flesh and blood eating - it will drag religion and nature down. Finally, humans will have nothing. That would be the end of the human race.

Many groups of people in communes have no religion or do not believe in religion but they think, speak and act ethically. Is it correct to say that both religion and ethics are equal?

References

Faculty of Veterinary Sciences, Chulalongkorn University. Quality Measurement. QM-VET, 19 February 2003.

Third Session of the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST). Rio de Janeiro, Brazil, 1-4 December 2003.

ANIMAL PEOPLE : http://www.animal peoplenews.org

Windiyaningsih C,Wilde H, Meslin FX, Suroso T, Widrso HS. *The Rabies Epidemic on Flores Island*, Indonesia (1988-2003). J Med Assoc Thai 2004; 87: 1389-93.

Hemachudha T. *Rabies and Dog Population Control in Thailand: Success or Faliure?* J Med Assoc Thai 2005; 88: 120-3.

The National Research Committee, Ministry of Sciences, Technology and Environment. *Ethical Guideline for Research*. The National Institute of Research, September 1998: 8-9.

The National Research Committee, Ministry of Sciences, Technology and Environment. *Ethical Guideline for Animal Research*. The National Institute of Research, September 1999:1-13. http://www.nrct.go.th/~animal/intro2.htm 18/10/2547.

Hay T. SEATTLE POST - INTELLIGENCER. In the Global Village, *Kids Everywhere Meet at "Sesame" and Main*. http://seattlepl.nwsource.com/tv/203882-sesame 16.html 18/12/47.

The Administrative Committee for Animal Research, Faculty of Medicine, Chulalongkorn University. *Guideline for Animal Research*, 2000: 1-7.

The Declaration of Ethics of Veterinarians, *Act of animal diseases control, Act of animal hospital and care place, Act of animal food control, Act of rabies control, Act of animal epidemic diseases, Act of wild life control, C.I.T.E.S*, Thai Association of Veterinarians, 15 June 1992.

Jaiman S. *Study and Analysis of Thai law and GATT* 1995.

Angsuthornchaisee C. *Hand book for Royal Officer: Act of Drug 1967. Animal Drug Control Division, Animal Department*. Bangkok: Agricultural co-op publisher of Thailand, 2001.

The National Research Committee, Ministry of Sciences, Technology and Environment. *Report of the Seminar for Ethical Animal Using*. Bangkok: Rama Garden Hotel, 11 May 1999.

Tsunami in Andaman Sea, Indian Ocean, 26 December 2004.

Council for International Organization of Medical Science (CIOMS). *International Guiding Principles for Biomedical Research Involving Animals*. Geneva, Switzerland, 1985.

Song Sang-yong: Human Rights, Science and Ethics

The history of science can be written as the story of expanding scientism. Richard Gregory, the editor of *Nature* in the 1930s, said, "My grandfather preached the gospel of Christ, my father preached the gospel of socialism, I preach the gospel of science." Such a belief in science is not without reason. Science proved to be the most successful pursuit of knowledge. The spectacular civilisation today is the product of modern science which has been successful. Scientism grew out of the development of science.

Scientism began with the Scientific Revolution of the 17th century. As a result, science arose as the centre of European civilisation, replacing the Christian Church. The establishment of Newtonian physics was the peak of the Scientific Revolution. It was a formidable victory. Newton was not challenged for more than a century in the fields where he excelled. In the Age of Reason, Newton was the hero of French philosophers. They admired science, believed in progress and rejected religion. It led to attempts to explain all social phenomena with science. They believed that mankind marched towards better stages as science developed. The simple equation that science equals progress was universally accepted. Abstract reason, mathematisation, a mechanical view of nature and anti-teleology were the characteristics of the Scientific Revolution. As science emphasised the independence of objective reality, the subjectivity of man became downgraded. Man was no longer a subject with purpose, emotion and value, but the object which was observed, measured and manipulated.

The Industrial Revolution of the 18th and 19th centuries was another turning point. In the beginning, the alliance between science and technology was uneven and insufficient. But the close cooperation between science and technology in the later period resulted in the explosive development of industry. The shift from *scientia contemplativa* to *scientia activa et operativa* was finally realised. The Baconian dream of an industrial civilisation was in full bloom. At the time of the Scientific Revolution, the influence of science was confined to the intellectual circle. Now science could exert influence on the general public and change the structure of society through technology. To a great extent, the splendid achievement of science and technology during the Industrial Revolution encouraged scientism. There was wide spread conviction that science would lead history in the direction of enhancing freedom for everybody. Such a tendency was strengthened continuously until the 20th century.

In philosophy, positivism emerged as a reaction to the extreme speculative philosophy of 19th century Germany. There is no doubt that it also fostered scientism. The analytical style of the 20th century philosophy of science was the outcome of an age when the belief in science reached its climax. The scientific mode and its extension were the only means of knowledge recognised in the logical positivism of the 1930s. Epistemology, with its classic problems, was substituted by observation and metaphysics and was then eliminated for its unverifiability. History and ethics disappeared and we had to wait another generation to see them reinstated.

There certainly was some resistance against scientism. In the early 17th century, John Donne, a metaphysical poet, wrote, "Tis all in pieces, all coherence gone." It was resentment toward the disturbances brought on by new science. As time went on, humanists more loudly denounced the science devoid of humanistic elements. It was the Romantic Revolt to cold Mechanical Philosophy.

However, they were minorities and their voices were too weak to curb the tyranny of scientism.

The first half of the 20th century witnessed several serious abuses of science. Eugenics, despite of its good meaning (good in birth), turned out to be a dirty word. The National Origins Quota Law of the United States was an obvious discrimination against non-Anglo-Saxons. Sterilisation laws were passed in the United States and Europe in the 1930s. It was a terrible infringement of human rights. Especially in Nazi Germany, 400,000 socially unsuitable and intellectually handicapped people were forcibly sterilised between 1934 and 1939. The most horrible abuse of science was the human experimentations by the Nazi and Japanese armies during World War II. Ruthless human experiments were carried out in Auschwitz and the 'Factory of Death', Pingfang, China, in the name of science. In Unit 731, Japanese doctors experimented, tortured and killed more than 3,000 Chinese, Russians, Mongols, Manchu, Koreans and Americans for the systematic study of bacteriological warfare.

At the Nuremberg Military Tribunal, 23 German physicians were prosecuted for their involvement in the Nazi human experiments. In the case of Unit 731, however, nobody was punished. The United States pardoned them in return for the valuable information it received. No explanation has been given as to why the United States treated the Japanese and German criminals in different ways. The U.S. government has the burden to provide an answer. For the crimes by Japanese doctors, there were no counterparts of the Nuremberg Trial and the Nuremberg Code. Due to Japanese denials, the relative silence of Chinese and Taiwanese governments and the American cover-up, the Japanese doctors' atrocities have been much less known and explored. The governments of both Koreas have never raised the issue.

Jacob Bronowski begins his book *Science and Human Values* with his vivid feeling when he stood on the ruins of Nagasaki not long after the explosion of atomic bomb. 40,000 were killed by a flash which lasted for seconds. Ironically, the bomb exploded over the main Christian community in Japan. There have been controversies on the inevitability of dropping the bomb twice. Any arguments for it can hardly been defended. The heyday of pure science, which J. R. Ravetz calls 'academic science', ended with the atomic bomb. It shattered the naïve view of science. Scientists began to sincerely think about such words as conscience, responsibility and ethics. Many prominent scientists joined the anti-nuclear movement after the war.

Still, science seemed to be a guarantee for progress in spite of the tragedy of Hiroshima and Nagasaki. However, science's image was suddenly aggravated in the 1960s due to environmental deteriorations such as with Minamata disease and Torey Canyon. Science was the target of the counter-culture movement which swept over industrialised countries. The attack on science came from within as well as from outside the scientific community. The criticism of science was not confined to intellectuals, but was widely voiced among the general public. Anti-science movements were aimed at not only high technology, but also science itself. The challenges to the goals and results of scientific policy led to doubting the inherent norm of science and its epistemological status.

References

Aronowitz, Stanley, *Science as Power*, Houndmills: Macmillan, 1988.

Annas, George J. & Michael A. Grodin, *The Nazi Doctors and the Nuremberg Code*, New York: Oxford University Press, 1992.

Arditti, Rita, Pat Brennan, Steve Cavrak, eds., *Science and Liberation*, Montreal: Black Rose Books, 1980.

Bronowski, J., *Science and Human Values*, New York: Harper, 1956.

Dixon, Bernard, *What Is Science For*, New York: Harper, 1973.

Drenth, Pieter J.D., Jens E. Fenstad, Jan D. Schiereck, eds., *European Science and Scientists Between Freedom and Responsibility*, Luxembourg: Office for Official Publications of the European Communities, 1997.

Fenstad, Jens Erik, "*Science Between Freedom and Responsibility*," European Review, Vol. 11, No. 3, 2003, 407-416.

Hamano, Kenzo, "*Human Rights and Japanese Bioethics*," Bioethics, Vol. 11, No. 3/4 July 1997, 328-335.

Harris, Sheldon H., *Factories of Death. Japanese Biological Warfare, 1932-45, and the American Cover-up*, London: Routledge, 1994.

Holton, Gerald, *Science and Anti-Science*, Cambridge, Mass.: Harvard University Press, 1993.

Jonsen, Albert R., *The Birth of Bioethics*, New York: Oxford University Press, 1998.

Johnson, M. Glen & Janusz Symonides, *The Universal Declaration of Human Rights: A History of Its Creation and Implementation 1948-1998*, Paris: UNESCO, 1998.

Koyré, A., *From the Closed World to the Infinite Universe*, Baltimore: The Johns Hopkins University Press, 1968.

Lipscornbe, Joan & Bill Williams, *Are Science and Technology Neutral?*, London: Butterworths, 1979.

Nakayama, Shigeru, *Science Technology and Society in Post-war Japan*, London: Kegan Paul International, 1991.

Nie, Jing-Bao, "*Japanese Doctors' Experimentation in Wartime China*," The Lancet, Supplement, Vol. 360, December 2002, 5-6.

Nie, Jing-Bao, et al., "*A Call for Further Studies on the Ethical Lessons of Japanese Doctors' Experimentation in Wartime China for Asian and International Bioethics Today*," Eubios Journal of Asian and International Bioethics, Vol. 13 (3), May 2003, 106-107.

Nowotny, Helga & Hilary Rose, eds., *Counter-movements in the Sciences*, Dordrecht: D. Reidel, 1979.

Passmore, John, *Science and Its Critics*, London: Duckworth, 1978.

Qiu, Ren-Zong, ed., *Bioethics: Asian Perspectives, A Quest for Moral Diversity*, Dordrecht; Kluwer, 2004.

Ravetz, Jerome R., *Scientific Knowledge and its Social Problems*, Oxford: Oxford University Press, 1979.

Regan, Tom, *The Case for Animal Rights*, Berkeley: University of California Press, 1983.

Rhodes, Richard, *The Making of the Atomic Bomb*, New York: Simon Schuster, 1986.

Rose, Hilary & Steven Rose, *Science and Society*, Harmondsworth: Penguin,1970.

Sakamoto, Hyakudai, "*Towards a New 'Global Bioethics'*," Bioethics, Vol. 13, No. 3/4, July 1999, 191-197.

Singer, Peter, *Animal Liberation*, London: Pimlico, 1975.

Tao Lai Po-Wah, Julia, ed., *Cross-Cultural Perspectives on the (Im)Possibility of Global Bioethics*, Dordrecht: Kluwer, 2002.

Weeramantry, C.G., ed., *Human Rights and Scientific and Technological Development*, New York: United Nations University Press, 1990.

Weeramantry, C.G., ed., *The Impact of Technology on Human Rights – Global Case Studies*, New York: United Nations University Press, 1993.

David Jan McQuoid-Mason: Human Rights, Science and Ethics

Advocate of the High Court of South Africa, James Scott Wylie Professor of Law University of KwaZulu-Natal, South Africa and President of the Commonwealth Legal Education Association

1. Introduction

The scientific advances of the 18th, 19th, and 20th centuries can be matched by human rights developments during the same period – despite occasional severe setbacks caused by wars.

The 18th century saw the adoption of the American Bill of Rights in 1789-1791[1] and the adoption by the French of the Declaration of Rights in 1789 [2] and the Declaration of the Rights of Man and the Citizen in 1793.[3] During the 19th century, slavery was abolished in Great Britain in 1833, in France in 1848, and undertaken to be abolished by the signatory nations of the General Act and Declaration of Brussels in1890.[4]

In the 20th century – despite the serious setbacks of the two World Wars and numerous regional and civil conflicts - a plethora of international human rights declarations, conventions, covenants and charters were introduced by the League of Nations, the United Nations and other bodies and regional groupings. The Covenant of the League of Nations (1919) provided for the protection of colonial peoples subjected to mandated rule after the end of the First World War.[5] The League also introduced the Slavery Convention of 1926 to extend the work of the Brussels Act,[6] while the International Labour Organisation outlawed forced labour.[7]

The United Nations, the successor to the League of Nations, introduced a large number of human rights declarations and covenants during the 20th century, the most important of which are the Universal Declaration of Human Rights (1948),[8] the International Covenant on Civil and Political Rights (1966),[9] the International Covenant on Economic, Social and Cultural Rights (1966),[10] the Convention on the Elimination of All Forms of Discrimination against Women (1979),[11] and the United Nations Convention on the Rights of the Child (1989). [12] Some of these documents have been strengthened by optional protocols. There are also regional human rights

[1] American Bill of Rights (1789-1791).
[2] Declaration of Rights (1789).
[3] Declaration of the Rights of Man and the Citizen (1793).
[4] General Act and Declaration of Brussels (1890).
[5] Covenant of the League of Nations (1919) Article 22.
[6] Slavery Convention (1926) Preamble.
[7] Convention Concerning Forced Labour (1930) Article 1.
[8] Universal Declaration of Human Rights (1948).
[9] International Covenant on Civil and Political Rights (1966).
[10] International Covenant on Economic, Social and Cultural Rights (1966).
[11] Convention on the Elimination of All Forms of Discrimination against Women (1979).
[12] United Nations Convention on the Rights of the Child (1989).

instruments such as the European Convention for the Protection of Human Rights and Fundamental Freedoms (1950);[13] the American Convention on Human Rights (1969);[14] the African Charter on Human and Peoples' Rights (1981);[15] the Arab Charter on Human Rights (1994);[16] and the Commonwealth of Independent States Convention on Human Rights and Fundamental Freedoms (1995);[17] some of which have enacted additional conventions, charters and protocols.

This paper deals with human rights, science and ethics, and the link between ethical principles and science and how such ethical principles relate to human rights in the context of science. The 'Georgetown' classification of the principles of biomedical ethics[18] has been selected as a useful tool to apply to human rights and science.

2. *Ethical principles, human rights and science*

The Georgetown classification of ethical principles suggests four categories: (a) autonomy, (b) beneficence, (c) non-maleficence, and (d) justice. Each of these will be considered in the context of the Universal Declaration of Human Rights (UDHR) and science.

2.1 Autonomy

The principle of autonomy recognises the rights of individuals and societies to make decisions about themselves.[19] It is reflected, for example, in the UDHR in the articles dealing with life, liberty and security; [20]privacy; [21]and freedom of thought, conscience and religion.[22] When applied to science, autonomy refers to the duty of scientists to respect the rights of individuals and communities to make decisions about themselves.

The application of the principle of autonomy to science means that there is a duty on scientists to respect the freedom of individuals and societies to make decisions about themselves – whether as subjects or beneficiaries of scientific research. For instance, where research is conducted on human subjects, a proper informed consent must be obtained from them[23] and they should not be exposed to perverse incentives to encourage them to participate (e.g. paid remuneration rather than compensation).[24] Furthermore, subjects who participate in human genome[25] or other research have the right to have their privacy respected – unless they consent to disclosure. Likewise, people who buy fruit, vegetables or grains have the right to know which crops have been subjected

[13] Convention for the Protection of Human Rights and Fundamental Freedoms (1950).
[14] American Convention on Human Rights (1969).
[15] African Charter on Human and Peoples' Rights (1981).
[16] Arab Charter on Human Rights (1994).
[17] Commonwealth of Independent States Convention on Human Rights and Fundamental Freedoms (1995).
[18] Tom L Beauchamp & James F Childress *Principles of Biomedical Ethics*, New York: Oxford University Press, 3 ed. 1989.

[19] See generally Beauchamp & Childress 67-113.
[20] Article 3.
[21] Article 12.
[22] Article 18.
[23] See generally Judith Areen, Patricia A King, Steven Goldberg, Lawrence Gostin & Alexander Morgan Capron *Law, Science and Medicine*, New York: Foundation Press, 2 ed 1996 1041.

[24] For international ethical principles governing research see the World Medical Association Declaration of Helsinki (1964), as amended.
[25] Generally on the ethical problems concerning the human genome project see Kennedy I & Grubb A, *Medical Law: Text with Materials*, London: Butterworths, 2 ed. 1994, 4-8; Areen et al 1-31.

to genetic modification, particularly where animal genes have been used, as this may have significant religious or cultural implications.

2.2 Beneficence

The principle of beneficence recognizes the duty to do good for individuals and society.[26] For example, it is reflected in the UDHR in the references to the rights to an effective remedy[27] and an adequate standard of living.[28] When applied to science, it refers to the duty of scientists to do good for individuals and society.

The application of the principle of beneficence to science means that scientific studies and their practical implementation should be done for the good of human kind. For example, when the products of science harm individuals or societies, (e.g. as happened during the Thalidamide drug disaster in England, or the Union Carbide catastrophe in Bhopal, India), adequate compensation should be paid to the injured individuals and their families. Governments must put mechanisms to ensure that the victims of such scientific tragedies are given effective remedies.

Good examples of beneficence by science are the improvements in sanitation, water purification and disease prevention that have drastically reduced mortality rates over the centuries in the developed world. Such measures need to be increased in the developing world to ensure that its citizens attain a similar adequate standard of living.

An emerging but controversial area of scientific research that may have major future benefits for humanity is stem cell research.[29]

2.3 Non-maleficence

The principle of non-maleficence recognizes the duty not to harm individuals or societies.[30] For example, the principle can be found in the provisions of the UDHR that deal with the rights to freedom from discrimination[31] and freedom from torture and cruel, inhumane or degrading treatment. [32]

The application of the principle of non-maleficence to science means that scientists should not harm individuals or societies. For example, scientists must not conduct discriminatory biological experiments aimed at harming particular race or ethnic groups, as occurred in Nazi Germany[33] or apartheid South Africa.[34] Likewise, subjects of scientific research should not be exposed to torture and cruel, inhumane or degrading treatment as occurred in both these countries. The products of science should also not lead to inhumane treatment, for instance the development of chemical weapons (e.g. the use of mustard gas during the First World War), and weapons of mass destruction (e.g. the atomic bombs dropped on Japan during the Second World

[26] See generally Beauchamp & Childress 194-249.
[27] Article 8.
[28] Article 25.

[29] Cf Charles Marwick '*Funding stem cell research*' 281 *JAMA* 692 (1999).
[30] See generally Beauchamp & Childress 120-184.
[31] Article 2.
[32] Article 5.
[33] See *Trials of War Criminals Before the Nuremberg Military Tribunals Under Control Council Law No. 10*, 1949; cf Areen et al 993-100; Kennedy & Grubb 1011-1024.
[34] See generally Jerome Amir Singh, *The Biological Manipulation of the Human Species in Southern Africa by Means of Chemical and Biological Weaponry – Medico-Legal Implications*, Durban: Unpublished Ph D Thesis, University of Natal, 2002.

War).[35] The same applies to the experiments conducted by the Japanese Imperial Army regarding frostbite, pressure chambers, vivisection and biological warfare in Manchuria during World War Two.[36]

2.4 Justice

The principle of justice recognises that individuals and societies should be treated equally and fairly.[37] This is reflected, for example, in the provisions of the UDHR that deal with equality in dignity and rights,[38] and the fact that everyone is entitled to all the rights and freedoms in the UDHR without distinction[39] and that everyone is equal before the law and should not be discriminated against.[40]

The application of the principle of justice means that scientists should treat individuals equally and fairly. There should be no place in science for pseudo-scientific practices, such as eugenics, that sought to classify people according to race for political purposes to maintain racial purity and superiority in the United States, Nazi Germany and South Africa. Scientists should not be involved in programmes that distinguish people in order to prevent them from entitlement to all the rights and freedoms in the UDHR. This was done during the segregationist years in the United States, the Nazi era in Germany, and the apartheid period in South Africa, when scientists were involved in developing race classification criteria to support legally sanctioned racial discrimination.

---

[35] See Areen et al 114.
[36] See generally, Sheldon H Harris, *Factories of Death: Japanese Biological Warfare 1932-45, and the American Cover–up*, London: Routledge 1994.
[37] See Beauchamp & Childress 256-302.
[38] Article 1.
[39] Article 2
[40] Article 7

3. Conclusion

Scientists should use the ethical principles of autonomy, beneficence, non-maleficence and justice as their guidelines when conducting research or allowing the fruit of their research to impact individuals and societies.

If the ethical principles of autonomy, beneficence, non-maleficence and justice are followed by all scientists, their conduct will be consistent with international human rights norms and standards.

If these ethical principles are followed by scientists living in democratic countries, their conduct will also be consistent with their countries' constitutional imperatives and legal requirements.

Saratoon Santivasa: Protection of the Right to Health in International Law and the Development of Biotechnology

Introduction

The links between health, human rights and ethics are now evolving rapidly in response to unprecedented events, experiences and struggles. These include the general issues of public health, the uncontrollable spread of the HIV/AIDS epidemic, SARS and the bird flu. Health problems exist in all countries. The alarmingly poor health conditions of millions of people in developing countries are a main obstacle to development. Developed countries also face health care problems of their own. Yet, what developing and developed countries have in common is the growing interconnection between problems and ethical issues pertaining to human rights. Human rights also include the right to health and other related rights.

The extraordinary development of biotechnology has unprecedented impacts on individual lives and society and raises a host issues, whether they be human reproduction, beginning and ending of life, biomedical research involving human subjects, human organ and tissue transplantation, the use of embryonic stem cells in therapeutic research, etc. Such evolution transforms the relations between medical science and human rights[1] to the extent that scientific progress influences legal norms. Conversely, laws must be adopted to govern the right conduct of biotechnology activities. To enact such legal norms, fundamental human rights principles and bioethics must be taken into consideration.

Human rights create obligations, usually on governments, to protect human dignity and integrity from abuse and injustice by regulating relationships between the state and individuals or groups. On the other hand, bioethics addresses two fundamental questions: what individuals and communities should do, permit, tolerate or prohibit in biology, particularly when new developments affect the future of human beings; and how decisions should be made to determine mandatory, permissible, tolerable, or prohibited conduct[2].

Ethics and human rights are derived from a set of quite similar, if not identical, core values. It is, therefore, appropriate to consider human rights and ethics as a continuum[3]. Transforming bioethics into legal principles enhances human rights protection.

Right to health as human rights

Human rights, as part of international law, are rights to which every human being should be entitled, irrespective of race, religious or political beliefs, legal status, economic status, language, colour, origin, gender and ethnicity. The international community has developed a large number of human rights instruments which set out various principles and norms[4].

---

[1] B. Mathieu, *Génome humain et droits fondamentaux*, Ecomomica, Paris, 1999.

[2] R. Cook, B. Dickens and M.Fathalla, *Reproductive Health and Human Rights. Integrating Medicine, Ethics, and Law*, New York, Oxford University, 2003, p.65.

[3] Ibid. p.91.

[4] When adopted as declarations, recommendations, principles, or guidelines, they have no binding legal effect but can be customary international law. But when adopted as international treaties-however

These instruments further contribute to promoting human dignity and integrity on the basis of equality and non-discrimination.

Contained in numerous core international instruments[5], the right to health is a fundamental human right which is based on a broad definition that encompasses medical and public health perspectives[6]. The Covenant on Economic, Social and Cultural Rights of 1966 was the first human rights treaty to require the state to recognize and progressively realize the right to health. Moreover, the broad definition of health implied by the right to health in article 12 of the Covenant[7] covers both the curative and preventive aspects of health. This dual aspect corresponds to the distinctive perspectives of clinical medicine and public health, both of which have influenced how the right to health has been developed. Whereas clinical medicine has traditionally focused on the health status of individuals, public health has focused on the population and guaranteeing conditions under which people can be and remain healthy[8].

Modern biotechnology and right to health

The development of modern biotechnology has unprecedented impacts on individuals' lives. The scientific advances in the fields of biology, medicine and biochemistry have undoubtedly brought many benefits to humanity through improved health and medical care and have helped extend life expectancy. At the same time, it has increasingly been recognized that these scientific advances raise ethical questions. As a result, potential uses of modern knowledge about human biology could benefit or threaten various rights embodied in international legal instruments, including the International Covenant on Civil and Political Rights, namely the right to life (art.6), the right not to be subjected to medical or scientific experimentation (art.7), the right to security of the person (art.9), and the right not to be subjected to arbitrary or unlawful interference with privacy, family, home or correspondences (art.17).

Existing international human rights treaties provide guarantees of human dignity and fundamental human rights and freedom. Our society needs more specific rules to regulate scientific and technological innovations, based on the process of reflection on ethical issues raised in our relationships with other living organisms. The consideration of ethical issues

called: treaties, conventions, covenants, or protocols, they generate legal binding effect to the states party.

[5] Constitution of WHO, Covenant on Economic, Social and Cultural Rights 1966, Convention on Elimination of All Forms of Discrimination Against Women 1965,Convention Against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment 1984, Convention on the Rights of the Child 1989, International Convention on Protection of the Rights of All Migrants Workers and their Families1990.

[6] See. General Comment 14, Rights to health, Committee on Economic Social and Cultural Rights, paragraphs 9 and 11.

[7] Article 12 states that: 1) The States parties to present Covenant recognize the rights of everyone to the enjoyment of the highest attainable standard of physical and mental health. 2) The steps to be taken by State parties….to achieve the full realization of this rights shall include those necessary for: a) The provision for the reduction of the still birth rate and infant mortality and for the healthy development of the child; b) The improvement of all aspects of environmental and industrial hygiene; c) The prevention, treatment and control of epidemic, endemic, occupational and other diseases; and d) The creation of conditions which would assure to all medical services and medical attention in the event of sickness

[8] J. Asher, *The Right to Health: A resource Manual for NGOs*, Commonwealth Medical Trust, 2004,p.18; J.Mann, '*Medicine and Public Health, Ethics and Human Rights*' Hastings Center Report, 00930334, May/July1997, vol.27, Issue3

in these spheres includes health, environment and the use of technologies that affect life. On the one hand, therefore, bioethics aims to ensure that progress resulting from this benefits humanity as a whole without breaching the rights; on the other hand, to identify rationally and responsibly the social and cultural implications of science and technology which concern, among other things, health.

Bioethics serves as guardian of the right to health: Draft Declaration on Universal Norms on Bioethics

The search for common responses to bioethical issues is a laborious challenge, but possible because international human rights law presupposes that fundamental rights transcend cultural diversity. Bioethical principles should be elaborated in light of the fundamental rights presented in the Universal Declaration of Human Rights of 1948. A large number of non-legal biding texts, such as the Nuremberg Code of 1947, the Declaration of Helsinki of 1964, The International Guidelines for the Bioethical Research Involving Human Subjects of 1992, have established rules for the protection of persons involved in biomedical research. At the regional level, the existing conventional instrument is the Council of Europe's Convention on Human Rights and Biomedicine of 1996.

UNESCO's draft declaration on bioethics adopts the bioethical principles in the form of general principles or human rights. From the point of view of the rights to health, states, medical practitioners and other health professionals are expected to observe the following bioethical principles[9] in promoting and protecting the right to health.

-Human Dignity and Human Rights Considered the most important principle in international bioethics, this concept aims at guaranteeing human dignity, which seeks to avoid abuse of the human being. Indeed, the interest and welfare of human beings should prevail over the interests of science or society. However, this principle cannot be simply invoked to solve bioethical dilemmas in particular cases without taking into account other rights, such as informed consent, body integrity, non-discrimination, privacy, confidentiality, solidarity, justice and equity [10]

-Equality, Justice and Equity *Equality* implies that all persons must be treated equally in a similar circumstance, whereas *Equity* seeks to correct unfairness. *Justice* plays an important role in bioethical issues, for instance, the decision the public health sector makes in allocating budget to health care service.

-Benefit and Harm This principle is based on the concept of proportionality. Any medical/scientific practice or decision must seek to benefit the person concerned and to minimize the potential harm that may result from that practice or decision.

-Respect for Cultural Diversity and Pluralism Cultural Diversity refers to the various ways in which the cultures of different social groups find expression. The ethical standard must be interpreted and adapted in conformity with the culture or religion of each

[9] Articles 4-15 of Preliminary Draft Declaration on Universal Norms on Bioethics, see. UNESCO, International Bioethics Committee, SHS/EST/CIB-EXTR/05/CONF.202/2, 9 February 2005;. . UNESCO, Explanatory Memorandum on the Elaboration of the Preliminary Draft Declaration on Universal Norms on Bioethics, SHS/CIB-CIGB/05/CONF.202/4,21Febuary 2005, pp. 5-15.

[10] Roberto Andorno, *Biomedicine and International Human Rights Law: Search of a Global Consensus*, Bulletin of World Health Organization, 2002,80(12), p.960.

society but should not be contrary to human rights and fundamental freedoms.

-Non-Discrimination and Non-Stigmatization Unlawful, unfair or unjustifiable discrimination and stigmatization based only on grounds such as gender, age, ethnicity, colour, religion, sexual orientation or status should be prohibited in health care, biomedical research and public health policy formulation.

-Autonomy and Individual Responsibility Autonomy and individual responsibility reflect the rights to make individual decisions while respecting the autonomy of others.

-Informed Consent This principle is based on the right of an individual to self-determination. Unless emergency or incapacity render impracticable, an intervention in the health field can only be carried out after the person concerned has given free consent, having understood the nature of the intervention and its potential risks.

-Privacy and Confidentiality Individuals are entitled to the right to privacy. Respect for a person's health information provides a claim for non-interference. However, the wishes to not be informed should also be respected. Any information associated with an identifiable person and stored or processed for the purposes of research or other purposes must be held confidential and will not be disclosed to third persons under the conditions set by law.

-Solidarity and Cooperation Bioethics not only guarantees individual rights but also recognizes the importance of solidarity. The idea of social protection and fair opportunity constitutes the core principle governing policy making. In planning health care, special attention must be paid to social considerations such as the inequality between the rich and poor and the inaccessibility of some vulnerable groups to quality health care.

-Social Responsibility Health protection by bioethics requires not only individual rights but also social responsibility to ensure that progress in science and technology contributes to justice, equity and the interest of humanity.

-Sharing of benefit Benefits resulting from scientific research are worthwhile only when they can be shared with society as a whole and among countries, particularly developing countries. Benefits may be in the form of: 1) assistance to the persons taking part in the research, 2) access to quality health care, 3) provision of new diagnostics and facilities for new treatments, or medical products stemming from the research, 4) support for health services, 5) access to scientific and technological knowledge, 6) capacity-building facilities for research purposes, or 7) any other form consistent with the fundamental principles. Such sharing will, in practice, take place within the framework of international law and internal law relating to human rights, public safety, prevention of crime, etc.

-Responsibility towards the Biosphere Human beings are an integral part of the biosphere and have responsibilities towards others forms of life. Any decision or practice should be made considering the safeguard of interests of biodiversity and the biosphere that extend beyond the present generation.

Obligation to respect, protect and fulfil the right to health in light of bioethics

While the international protection of human rights is crucial, national implementation makes them effective in a local setting. In general, international declarations cannot legally bind the state (soft law). However, in the case of the (draft) Bioethics Declaration, two hypotheses could be proposed. On one hand, the principles on bioethics have already been established in various international documents and have been implemented in many countries. This could be considered as evidence of general practice and to some extent, accepted as international customary. On the other hand,

the declaration has its role in the series of international instruments for human rights protection, such as the Universal Declaration of Human rights of 1948, whose legal force, originally non-biding, is now recognized as international customary law.

Bioethics principles are undeniably in the same line as human rights protection and provide the elements to protect human dignity, fundamental rights and freedom. States have an obligation to respect, protect and fulfil the right to health, each of which is subject to obligations of conduct and result.

-Respecting the right to health means that states refrain from undertaking actions that would restrain an individual's ability to enjoy the right to health by means of introducing policies, laws, programmes or actions which are contrary to bioethics principles

-Protecting the right to health applies to states which have the obligation to make efforts to minimize risks and to take all necessary measures to safeguard the population from violations of the rights to health by a third party. States are not responsible for the acts or omissions of the private sector, but responsible for taking measures to ensure non-violation of the rights of individuals and communities.

Final remarks

The problem of human rights protection relating to biotechnology activities calls for setting a universal standard. Recently, international organizations such as the Council of Europe, the United Nations, UNESCO and a large number of NGOs have actively contributed their efforts to the elaboration of international principles on bioethics. This relatively new legal discipline is consistent with human rights. The protection of human rights and the right to health in particular, by means of the international instrumentalization of bioethics, seems to be an appropriate approach. To reach a universal consensus in this area is a challenging task because it is impossible and unfair to impose detailed legal rules relating to controversial biotechnology issues on culturally diverse societies.

The draft of the Declaration on Bioethics that we now have, which is concise in its formulation, pluralist in its approach and general in its principle, can become a new common standard in the field of human rights protection.

Prapon Wilairat: Ethics in Science and Technology - A Practicing Scientist's Viewpoint

Science is man's attempt to understand himself and the environment based on experimental observations. Thus, the pursuit of science per se is, on the surface, devoid of any ethical concerns or considerations.

Technology is the application of scientific knowledge to the service of mankind. Here, ethical concerns and considerations do come into play. Technology can be used in both beneficial and harmful applications. The employment of knowledge in atomic physics, chemistry and biology can be applied to produce atomic power plants and atomic bombs, curative drugs and toxic compounds, protective vaccines and bio-weapons.

As a scientist and teacher, what advice can I offer to today's youth who wish to embark on a career in science and technology? What ethical standards should we adhere to and to whom should we look for guidance and advice?

Surprisingly, in the basic sciences there is no formal code of ethical behaviour, as is found in applied sciences such as medicine and engineering, where some forms of unethical practices are spelled out and transgressors are subject to punishment meted out by society.

One of a scientist's normal routine activities is to publish the results of experiments conducted in a specialized journal for scrutiny by his peers. This is probably the first contact that the scientist has with ethical issues. It is expected that the experiments have been conducted honestly, that the data reported has been analyzed using the full rigor of existing mathematical tools, that it was done without bias and that the results of others were taken into due deliberation. Who is responsible for these actions being carried out? At the laboratory level, it is the onus of all the authors of the research publication (in particular the mentor of the youth/student involved) to be responsible for the truthfulness and veracity of the research work. At the journal level, it is up to the reviewers of the research paper and the editor of the journal to ensure that the results in the published article have been properly and honestly carried out.

What types of transgressions can occur? They can include selective omission of data, plagiarism and outright falsification of experiments. Detection of these unethical conducts is difficult, time consuming and harmful to the careers of all concerned (both guilty and innocent). It is best if the youth entering the fields of science and technology are inculcated with the proper values and behaviour of ethical scientific endeavours, through both formal instruction and guidance by appropriate role models. Nevertheless, the scientific community also needs to establish an institutionalized and transparent system to investigate allegations of scientific misconduct, to punish those found guilty and, more importantly, to ensure that the careers of innocent by-standers are not tarnished nor irreparably damaged in the process.

For scientists in the life sciences, experiments involving animals or human beings are governed by ethical guidelines. Experimentation on animals is governed by the concern that it should not cause unnecessary pain or suffering. Termination of life should be avoided whenever possible. There is a strong movement to have many tests on animals replaced by chemical or *in vitro* surrogates. In Thailand, the National Research Council of Thailand has produced guidelines for ethical practices in animal experimentation. There is as

yet no legal or mandatory certification of researchers doing animal experiments.

Experiments (in universities) involving human subjects must be approved by an ethics committee on human experimentation. In addition to determining that the procedures are safe and necessary, it requires each subject to sign an informed consent form that ensures that the subject involved understands the procedures and risks of the experimental procedures. It also ensures that the anonymity of the subject's identity and personal data be protected from public exposure except to those directly associated with the experiments. In Thailand, there is no standard informed consent form, but the ethical conduct of physicians is supervised by the Thailand Medical Council.

Recent advances in molecular biology, especially the acquisition of knowledge concerning the genetic basis of life (ranging from viruses and unicellular bacteria, to multicellular organisms such yeast, protozoa, plants and animals, including man) have raised a new set of ethical issues under the umbrella of "bioethics". UNESCO is in the process of issuing a Declaration on Universal Norms on Bioethics, in which the term "bioethics" refers to theoretical and practical moral issues raised in medicine and the life sciences that apply to man and his relationship to the environment.

If one wades through the bureaucratic jargon of the document, it becomes evident that the drafting committee for UNESCO agrees on the need for the creation of an ethics and bioethics committee to assess the ethical (and legal and social) issues of scientific research and the development of technologies arising from such research. In addition to recognizing the need for the informed consent of peoples enrolled in the scientific and medical experiments and the protection of their privacy, the Declaration also includes provisions for sharing the benefits of research and technology development with persons that have participated in the research. The Declaration further states that risk assessment be a normal aspect of good bioethical conduct in cases where there is doubt regarding the impact of new technologies on human health and the environment. A relevant example is the debate on the ethical use of genetically modified organisms (GMOs) (which is part of the program of this 4th COMEST meeting).

Another issue that requires public debate concerns therapeutic cloning in man. Therapeutic cloning is the process by which cells of a desired type are generated by *in vitro* differentiation of embryonic stem (ES) cells. These ES cells are obtained from the inner cell mass of blastocysts grown in culture, which are produced by the multiple divisions of a human egg that has been "fertilized" by insertion of a nucleus from another (somatic) donor cell following the removal of the egg's own nucleus. These differentiated cells, if introduced into the body of the donor, can replace defective cells of the same type without any rejection. This technology has the potential of curing such diseases as heart failure, diabetes, Parkinson's, kidney failure - in fact any disease that is caused by the premature failure of cells to function properly. In the process of harvesting ES cells, the blastocyst is destroyed: The ethical issue is whether the blastocyst is a human being, and thus has a right to life, or whether it is just a collection of cells and as such is considered an organ. In some societies, a human being exists from the moment of conception (which includes fertilization by nuclear transfer), whilst others accept that there is a period, ranging from weeks to days, before a collection of cells is considered a human being.

If the blastocyst produced as described above is allowed to develop *in utero*, then we have generated a human clone and the process is known as reproductive cloning, which is considered by almost everyone as being unethical (and in some countries, unlawful).

The ability to rapidly amplify desired sequences of a cell genetic material (DNA) and to

characterize its property has led to the technology of DNA profiling or fingerprinting. This allows a person to be codified based on the unique DNA profile of that individual, which is not the same as anyone else (except for identical twins). DNA profiling has become an important and necessary tool in forensics. There is a desire in some countries to maintain a complete catalogue of DNA profiles of all their citizens, so that criminals can be readily tracked down or accident victims quickly identified. However, DNA is the blueprint of our very being, with records of our genetic heritage, both good and bad. Ethical, legal and social issues need to be explored and debated in an open and transparent fashion before such a decision becomes implemented.

Each scientific breakthrough and technological development is a Janus coin, on one side presenting the promise of improving man's lot on earth and on the other promising a bitter harvest. Only by examining and upholding acceptable ethical (and bioethical) practices will man be able to distinguish between the two faces of the coin.

S.R.P. Silva: The Importance of Sharing Information for the Future of Science and Technology

Introduction

Perhaps the greatest single evolutionary advantage that humans possess is the ability to communicate acquired information not only with those in close proximity but over great distances and even across time through the writings of our ancestors. This is particularly true in the fields of science and technology where it is through the study and appreciation of the work of others that progress is made. "If I have seen further it is by standing on the shoulders of giants." [Sir Isaac Newton in a letter to Robert Hooke, February 5, 1675].

This tradition of sharing and exchanging ideas was instrumental in the development of Quantum Theory during the early part of the twentieth century, which underpins much of contemporary physical science and electronic engineering. This example also demonstrates the importance of multi-national communication, enabling scientists to discuss ideas across political borders. This scholarly tradition of openness continues even today with forums such as this. Here, the fruit of one's research is openly disseminated, debated and dissected in public. This allows others in all stages of their careers, independent of their ideology, to start from a level playing field; rather than play catch-up to the countries that have in the past expended more energy to understand and push ahead in sciences and technologies that are significant and crucial for the well being of humans in the present and future. Yet, this traditional means of communication may be under threat due to the influence of industry and commercial pressures now forced upon universities around the world. Intellectual property (IP) protection is now paramount in most research establishments.

The dissemination of scholarly research has ensured that readers become aware of current research and methodology in their fields, preventing duplication of experiments and raising awareness of new techniques. Traditionally, this distribution of research results has been through peer reviewed printed journals, primarily found in university libraries, research institutes and conferences; the wealthier establishments holding the most comprehensive collections of journals and proceedings.

The Information Technology Revolution

Arguably one the most significant achievements of the last 15 years has been the development of the World Wide Web (WWW), a tool in part created by Tim Berners-Lee at CERN for the purpose of sharing information between fellow scientists. As was envisaged by its creators, the web has become so much more than this, which in itself creates a multitude of ethical issues beyond the scope of this paper.

For science and technology, the WWW offers an excellent medium for sharing and discussing research results, just as private correspondence and printed learned journals did in the past. This not only offers a great opportunity for scientists to keep informed on the latest developments around the world, in an environment where the experiments appear to be happening just next door and are but a few mouse clicks away from one's own research work, but also allows for one to collaborate globally, with no regional or national boundaries coming into play. Most significantly, it also allows members of the general public to satisfy their own need to make an informed judgement as to their tax money being spent wisely by the research councils and government laboratories. Never in

the history of the human species has science and technology had such a huge impact on our daily lives. Through science, mankind has developed the opportunity to revolutionise our lives with, for example, 'nuclear power' or 'genetic engineering'. But at the same time, this knowledge used immorally can destroy us and the faith and respect the general public has in scientists.

The WWW enables articles to be published rapidly, and in principle, be available to an audience anywhere in the world that has access to a computer with a modem and phone line. This offers the opportunity for a more level playing field for researchers in less well off nations or universities. Unfortunately, the full potential of the WWW has not been realised. This is particularly true in the context of publishing research results. Obtaining a true overview in a subject area will remain more difficult while the majority of research is hidden behind subscription. But, the scope for scientists and technologists to gift humanity with truly significant knowledge is now easier than ever before in the history of mankind. The example of 'satellite communication' comes easy to ones consciousness, especially after meeting personally with the great visionary Sir Arthur C. Clarke last year in Sri Lanka. His superb description of the use of geostationary orbits for satellites to be used bounce off packets of information streams beamed to space and then to anywhere in the world, was used in science fiction novels to prevent a single global entity protecting the IPR of satellite communication. This legacy is now seen in everyday life, where all mankind has the ability to buy a relatively inexpensive hand held portable mobile phone and communicate anywhere around the world with almost no delay in the transfer of ideas. The benefits this has afforded commercial enterprises is incalculable. At present, the global market has made it possible that when the western-world is asleep, all the processing of accounts and billing can be tackled in the south east countries, to make the world a truly smaller place to live in.

The potential to access information will continue to increase with developments in information technology. This is not only true from the software perspective, but also with developments in hardware. The phenomenal rate of miniaturisation undertaken in the microelectronics sector since the 1960's has delivered computing power to handheld devices of unimaginable magnitude to the pioneers of the field. However, current technology is reaching its limits, with the familiar Moore's law estimated to reach saturation by around 2010.

As always with science and technology, there is a potential successor in the wings ready to carry the baton of progress. The field of Nanotechnology holds the key to more powerful and efficient devices. The driving force for miniaturisation is to make devices faster by virtue of electrons having to travel smaller distances in integrated circuits. By making devices smaller you use less real-estate and so more devices can be fit into the integrated circuit (IC) with more functionality and more devices. This dimension of scale can then be utilised to improve and add parallelism to enhance processing power. Nanotechnology could well hold the key to realising quantum computing. Combined with ever increasing storage capabilities, the immense processing power of quantum computing will enable people to access enormous databases of information. This is by no means the end of the story. Now, multi-disciplinary teams of researchers are looking to making the mobile communication experience a real one, with 'immersive presence' and 'augmented reality' being the key words in describing this research. In order for future mobile applications to be able to transmit not just voice, but also real time pictures, data catalogues and 3D presence to a flexible display would require ultra-wide band communication channels that will take up more and more space in the electro-magnetic spectrum. The only limit to the access of information will be from those responsible for distributing it and, ultimately, buying power (wealth).

Open Access Journals?

Researches as authors provide material free of charge, signing away their copyright to publishers. The publishers then add value through the quality of peer review, editorial assistance, design and marketing of the journal. This is then sold back to the researchers mainly through the mediation of libraries or research department budgets. This means that although researchers are the main consumers of journals, they are less exposed to subscription prices. Also by signing away their copyright, researches are restricted in how they use and share their own material. Either they are compelled to do so by the conditions of publication, or they are unaware of the implications of signing away their copyright. This limits their freedom to reuse their own material in teaching or distributing it via an open website.

The journal publishing market is complex. Different players in the market respond to different variables. Academics respond to impact factors and quality measures, as these affect career progression and future research funding. Libraries spend budgets in order obtain a portfolio of journals which best meet the needs of the academic community they serve. Commercial publishers attempt to maximise profits through manipulating the price and availability of journals. Not for profit publishers attempt to acquire a satisfactory return, which enables them to fulfil other objectives, whilst at the same time maximising the availability of their output. The problem is that the variables which influence behaviour in the commercial market do not have a strong relationship with the concerns of the academic market or the wider community in the context of the persistence of science as a public good.

The current subscription system for access to research increases the risk that some important research might be overlooked if not easily accessible via the web. As science becomes more multi-disciplinary in fields such as nano and biotechnology, and as researchers increasingly rely on internet searches for their reference material, there will be a growing requirement to interconnect scientific literature through internet search engines in a more sophisticated manner. In order to access many online journals, specifically high impact journals, costly subscriptions must be paid. This effectively restricts access of that commodity to large institutions that are wealthy enough to maintain a comprehensive catalogue. An open access journal works on the same principle of rigorous peer review, but the author(s) and copyright holder(s) grant to all users free, irrevocable, worldwide, perpetual right of access to the information.

Problems still arise over peer review and the confidence of the academic community that they are reading work of acknowledged quality, as exemplified by the Schön case. However, peer review journals are essential for the integrity of scientific endeavour. The journal format still offers the best method to ensure that reported results are credible. There is the possibility that a greater degree of unrestricted accessibility to scientific literature will result in an increased opportunity to detect, and therefore challenge, plagiarism and fraud. This task should be made easier with the increasing power of internet tools able to search and compare different documents.

There are groups such as the Public Library of Science, an American association of scientists trying to establish international online public libraries of science that will archive and distribute the complete contents of published scientific articles and develop new ways to search and link information. A further topical example has been the data from the human genome project that was made immediately available on the WWW and could be used by everyone, free of charge. It is the absence of constraints that enables ease of access to vast numbers of researchers in more than 70 countries, 28 of which are in the developing world. A further ethical consideration is that the written information being created in the world is doubling every four years, with knowledge estimated to double every five years.

To put this in context, over the last thirty years more information has been created than the preceding five thousand years! What this means is, for us to create a knowledgeable new generation of youth to take mankind forward, free access to information in printed or virtual format is paramount. For this to happen, all governments around the world must come together on a single policy that allows the freedom to access scientific information with the least amount of resistance.

Concluding Remarks

Given the profound influence science and technology has on the future success or failure of our civilization, it would be wholly unethical to stifle progress by not allowing the widest access to cutting edge research. Pursuing short-term profit from the publishing of research data is unjustifiable. There will be plenty of opportunity for business to benefit from the output of science and technology further down the line. The free flow of knowledge should not be stemmed by short-sighted greed, especially with the opportunities offered by information technology.

This short paper does not offer solutions to the problem. It is just intended to highlight the ethical implications that have arisen from the ease of access to research findings, facilitated by the information revolution that has taken place in the last thirty years. In the coming years, this unabated creation of 'new' information and knowledge will only widen the gap between those who have free and ready access to information and those who do not. This issue is still under debate, with different camps proffering various solutions.

Bibliography

"*Thirty Years that Shook Physics*" George Gamow

"*The World Wide Web: A Very Short Personal History*", by Tim Berners-Lee http://www.ibarakiken.gr.jp/www/world/shorthistory-e.html

"*Nanotechnology: Science of the Future*" a keynote address given by Prof. S.R.P. Silva to the National Science Foundation of Sri Lanka (2004).

"*Remarks by the President to the National Association of Attorneys General*", by William J. Clinton (1998).

"*Economic Analysis of Scientific Research Publishing*", A report commissioned by the Wellcome Trust (2003)

"*Scientific Publishing Inquiry Memorandum*" by the Wellcome Trust (2004)

The Wellcome Trust Sanger Institute: Human Genome Project

http://www.sanger.ac.uk/HGP/

Sakarindr Bhumiratana: The Ethical Use of GMOs

Abstract

The commercialization of genetically modified organisms (GMOs) has sparked profound controversy concerning adequate approaches to risk regulation. Ethical discussions are an important characteristic of the resultant public debate. The ethical concerns regarding GMOs can be divided into two groups; intrinsic concerns and extrinsic concerns. Intrinsic concerns are the major reason leading consumers to reject GMOs as a result of the process of genetic engineering regarded as an unnatural, for example, interference with nature or playing God. The public conception that GMOs may have adverse effects on the environment and human health are regarded as extrinsic concerns. These include concerns expressed that GMO products place the farmer at a disadvantage. It is important to note that extrinsic concerns require major attention from both scientists and policy-makers as it is addressing these concerns that will contribute to greater safety assurance for the general public. It is recommended that both scientific investigation and regulatory oversight are needed, preferably on a case-by-case basis. However, a ban on all GM crops is not an appropriate way to solve the problem and can only result in denying the country use of a technology that can enhance production and provide a comparative advantage for exports. Apart from these concerns, the transparency of decision-making at all levels will lead to greater understanding, acceptance and proper use of GMOs for all stakeholders.

Matthias Kaiser: A Response to the Ethical Use of GMOs

Admittedly, the debate surrounding GMOs is complex and raises concerns from many quarters worldwide. Ethical aspects play a major role in the evaluation of how one should deal with this issue. With ethics being influenced by cultural and religious factors, the debate does not get any easier. It is therefore with satisfaction that I can register a number of points of agreement with the previous speaker. These are in particular:

A general ban of all GMO crops is not a good solution and may even be unethical in some cases;

Case-by-case and step-by-step assessments are crucial for dealing satisfactorily with GMOs, thus covering the spectrum:

> From contained use – to experimental field trials – to production and finally marketing;
>
> The importance of better risk assessments needs to be stressed;

Extrinsic concerns are, in the long run, more important than intrinsic concerns.

In spite of this basic agreement, I see the need to stress a number of points that the speaker may have overlooked or that he sees differently. My first point concerns the ethical responsibility to deal with scientific uncertainty.

Sometimes what we do *not* know is ethically more important than what we know.

Public policy needs to be based on the recognition of both knowledge and uncertainty.

We need to make the scientific uncertainties around GMOs explicit to all decision makers. These uncertainties relate both to the lack of knowledge and to the inherent uncertainties of complex natural systems, including their use in the socio-economic context. Therefore, we need to employ an adequate framework to represent scientific uncertainty. Frameworks to this effect have been worked out in the recent past. In this respect I want to recommend, for instance, the following contribution: Walker, W.E., Harremoës, P. et al. (2003) "Defining Uncertainty: A Conceptual Basis for Uncertainty Management in Model-based Decision Support", Integrated Assessment 4 (1), 5-17.

Furthermore, since GMOs so far are beset with major uncertainties, we have to consider applying the Precautionary Principle. It is a major misconception that this principle implies a total ban or a moratorium of an activity. There are a number of precautionary strategies that may be adequate, depending on the case at hand. A new definition of the Precautionary Principle and a discussion of its use can be expected in a forthcoming COMEST report on the subject. The major point in this discussion is that the Precautionary Principle provides for a way of dealing with scientific and technological uncertainties in an ethically responsible manner.

My next point relates to intrinsic concerns about biotechnology. While I agree that extrinsic concerns in the long run may be more important than intrinsic concerns, this does not relieve us from our duty to deal with these existing concerns in a responsible manner.

Even if intrinsic concerns about GMOs may in the long run have a weak standing, both in terms of support and in terms of rational foundation, they need to be respected in our policies about GMOs.

Intrinsic concerns about GMOs come traditionally in a variety of forms, some of them based more on religious beliefs, some of them based more on secular ideas. Typical intrinsic arguments are e.g.:

Playing God is morally wrong; one should respect the divine design of our living world.

GMOs are in an important sense "unnatural", they clash with a moral imperative to live in harmony with nature.

GMOs are, in an important sense, a commodification of life-forms that reduces living beings to entities in a market, and this is a perversion of the human condition.

I happen to believe that all of these concerns face grave difficulties as soon as one tries to spell out the moral argument behind them. I think it is more or less impossible to back them up by rational argument. There are several reasons for this. One reason is that even from a religious point of view, the argument is not straightforward. Different religions see this issue differently. Even from within the tradition of Christianity there are many arguments to the contrary. Another reason is that these intrinsic concerns, once they are spelled out in greater detail, fail to address GMOs exclusively. Instead, they seem to affect a great variety of activities that people in general evaluate as morally acceptable, e.g. common breeding practices. In other words, if one is clear on what the intrinsic concerns really are, then one also has to accept to condemn a lot of other human activities, like ordinary agriculture or health care, as likewise problematic from a moral point of view.

However, even if we cannot in general accept these concerns as rational arguments, we cannot simply overlook as irrelevant the strength with which they are felt by some people. Ethics demands a basic respect for people who feel and think differently from us. From this there are two very clear conclusions:

Consumer choice needs to respected and thus all GMOs need to be clearly labelled as such.

Alternatives to GMOs need to be on the market and the co-existence of several GM and non-GM production forms needs to be guaranteed.

My third point concerns the need for transparency and independent expertise.

There are big, global interests at play in the GMO business. For the ordinary person or even for the governmental decision maker, there is often a noticeable lack of transparency and lack of independent expertise.

If one looks at some current debates about GMOs, what one often finds is the problem of getting good and reliable information. The information one gets is often biased in one or other direction, and is often incomplete. Some information seems well guarded and intellectual property rights contribute to strong tendencies of secrecy around GMOs. From an ethical point of view, incomplete and biased information paves the way to bad moral judgement and decision making. Wise governance includes participatory processes between stakeholders and the public. However, as long as information is unreliable, such processes cannot be credible and cannot result in socially robust policies.

There is a need to strengthen transparency around GMOs as much as possible.

There is a need to build up independent expertise in order to supplement assessments made by or paid for by industry and special, powerful interest groups.

As a fourth point, I want to raise a question about public surveys. There are indeed a number of surveys, like the Eurobarometer, that screen public attitudes to genetic engineering and GMOs. Many of these seem to indeed show that people have worries of an intrinsic kind. But it is far too easy to conclude from this that people are technophobic or in principle opposed to technological progress. When one engages people in consultation processes, where there is opportunity for argumentation and where their voice is heard, one will often experience that people do not want to trust mere gut-feelings and reject a new

technology out of hand. Rather, they question the framing of the issue at stake and want to make sure that a technology by and large is put to a good end. They ask, "Is this really a benefit to mankind?", or, "Does this really contribute to a good life?" Thus, I believe that many people tend to turn from mere intrinsic to extrinsic concerns provided that general ethical questions about the qualities of life are included.

We need to supplement mere quantitative data on people's attitudes with data from qualitative processes where people can make considered judgements in a deliberative manner that would include ethical dimensions.

As a final point I want to say something about the concrete difficulties in coming up with good assessments of GMOs. If some of the above points are correct, then we need to be explicit about the ethical aspects of GMOs. Ethics should then become an integral part of our standard assessments of GMOs and our laws and regulations need to reflect this. Yet, how can this be done? Can ethics really be made a part of a regulatory framework, given its plurality of viewpoints and theoretical approaches? I do not claim that there are "objective" ways to go about finding the best ethical outcome. I believe there will always be an element of judgement involved. However, ethics can still be explored in a way that would bring out all or most of the relevant ethical concerns so that the final decision making will at least be well informed about the ethics involved in an issue like GMOs. Recently, an expert consultation of the WHO/FAO on the safety assessments of foods derived from genetically modified animals, including fish (Rome 17-21 November 2003; ftp://ftp.fao.org/docrep/fao/006/y5316E/y5316E00.pdf) concluded in a similar vein.

Practical ethics needs to develop tools for ethical assessments that can be utilised in concrete evaluations of GMOs.

One such tool is the ethical matrix that was developed by Ben Mepham (1996) and presented in the above expert consultation. An example of such a matrix may look like this in its initial stage:

Ethical matrix for genetically modified fish	**Do not do harm**	**Do good / provide benefit**	**Respect dignity / autonomy**	**Justice / fairness**
Small producers	Dependence on nature and corporations	Adequate income and work security	Freedom to adopt or not to adopt	Fair treatment in trade
Consumers	Safe food	Nutritional quality	Respect for consumer choice/labels	General affordability of product
Treated fish	Proper animal welfare	Improved disease resistance	Behavioural freedom	Respect for natural capacities
Biota	Pollution and strain on natural resources	Increasing sustainability	Maintenance of biodiversity	No additional strain on resources

One can then, in a next step, evaluate how a given technology affects all of these specified concerns concretely. The ethical matrix approach has been tried out in many different settings (see, e.g., Kaiser and Forsberg 2000) and is a promising tool for including ethical aspects in our assessments of new technologies. The debate around GMOs might profit from utilising such a tool.

References

Kaiser, M. & Forsberg, E.M., 2000: *Assessing Fisheries – Using an Ethical Matrix in a Participatory Process*, Journal of Agricultural and Environmental Ethics 14, 91-200

Mepham, T. B., 1996: *Ethical Analysis of Food Biotechnologies: An Evaluative Framework, in Food Ethics*, edited by T. B. Mepham, Routledge, London. pp. 101-119

Pierre Sané: Closing Address

Mr. Minister,
Mr. Chairperson of COMEST,
Distinguished Members of COMEST,
Ladies and gentlemen,

Impressive as the rapid advancement of information technology has been, it has yet to supplant the benefits of face-to-face communication. On behalf of the Director-General of UNESCO, I would like to express my sincere thanks to the Kingdom of Thailand for hosting the fourth session of COMEST in Thailand and giving us this opportunity to meet, listen to and learn from each other face-to-face. We are especially honoured that the princess of Thailand has taken a personal interest in this event and graciously presided over the session. This initiative clearly demonstrates the commitment of Thailand to the promotion of ethics in science and technology.

One of the primary means by which UNESCO promotes ethics in science and technology is by encouraging and contributing to dialogue and the exchange of ideas. Judging from the quality of the presentations and debate, I believe this three-day long session has been a success in these terms. Two elements are essential for constructive dialogue: willingness to participate and substance to be communicated. Both of these elements have been present in abundance throughout thanks to everyone involved.

Indeed, it is the presence and active participation of concerned parties - regional experts, policy makers, scientists and the interested public - that has been a key factor in the success of this session. Ethics cannot be handed down by decree. If it is to have impact and if its application is to be sustainable, it must address the local context and relate to concerns that are real and shaped by many. Thailand's proactive approach to the organization of this session and the high-level representation at the regional ministerial meeting held in parallel with the session are signs that ethics in science and technology have strong roots in the Asia-Pacific region.

The participation of young people at the session is noteworthy. It is important that young people in particular be involved in conceptualizing ethics in science and technology in the Asia-Pacific region and recognize its relevancy. After all, sensitivity to the ethical dimension of science and technology should be transmitted to each new generation of scientists. The youth forum provided a space for young people to air their views and to network. I hope that this will give a fillip to discourse in the Asia-Pacific region.

It has been a great pleasure to follow the rich discussion on topics that have ranged from environmental ethics and GMOs to good governance and international cooperation - there has certainly been no want of substance. The choice of issues was made in close consultation with the Ministry of Science and Technology of Thailand and was intended to reflect the regional agenda. Once again, COMEST insists on local relevance and applicability because ethics is not mere talk - it is the concrete form that ethics takes that counts. Certainly, one of the primary reasons for COMEST to hold its sessions in different regions of the world is to listen closely to the views and needs of the region so that it can translate these into appropriate recommendations for UNESCO's actions in the area of ethics in science and technology.

COMEST has come a long way since its inception in 1998. For this we are greatly indebted to Mr. Jens Erik Fenstad, who has seen COMEST through to maturity. I would like to pay tribute to a man of great

accomplishment who has devoted himself to the cause of ethics in science and technology as Chairperson of COMEST since 2001. These formative years have not been easy for the Commission. Due to changes within the Secretariat, there have been discontinuities and gaps in its administrative support. Through all of these difficulties, it was you, Mr. Fenstad, who helped us keep COMEST afloat. I take this opportunity to thank you wholeheartedly, Mr. Fenstad, for holding firm to your vision of a stronger COMEST and for working tirelessly towards making that vision a reality. Your efforts have been rewarded. Let me also address my sincere thanks to the departing members, namely Mr. Lu Yongxiang, Mr. Hamish Kimmins and Mrs. Suzanne Mubarak.

COMEST has emerged more robust from its period of gestation and its objectives and working methods have taken clear form. Thus, COMEST is now able to recommend UNESCO towards a number of tangible final products. For example, with a view to the potential establishment of norms in ethics in science and technology, COMEST recommends UNESCO conduct a study on the feasibility of drafting an international declaration of ethical principles for the use of the environment. This study, which would be completed by 2007, would be another step towards the enshrinement of ethical norms in an international instrument. UNESCO, of course, has extensive experience with drafting such an instrument, howbeit, in the area of bioethics.

In terms of working methods, over these past few years UNESCO and COMEST have developed a strong symbiotic relationship and a clear working structure has emerged. As a result, UNESCO is well positioned to anticipate the needs of the Commission and to give it adequate support. COMEST members are more closely involved than before in the work of UNESCO. A number have offered their expertise in the deliberations of UNESCO expert groups on environmental ethics, space ethics and science ethics. Several will also be on the advisory board of the Ethics Education Programme, which is another example of the tangible products towards which UNESCO is working.

The Ethics Education Programme is the implementation of the Report on the Teaching of Ethics adopted by COMEST at its third session and can be viewed as part of the UNESCO-led United Nations Decade of Education for Sustainable Development 2005-2014. Through this Programme, UNESCO seeks to help Member States enhance their capacity in the area of ethics teaching by creating networks of ethics teachers, developing teaching programmes and setting up a fellowship fund, among other activities.

Another concrete capacity-building project that UNESCO is currently undertaking is the Global Ethics Observatory. The Global Ethics Observatory is a system of four databases through which UNESCO will provide Member States with information and material that will assist in creating and building upon human and institutional resources regarding ethics in science and technology. The first database has already been launched and contains information on experts active in applied ethics. The second database is of ethics institutions and committees and will be available shortly. By the end of 2005, a third database will have been set up with information on ethics teaching programmes and a fourth database on relevant legislation is envisaged for the forthcoming biennium. The databases will be accessible and searchable online through the UNESCO Ethics website.

UNESCO will continue to build upon the strength of its consolidated structure by branching out into more areas within ethics in science and technology. I expect that the increased emphasis on deliverables, along with an expanded scope of work, will serve to increase the visibility of COMEST and UNESCO's work in the area of ethics in science and technology.

There is no uncertainty about the path forward. Mr. Fenstad has pointed a mature and confident COMEST towards clear goals. I welcome Ms. Pilar Armanet Armanet as the new Chairperson of COMEST and the other members of the bureau: Mr. Alain Pompidou, Mr. Song Sang-yong and Mr. Johann Hattingh. I invite them to lead the way.

In closing I would like to thank the members of COMEST for your participation and hard work. It is your vigour and enthusiasm that has taken COMEST this far and that will take COMEST so much further. In particular I would like to thank those members of COMEST whose mandate will expire this year: Mr. Bennouna, Mr. Fenstad, Mr. Kimmins, Mr. Lu and Mrs. Mubarak. I would like to thank again the Thai Government and, in particular, the Ministry of Science and Technology for taking the lead in organizing this event. My thanks are also due to the staff members of UNESCO for all of their work in making this session a real success. I would like also to acknowledge and thank the interpreters for their work over these past three days. Finally, my thanks go to all of you for the part you have played in making this session an exercise in constructive dialogue. I wish you all a safe journey home.

ADDENDUM: BANGKOK DECLARATION ON ETHICS IN SCIENCE AND TECHNOLOGY

The following declaration is an outcome of the Ministerial Meeting of Ministers and Higher Authorities of Science and Technology of Asia and the Pacific and was transmitted to UNESCO.

Bangkok Declaration on Ethics in Science and Technology

***WE**, Ministers for Science and Technology, considering the important role of ethical framework in science and technology by initiating and supporting the process of democratic norm building which awareness raising, capacity building and standard setting are therefore the key thrusts of UNESCO's strategy in this and all other areas;*

***NOTING** with deep satisfaction that our countries have forged a close and beneficial relationship since this approach is founded upon UNESCO's ideal of "true dialogue, based upon respect for commonly shared values and the dignity of each civilization and culture";*

***ENCOURAGED** by the significant progress for years of the programmes in the area of Ethics in Science and Technology, as supported by UNESCO;*

***RECOGNISING** that Science ethics is necessary to articulate the basic values of science and scientific research when there is a growing risk of conflicts of interest (e.g.,due to publication pressure, commercialization, security needs) as well as traditional and non-traditional issues affecting human ethics, require a more coherent and well-coordinated response at the regional level;*

***ACKNOWLEDGING** the shared goals and partnerships formed with relevant institutions between countries to promote ethics of science and technology focusing on formulating policies and legislations on ethical and good governance in science and technology, building human capacity, sharing science and technology with fairer trade rules and negotiations, creating networks to enhance science and technology development, promoting the role of youth in science and technology, science, technology, and environment protection, and increasing developing countries' access to new areas of science and technology (such as nanotechnology and space);*

***DESIRING** to conclude an agreement with a view to ensuring the establishment and operation of appropriate policies and legislation on ethics of science and technology and mechanisms to support human resource development activities;*

HEREBY DECLARE TO:

***1. ENHANCE** science and technology cooperation which emphasizes fair trade more than free trade.*

***2. DEVELOP** cooperation in Intellectual Property (IP) which aims at Benefits to Humanity over Commercial Benefit, especially in the Least Developed Countries that have less ability to access IP.*

***3. PROMOTE** the role of youth in science and technology to encourage youth scientist development.*

***4. URGE** Mutual Understanding of the importance of ethical and steadfast development of emerging technology (such as nanotechnology, radiation, satellite, biotechnology, human organ replacement, for example) based on public understanding and due care for the impacts of technology.*

Done in Bangkok, Thailand, this 25th day of March Two Thousand and Five, on the occasion of the 4th Session of the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST).

States Parties to the Bangkok Declaration:

- Bhutan
- Cambodia
- Indonesia
- Japan
- Malaysia
- Nepal
- Pakistan
- Philippines
- Thailand
- Vietnam

Division of Ethics of Science and Technology of UNESCO

The Division of Ethics of Science and Technology reflects the priority UNESCO gives to ethics of science and technology, with emphasis on bioethics. One objective of the medium-term strategy of the Organization is to "promote principles and ethical norms to guide scientific and technological development and social transformation".

Activities of the Division include providing support for Member States of UNESCO that are planning to develop activities in the field of ethics of science and technology, such as teaching programmes, national ethics committees, conferences and UNESCO Chairs.

The Division also ensures the executive secretariat for three international ethics bodies, namely the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST), the International Bioethics Committee (IBC) and the Intergovernmental Bioethics Committee (IGBC).

For any further information, please contact:

UNESCO
Division of Ethics of Science and Technology
Social and Human Sciences Sector
1, rue Miollis
75732 Paris Cedex 15
France

http://www.unesco.org/shs/ethics

(SHS-2005/WS/41)