

MULTITEMPORAL SEALING MAPS OF GRAZ AND THEIR APPLICATION IN TOWN SEWERAGE SYSTEM PLANNING

Sulzer, W.¹, Kern, K.¹ and Sprung, W.²

1. University of Graz, Institute for Geography and Regional Science, Heinrichstr. 36, A-8010 Graz, Austria; Tel. +433163805149, Fax +433163809886; wolfgang.sulzer@uni-graz.at
2. Government of Graz, Kanalbauamt, Graz, Austria; werner.sprung@stadt.graz.at

Urbanization process is a major factor of change in Central Europe cities, where urban settlement structures have raised over the past decades, especially since the 2nd World War. Over the past 20 years the extent of built-up area in many western and eastern European countries has increased by some 20 % and far exceeds the rate of population growth in the EU over the same period (6 %). Several cities rapidly became regional centres or international nodes according to economic and political pressures. Urbanization causes land cover changes, which can lead to deeper social, economic and especially to environmental changes (i, ii). Monitoring in soil sealing provides basic indicators of the urban ecology because of its negative effect on the soil water balance, microclimate, flora and fauna (destruction of habitats), noise and the urban heating (iii, iv).

The main objectives of this paper are to provide time-series information to define and locate the urban sprawl trends in sealing processes of the Graz/Austria and to document the application and integration of the sealing maps in planning purposes of building authority of the government of Graz (especially for constructing sewerage systems). Developments in soil sealing are largely determined by spatial planning strategies where unfortunately the effects of irreplaceable soil losses are often not sufficiently taken into account. The sealing of the soil causes significant (quantitative and qualitative) changes in groundwater recharging and in the water balance. These changes have to be recognized by the governmental authorities to construct appropriate drainage systems. Especially the heavy rainfall evidences in August 2005 with more than 120 mm/per day and extreme flooding and overload of drainage system strengthen the importance of detailed planning of urban watersheds and drainage system of the municipality Graz by means of remotely sensed generated sealing maps.

Multitemporal and multisensoral sealing maps which were generated by analogue aerial photograph interpretation (1952-1997, v) and by digital classification of multispectral DAEDALUS Scanner data (1986/1996 and 2004) and conventional LANDSAT data (1991 and 2001) are used for this study. The different methodology/approach of data analyses, their advantages and disadvantages for further applications in water management will be documented in this paper.

REFERENCES

- i. Wilson E H, J D Hurd, D L Civco, M P Prisloe & Ch Arnold, 2003. Development of geospatial model to quantify, describe and map urban growth. *Rem. Sensing of Environment*, 86: 275-285.
- ii. Herold M, G Menz & K C Clarke, 2001. Remote sensing and urban growth models—demands and perspectives. In: *Symposium on remote sensing of urban areas*, Regensburg, Germany, June 2001, *Regensburger Geographische Schriften*, vol. 35.
- iii. Meinel G & A Hernig, 2005. Survey of soil sealing on the basis of the ATKIS basic DLM - feasibilities and limits. In: *Proceedings of CORP 2005 & Geomultimedia05*, edited by M Schrenk, Wien, 359-363.

- iv. Wilson J S, M Clay, E Martin, D Stuckey & K Vedder-Risch, 2003. Evaluating environmental influences of zoning in urban ecosystems with remote sensing. *Remote Sensing of Environment*, 86: 303-321.
- v. Eichberger S & W Sulzer, 2004. Urban development of Graz - A time-Series analysis with historical aerial photographs. 1st Göttingen GIS & Remote Sensing Days - Environmental Studies - Göttingen, 07. - 08.10.2004, *Göttinger Geographische Abhandlungen*, Heft 113: 63-70.