IICT-BAS experience with hazards such as forest fires and floods

IICT-BAS is a research institute in Bulgarian Academy of Science where first steps in risk management and environmental modeling has been done by my PhD studies in the field of forest fire propagation and flood risk mapping with accordance to the EU directive 2007/60/EC on assessment and management of flood risks from 26 November 2007.

The forest fire propagation research has been supported by national project funded from the National Science Fund of the Bulgarian Ministry of Education, Youth and Science under Yong researchers Concourse Grant DMU 02/14 “Collecting and Processing of Data Concerning Wild land Fires, Occurred On The Bulgarian Territory In The Recent Years By Using WEATHER RESEARCH AND FORECASTING MODEL-FIRE (WRF-FIRE)”. The data used for simulations was from NCEP (US-National Centers for Environmental Predictions). The test bed area of the research is nearby village Leshnikovo, direction south from the town of Harmanly. The observed area has been burning from 14th until 17th August 2009. The research has been prepared only for the first 3 hours of the fire propagation because of the lack of detailed meteorological data for that particular period in the past. At the moment part of the team from the Bulgarian national project is collecting meteorological data in specific GRIB1 format, which the model - WRF-Fire used for the simulation can recognize. WRF-Fire combines Weather Research and Forecasting Model (WRF), with a semi-empirical fire model. It is using modified Rothermel formulas and the fire calculations of the model are represented by level set functions. The simulation is performed with WRF-Fire v.3.2, for area 48 km^2 for the first domain, where we start the atmosphere formation for the smaller area of the fire ignition line. The fire ignition line is 9.6 km^2 and is located in inner domain of the first bigger one. The method is using the meteorology formation from the bigger domain and use it as input parameters for the forest ignition domain. The land cover is obtained by resources with public availability: Shuttle Radar Topography Mission (SRTM) 3 arc sec topography data from NASA/JPL (www2.jpl.nasa.gov/srtm,http://dds.cr.usgs.gov/srtm/version2_1/Documentation/SRTM_Topo.pdf) and CORINE landcover data (http://www.eea.europa.eu/publications/COR0-landcover). At the poster can be seen the final visualization of the performed simulation.

For the flood risk mapping because of lack of data only algorithm of how we should perform flood modeling has been performed. The open source software HEC-RAS developed by the US military services gives very good options for compilation of geometrical, hydraulical and hydrological data. If it is available for Bulgarian rivers it can be applied for compilation prognostication data. Than for creation of real map can be used visualization with GIS application. This approach can be done in Bulgaria if the Inspire directive was working and available sources provide all three components together for the rivers in Bulgaria. On the poster we can show the algorithm for creation if the flood risk maps.