FÉDÉRATION EUROPÉENNE DES GÉOLOGUES
EUROPEAN FEDERATION OF GEOLOGISTS
FEDERACIÓN EUROPEA DE GEÓLOGOS

European Federation of Geologists
13 Rue Jenner, B-1000 Brussels
Ph. +32-2-7887636
efgbrussels@tiscalinet.be

Geo-scientific recommendations for the Floods Directive

Flooding is any abnormally high water flow that overruns the natural or artificial confining boundaries of the waterways. Single events can result in heavy tolls of death and can cause significant damage to properties, historical heritage, infrastructure and set-back of regional economy, as we especially have noticed in the European floods in the last decade. Floods are caused not only by rain but also by man-made changes to the earth's surface, e.g. farming, deforestation and urbanisation (especially of alluvial fans, in mountain regions, and flood plains). These actions increase runoff from rains, and storms that previously would have caused no flooding inundate vast areas today.

Construction in vulnerable areas should be avoided when possible, or else prevention and mitigation measures should be taken. The first and most important step is to identify the high-risk areas through risk maps showing flood probabilities.

Geology should be an integral part of flood prevention and protection. Weather forecasting is of course a first priority in flood prediction, but detailed knowledge of the subsurface is crucial in flood prevention and protection; imagine the subsurface behaving as a sponge or a seal. We therefore see it as our responsible task to provide practical advice from a geo-scientific perspective.

From a geo-scientific perspective, we recommend the following:

1. **Creating flood hazard and risk maps of river basins and coastal areas**

   - It is important to take into account the subsurface by using geological and geomorphologic maps, mostly available at National/Regional Geological Surveys, National Basin Authorities or National Environmental Protection Agencies.
     - The complete natural floodplain should be taken into account as zone of flood risk, instead of statistical historical records of the last e.g. 100 years (in many countries flood hazard analysis are done taking into account reference return periods of 200 and 500 yrs.). Adopting the complete natural floodplain would include areas likely to flood in some worst-case future climatic scenarios.
     - Construction of flood defence systems should be designed with specific geological & geomorphologic studies analyzing erosion (historical evolution of coasts and river banks) and solid carrying capacity of rivers (consult geological maps) to avoid building on top of old river bed deposits or other negative effects. These would function as underground water migration pathways towards the other side of the flood defence systems and thereby make the flood defence system dysfunctional.

   - Take into account other related natural hazards on flood risk maps, for example the vulnerability for landslides.

   - Flood and landslide risk maps should be fully adopted in land-use planning procedures. All land management and planning instruments must be realized with the support of specific geological hazard studies within a "Basin Plan".

   - Flood hazard and risk maps are dynamic and require periodic actualization.

European Federation of Geologists
13 Rue Jenner, B-1000 Brussels
Ph. +32-2-7887636
efgbrussels@tiscalinet.be

2. Raise awareness and educate people

Efforts must be made to increase the level of public awareness regarding the causes and effects of natural hazards. People living in vulnerable areas, e.g. in valleys affected by repeated flooding, should be aware of the potential risk and possible measures they can take to protect their lives and possessions. Local authorities must know when to alert the population and how to engage disaster management teams.

The more that can be achieved at a local plan, the better immediate measures. Education and practical instruction ought to be implemented at different levels in society: at public schools, via seminars, educational brochures as well as specific information to local politicians and decision makers. Measures may also be directed towards the tourist industry, including brochures and videos describing natural hazards in vulnerable parts of the world where tourism is important.

The European Federation of Geologists (EFG) can assist in editing schoolbooks, producing pamphlets and to arrange seminars in all member countries (to the general public, as well as special education to policy-makers and land-use planners). Efforts can be focussed on the specific priority schemes in each country.

3. Geo-scientific investigations to check the quality of water defence systems

Flood defence systems will deteriorate with time due to many factors, including ground erosion, slope instability, animal digging and vehicle traffic. The only accurate method for the identification of damaged flood defences can be carried out by means of geophysical techniques, which identifies differences in physical characteristics of rocks and soils.

The Flood Directive should include detailed geophysical, engineering geological and geotechnical investigations of flood defence systems in areas at higher risk (e.g. in areas with high population) to detect weak sections in dikes at an early stage.

The European Federation of Geologists can make recommendations to the type of geophysical and geotechnical methods to be applied and can provide experts to consult the European Commission and national governments in the procedure to be taken.

4. Set up expert teams at national or river basin level

It is recommended to set up expert teams at national or river basin level to quickly investigate the complete fluvial system to locate zones at high risk, to locate zones that are suitable for retention areas, to locate zones that require high priority in geophysical quality evaluation of flood defence systems, and so on. These teams should comprise hydrologists, geologists, geophysicists, remote sensing experts and engineering geologists.