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Geoscience as tool on civil protection against Natural Hazards

Intelligere, tueri noscendas - To understand, to identify and to protect

The geological science, the study of the dynamic changes which Earth has undergone and is undergoing, is always at the forefront of understanding the mechanisms of natural processes and events. Practitioners of geology, academics and professionals alike, offer their expertise to the society's benefit and provide one of the first lines of defence against natural disasters.

The European Federation of Geologists (EFG), the professional body that represents 24 national geological association members, would like to draw the attention of policy makers at international, European, national, regional and local level for the paramount importance of geoscience in civil protection against natural hazards.

The recent earthquakes in Nepal killed at least 9,000 people and injured more than 19,000. Their effects did not confine locally. Victims were also found in Bangladesh, India, Tibet, and on Mount Everest, where avalanches were triggered. Furthermore, damages and landslides were reported while slopes made unstable, ready to collapse. Thus, the risk for further calamities is still present. The local, regional and global financial implications have still not revealed.

These tragic events once more emphasize the importance of focussing on reducing the risks from natural hazards. The increase in the number of natural disasters, in various parts of the planet, during the last few decades underlines the importance of taking preventive and, where necessary, mitigation measures against natural hazards.

Europe itself is home to natural disasters and although in a different geological environment still is affected by floods, terrestrial landslides, submarine landslides which are prone to tsunamis, and has suffered extensive earthquakes. EU Legislation on Human Rights, provides the right of all citizens to equal protection from natural hazards regardless of location.

There is a tendency at all policy levels to concentrate on reaction to disasters, rather than taking preventive and mitigation measures. With climate change and the continuous increase of construction activities in hazard-prone areas, concentration on disaster reaction will only lead to continuous increase in cost. Investments in hazard identification and in Disaster Risk Reduction (DRR) can restrict the disaster cost and generate high economic returns. Benefit-cost ratios of 4 and higher are widely documented in the literature.

Therefore the EFG recommends to:

1) **Integrate geology into future European Directives and national legislation**
   Legislation, similar to the flood Directive 2007/60/EC should be considered to involve the prevention and management of all natural hazards such as landslides, earthquakes, drought, erosion and subsidence. Particularly, the generation of hazard/risk maps for guidance to control construction in vulnerable areas, such as on river floodplains, in landslide-prone areas and in earthquake-sensitive zones should be integrated into legislation. Subsequently, for areas identified to be at risk, geoscientific hazard assessment should become compulsory in planning regulations.

2) **Educate society to improve the understanding of and response to natural hazards**
   Many natural disasters are compounded by inappropriate human actions or decisions. Raising public awareness and increasing the knowledge of geological sciences will assist disaster management

teams and rescue operations to better understand the situation and avoid further escalation of the problems. Better insight in the geological sciences will lead to improved policy-making with respect to adopting the best preventive and mitigation measures against natural hazards.

3) **Support national and international geophysical infrastructure**
   Invest in geophysical infrastructure such as, seismic networks (weak and strong ground motion), GNSS networks, strain meters, tide gauges, gas sensors, weather sensors as vital part of scientific efforts to understand natural processes and map the hazard and associated risk.

4) **Develop and install early warning systems (geo-indicators) in areas at risk**
   Accurate forecasting and early warning systems are vital for safe and quick evacuation. Small-scale geological variations may be identified as precursors to large-scale natural events. Identification and monitoring of precursors at the earth surface, possibly in combination with earth observation from space, may provide indications of pending large-scale natural hazards, allowing mitigation responses to be initiated.

5) **Open access to the scientific data**
   Introduce legislation to make available to all scientists and the society the geophysical data as well as results of basic research. Release in digital form high-resolution topographic maps, near coast bathymetry, geological and geotechnical maps, remote sensing data.

6) **International scientific emergencies-committee**
   Creation of a scientific emergencies-committee that can advise in cases of natural disaster like Nepal. Europe has tremendous potential of experts engaged in regions with seismicity, especially in Spain, Italy and Greece.

7) **European coordination project**
   Research project on the geological knowledge and dissemination. Furthermore, investigation on countries with strong legislation background in areas of natural hazards and how a good preventive policy has avoided major disasters and reduced economic losses.

The group of experts on Natural Hazards of the European Federation of Geologists is available to provide all necessary information and to make recommendations from a geological perspective, so that it will lead to a significant reduction of negative effects caused by natural disasters.

About EFG: The European Federation of Geologists is a non-governmental organisation that was established in 1981 and includes today 24 national association members. EFG is a professional organisation whose main aims are to contribute to a safer and more sustainable use of the natural environment, to protect and inform the public and to promote a more responsible exploitation of natural resources. EFG's members are National Associations whose principal objectives are based in similar aims. The guidelines to achieve these aims are the promotion of excellence in the application of geology and the creation of public awareness of the importance of geoscience for the society.
www.eurogeologists.eu

About the EFG Panel of Experts on Natural Hazards: The group has been established in March 2003, in relation to EC initiatives on Civil Protection, DG Environment, and has since then provided many contributions to the EC.
Pavlos Tyrologou, the new coordinator of this Panel of Experts is Chartered Geologist and holder of EurGeol title on the field of Engineering and Environmental Geology. Furthermore, he is member of the Technical Committee in Engineering Practice of Risk Assessment and Management of the International Society for Soil Mechanics and Geotechnical Engineering.
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