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Comparison of environmental and socio-economic domains of vulnerability to flood hazards

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Socio-economic and environmental based vulnerability models have been developed within the research context of the FP6 project BRAHMATWINN. The conceptualisation of vulnerability has been defined in the project and is characterised as a function of sensitivity and adaptive capacity, where sensitivity is used to refer to systems that are susceptible to the impacts of environmental stress. Adaptive capacity is used to refer to systems or resources available to communities that could help them adapt or cope with the adverse consequences of environmental stresses in the recovery phase. In a wider context the approach reflects the wider objective and conceptualizations of the IPCC (Intergovernmental Panel on Climate Change) framework, where vulnerability is characterized as a component of overall risk.
A methodology has been developed which delineates spatial units of vulnerability (VULNUS). These units share a specific common characteristic and allow the independent spatial modelling of a complex phenomena independent from administrative units and raster based approaches.
An increasing detail of spatial data and complex decision problems require flexible means for scaled spatial representations, for mapping the dynamics and constant changes, and delivering the crucial information. Automated techniques of object-based image analysis (OBIA, Lang & Blaschke, 2006), capable of integrating a virtually unlimited set of spatial data sets, try to match the information extraction with our world view. To account for that, a flexible concept of manageable units is required. The term geon was proposed by Lang (2008) to describe generic spatial objects that are homogenous in terms of a varying spatial phenomena under the influence of, and partly controlled by, policy actions. The geon concept acts as a framework for the regionalization of continuous spatial information according to defined parameters of homogeneity. It is flexible in terms of a certain perception of a problem (specific policy realm, specific hazard domain, etc.). In this study, vulnerability units have been derived as a specific instance of a geon set within an area exposed to flood risk. Using geons, we are capable of transforming singular domains of information on specific systemic components to policy-relevant, conditioned information (Kienberger et al., 2008; Tiede & Lang, 2007).
According to the work programme socio-economic vulnerabilities have been modelled for the Salzach catchment. A specific set of indicators has been developed with a strong stakeholder orientation. Next to that, and to allow an easier integration within the aimed development of Water Resource Response Units (WRRUs) the environmental domain of vulnerability has additionally been modelled.
We present the results of the socio-economic and environmental based approach to model vulnerability. The research methodology utilises census as well as land use/land cover data to derive and assess vulnerability. As a result, spatial units have been identified which represent common characteristics of socio-economic environmental vulnerability.
The results show the spatially explicit vulnerability and its underlying components sensitivity and adaptive capacity for socio-economic and environmental domains and discuss differences. Within the test area, the Salzach River catchment in Austria, primarily urban areas adjacent to water courses are highly vulnerable.
It can be stated that the delineation of vulnerability units that integrates all dimensions of sustainability are a prerequisite for a holistic and thus adaptive integrated water management approach. Indeed, such units constitute the basis for future dynamic vulnerability assessments, and thus for the assessment of uncertainties due to climate change.

Kienberger, S., S. Lang & D. Tiede (2008): Socio-economic vulnerability units – modelling meaningful spatial units. In: Proceedings of the GIS Research UK 16th Annual conference GISRUK 2008, Manchester.

Lang, S. (2008): Object-based image analysis for remote sensing applications: modeling reality - dealing with complexity. In: Blaschke, T., S. Lang & G. Hay (eds.): Object-Based Image Analysis - Spatial concepts for knowledge-driven remote sensing applications. New York: Springer, 3-28.

Lang, S. & T. Blaschke (2006) Bridging remote sensing and GIS - what are the most supportive pillars? In: S: Lang & T. Blaschke (eds.): International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences vol. XXXVI-4/C42. CD-ROM and online at www.isprs.org.

Tiede D. & S .Lang (2007): Analytical 3D views and virtual globes – putting analytical results into spatial context. ISPRS, ICA, DGfK - Joint Workshop: Visualization and Exploration of Geospatial Data, Stuttgart