

# Science for Reduction of Risk and Sustainable Development of Society

The world is facing major threats to the sustainability of our planet. These threats are accompanied by the immediate dangers of natural and man-made disasters. Our vulnerability to them is greatly magnified with each passing year undermining our ability to maintain a sustainable and productive world into the 21st Century and beyond. Both history and common sense teach us that there is a tremendous potential in science to cope with these threats.

The EUROSCIENCE working group, 'Science and Urgent Problems of Society', together with the IUGG<sup>1</sup> Commission on Geophysical Risk and Sustainability, initiated a EUROSCIENCE – IUGG Advanced Research Workshop on 'Science for Reduction of Risk and Sustainable Development of Society' sponsored by the NATO Science Programme. More than 40 participants from 17 countries took part in the Workshop which was held in Budapest on June 15-16 2002. Talks and discussions focussed on the question of how science could help society in reducing risk and in promoting sustainable development.

After opening talks by senior executives of EUROSCIENCE (President, J-P. Connerade) and of IUGG (Vice-President, U. Shamir), J-P. Massué (Executive Secretary of EUR-OPA Major Hazards Agreement, Council of Europe) delivered a lecture entitled "Help for Decision Making in Risk Management: Mobilisation of the Scientific Community".

Several talks were given on natural and environmental risk prevention and sustainability. T. Beer (Australia) discussed two aspects of environmental risk: (i) risk to the environment as a result of human activity and (ii) risk to people as a result of environmental hazards. Z. Ferencz (Hungary) pre-

sented results of a model of catastrophic flood risk management in Hungary developed by a joint international team of researchers (leader J. Bayer, Austria). U. Shamir (Israel) analysed the range of dimensions along which sustainability is measured, and the risks that appear along each of these dimensions; he also elaborated on the role that the geophysical community can and should play in finding the "best" balance between reducing risk and increasing sustainability, and on the cost of achieving this balance. G. Panza (Italy) then discussed the crucial problem of preparedness in meeting natural disasters (in Europe), e.g. through reducing the vulnerability of lifeline systems and communications (oil and gas pipelines, power supply, telecommunication, etc). G. Heiken (USA) described how risk evaluation must rely heavily on modelling and visualisation of physical processes and their effects, which can be easily grasped by emergency planners, the insurance industry, policy makers and the public. A. Jayawardena (China) discussed problems of natural risk management practices in the Asia Pacific Region.

## We need to find the best balance between reducing risk and increasing sustainability, and on the cost of achieving this balance.

The second part of the Workshop concerned relationships between science, risk, and society. G. Schméder (France) considered that optimism about science has recently been tempered by a growing awareness of risks. According to her, science is feared not only because of its possible applications, but also because of a new perception of the risks involved in research itself. Schméder aroused a heated discussion with her claim that society distrusted scientists. It emerged that the BSE and foot and mouth epidemics have greatly tarnished scientific credibility

in Europe. On a more positive note, R. Gherardi (France) presented a detailed examination of his clinical hypothesis that aluminium-containing vaccines are responsible for chronic fatigue syndrome. He noted that multiple vaccinations performed over a short period of time in the Persian Gulf area have been recognised as the main risk factor for Gulf War syndrome. A. Vari (Hungary) presented some empirical findings demonstrating changing attitudes to the more political elements of public risk perception. J. Paterson (UK) proposed that however society decides to respond to risk, it is frequently the case that law is the chosen instrument by which it implements its decisions, whether through regulations supposed to mitigate or remove risk or through court procedures designed to allocate liability and compensation when a risk has been realised.

The second day of the Workshop consisted of two items: (i) a plenary session in which P. Dunbar (USA) and E. Kontar (Russia) discussed problems of natural risk and sustainability in India and the Black Sea region respectively, and (ii), general discussions which were summarised in the Budapest Manifesto on Risk Science and Sustainability (see opposite). In general the Workshop seems to have been successful in terms of increasing our understanding of the many problems of risk and sustainable development affecting society and highlighting the role of science and relationships between scientists and the public, and between scientists and authorities.

**Alik T. Ismail-Zadeh**

Alik.Ismail-Zadeh@gpi.uni-karlsruhe.de

**Résumé** Un symposium s'est tenu à Budapest, organisé conjointement par Euroscience (groupe de travail: Science et problèmes urgents de la société) et une Commission de l'Union Internationale de Géodésie et de Géophysique sur le thème: Science au service de la réduction des risques et du développement durable de la société. Dans une première session, les orateurs ont traité de différents risques naturels et de leur prévention, en particulier à travers la modélisation des phénomènes et de leurs impacts. La relation entre la science, les risques et la société fut le thème d'une seconde session où sociologie, économie et droit apportèrent leur contribution. Un manifeste fut rédigé et adopté par les participants (voir page 7).

<sup>1</sup> IUGG is the abbreviation for the International Union of Geodesy and Geophysics

# The Budapest Manifesto



The following declaration, made by attendees at the workshop SCIENCE FOR REDUCTION OF RISK AND SUSTAINABLE DEVELOPMENT OF SOCIETY, aims to reinforce the social and vital link between the scientific community and the public to provide a general guide for scientists who deal with risk and sustainability.

Sustainability refers to the progression towards improved quality of life, both now and in the future, in a way that maintains the environmental, social and economic processes on which life depends. Risk is a measure that combines the likelihoods and the consequences, over a given time, of a set of scenarios.

Risk is assigned to a policy or a plan as an indication of the potential losses and damages that communities face. Sustainability and risk are complementary to the extent that we seek policies and plans that increase sustainability and reduce risk.

The world is facing major threats resulting from the expansion of human activities, among them deterioration of the environment, biodiversity loss, depletion of natural resources through excessive consumption, and destabilisation of economies and the social order. Long-term threats to the sustainability of our planet include droughts, degradation of water quality, resource depletion, global warming, nuclear waste disposal, nuclear plant side-effects, and the manipulation of life itself. These threats are accompanied by the immediate dangers of natural and man-made disasters. As the global population continues to increase, our vulnerability to

them is magnified with each passing year. The tragic events of 11 September 2001 illustrated the vulnerability of cities to natural, technological and to social threats. We, as scientists, must apply our expertise and experience to the mitigation of these urgent societal problems.

The global crisis is particularly severe in the developing world. Many of the world's megacities are in developing countries and many are subject to the combined threats of natural, technological and social risks yet are also vulnerable in terms of their economic and infrastructure capacity to respond.

To mitigate and adapt to large-scale disasters in cities, we must go beyond traditional hazard mapping and monitoring. We must involve the community in extensive campaigns of knowledge exchange and communication. Risk evaluation must rely heavily, but not exclusively, on modelling and visualisation of physical, biological and social processes and their implications. The results need to be easily grasped by emergency planners, the insurance industry, policy makers, and the public. We also need a deeper understanding, based on work across disciplines, of all of the processes that are involved.

Scientists and their institutions have an obligation to work with the public to earn their trust and understanding. They must also be mindful of public concerns and the risk perceptions that underlie them. In many cases the interaction between science, risk, and society takes place within the legal system. Ongoing communication between the various groups needs to integrate the human dimensions. Scientific knowledge and scientific initiatives can be useful as a basis for public policy when they are acceptable to society from moral and ethical points of view. The science must interface coherently with public policy and social expectations, again illustrating the need for more carefully planned communication and consultation.

An appropriate framework within which to study environmental risk and sustainability needs to be sufficiently flexible to incorporate the diverse aspects included in these terms, yet sufficiently well defined to be able to treat the vulnerabilities to which human and environmental systems

are exposed. The methods and tools used to examine natural risk can be applied to the analysis of geo-political risk.

Living in an often turbulent and unpredictable public environment, we scientists can contribute to decision-making through a risk management framework with which to examine technical and social issues related to sustainability that consists of the following:

- Anticipating man-made and natural risks through widespread consultation.
- Determining concerns by using risk assessment techniques for various scenarios.
- Identifying the consequences by systematically cataloguing hazards.
- Undertaking calculations with appropriate models.
- Evaluating the certainties, uncertainties, and the probabilities involved in the calculations of the vulnerability and of the exposure.
- Comparing with criteria to assess the need for further action.
- Determining and acting on options to control, mitigate and adapt to the risk.
- Communicating the results to those who need to know.
- Promoting and guiding monitoring systems to collect, assimilate and archive data relevant to the determination of sustainability and risk, now and in the future.
- Integrating the knowledge and understanding from all relevant disciplines to provide society with the tools to review the sustainability and the risks of proposed policies and plans.

Though rational scientific methods hold the promise of an improved science of risk and sustainability, it must be remembered that the priorities for analyses are likely to be heavily influenced by the public and political agenda of the day. This means that implementation of risk management to achieve sustainability can be achieved only through an interaction of theory and praxis.

June 16, 2002  
Hungarian Academy of Sciences  
Budapest