Marc Metzger:
European vulnerability to global change
(A spatially explicit and quantitative assessment)

Summary by Andrej Bača

The lecture described the spatially explicit and quantitative assessment of ecosystems vulnerability for the major part of Europe (Eastern European countries excluded) within the EU project ATEAM. The project uses various General Circulation Models, 4 scenarios, 14 specific models, more than 20 ecosystem services (like biodiversity, carbon storage a. o.) for different time frames up to 2080 and works on 10' x 10' (18-20 km) resolution. Vulnerability of ecosystem services is understood as „a degree to which an ecosystem service is sensitive to global change plus the degree to which the sector that relies on this service is unable to adapt to the changes". Thus, it is a function of exposure, sensitivity and adaptive capacity. Vulnerability is described as a shell around services and is referred to regions, sectors and scenarios allowing various comparisons.

Vulnerability can be quantified through equations that include the value of potential impact. This variable needs an appropriate way of expressing the change of ecosystem services. The best solution is a standardized scale with 0-1 range of values within an environmental context. That required an environmental stratification of Europe – a reproducible and distinctive one. As the old stratifications were unsuitable, the author has developed his own one. He used a statistical method for clustering of environments defined by selected climatic and geographical variables. The resulting 84 explicit classes he aggregated into 13 main zones. Such classification corresponds to the Potential Natural Vegetation Map and to European Biomes (by IMAGE). By changing climate values, e.g. a 2080 map of zones is achieved. In this way, maps of potential impact on specific services (e.g. wood production) were developed.

Further, the adaptive capacity of human-nature system was put into the map. It is a function of awareness, ability and action and can be expressed by indicators like GDP per capita, transport network a. o. Adaptability was visualised on the map within the 0-1 range through a spectrum of colours and according to different SRES scenarios. Finally, vulnerability was represented by including a light-dark colour gradient to this spectrum.

A number of ca. 2500 vulnerability maps were made accessible through a software shell by various criteria like sector, service, storyline a. o. The study included different graph overviews of maps for example by regions or countries.

Conclusions reported large heterogeneity in vulnerability (highest values for Mediterranean region and the lowest for NW Europe). Most vulnerable sectors are agriculture and nature conservation. Dichotomy between the adaptive capacity and potential impact values was discovered.

Discussion dealt with the increased (additive) uncertainty of this procedure, limited knowledge of adaptive capacities, relation to different regional situations and the possibility of more detailed analyses.