A new concept of wildland-urban interface based on city clustering algorithm

M. Kanevski (1), A. Champendal (1), C. Vega Orozco (1), M. Tonini (1), and M. Conedera (2)

(1) Institute of Geomatics and Analysis of Risk, University of Lausanne, Switzerland (Mikhail.Kanevski@unil.ch), (2) WSL Swiss Federal Research Institute, Insubric Ecosystems Research Group, Bellinzona, Switzerland

Wildland-Urban-Interface (WUI) is a widely used term in the context of wild and forest fires to indicate areas where human infrastructures interact with wildland/forest areas. Many complex problems are associated to the WUI; but the most relevant ones are those related to forest fire hazard and management in dense populated areas where fire regime is dominated by anthropogenic-induced ignition fires. This coexistence enhances both anthropogenic-ignition sources and flammable fuels. Furthermore, the growing trend of the WUI and global change effects may even worsening the situation in the near future. Therefore, many studies are dedicated to the WUI problem, focusing on refinement of its definition, development of mapping methods, implementation of measures into specific fire management plans and the validation of the proposed approaches.

The present study introduces a new concept of WUI based on city clustering algorithm (CCA) introduced in Rosenfeld et al., 2008. CCA was proposed as an automatic tool for studying the definition of cities and their distribution. The algorithm uses demographic data – either on a regular or non-regular grid in space – where a city (urban zone) is detected as a cluster of connected populated cells with maximal size. In the present study the CCA is proposed as a tool to develop a new concept of population dynamic analysis crucial to define and to localise WUI.

The real case study is based on demographic/census data - organised in a regular grid with a resolution of 100 m and the forest fire ignition points database from canton Ticino, Switzerland. By changing spatial scales of demographic cells the relationships between urban zones (demographic clusters) and forest fire events were statistically analyzed. Corresponding scaling laws were used to understand the interaction between urban zones and forest fires. The first results are good and indicate that the method can be applied to define WUI in an innovative way.

Keywords: forest fires, wild-land-user interface, city clustering algorithms.

References
Rozenfeld Hernan D., Diego Rybski, Jose S. Andrade Jr., Michael Batty, H. Eugene Stanley, and Hernan A. Makse. (2008): Laws of Population Growth. Proceedings of the National Academy of Sciences U.S.A., 105: 18702–18707.