THE BUDAPEST MANIFESTO ON RISK SCIENCE AND SUSTAINABILITY

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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 wide-spread **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.