



## **Degree of urban sprawl in Switzerland: Quantitative analysis 1940–2002 and implications for regional planning**

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### *Objectives*

Urban sprawl (dispersed urban development) has a number of negative ecological, aesthetic, and economic effects. Urban sprawl has increased considerably over the last 20 years, even though several political declarations have called for a trend reversal. Therefore, data on the degree of urban sprawl that take into account the spatial configuration of the settlement areas (not just total amount) and on how it has developed (time series) are needed that are suitable for comparing different regions. The project has three parts the objectives of which are: (1) development of a new measure of the degree of urban sprawl that takes into account the spatial configuration of the urban areas; (2) quantitative analysis of urban sprawl in Switzerland; (3) determination of the interrelations between urban sprawl and landscape fragmentation (using time series of landscape fragmentation 1900-2002 from an ongoing and closely related project), identification of trends for the future development (for 2020 and 2050), comparison of different alternative scenarios based on trend extrapolation and different assumptions on the development of the human population in Switzerland and on the location of the new development areas to interpret the implications of these trends, and conclusions for regional planning including identification of the most urgent need for action and the proposal of new measures for controlling urban sprawl according to the principles of sustainable development.

### *Concept*

The three main research questions are: (1) How can the degree of urban sprawl be measured? (2) What was the development of the degree of urban sprawl in Switzerland since 1940 and what are the trends for the future? (3) How can the development of urban sprawl be controlled? Urban sprawl is among those pressing environmental issues where suitable quantitative indicators are still lacking. In earlier studies, the spatial configuration of urban areas has not been included successfully in quantitative descriptions of the degree of urban sprawl. Therefore, development of a new method is required based on a systematic set of suitability criteria. The project quantitatively investigates the development of urban sprawl in Switzerland since 1940 until 2002 using historic topographic maps and identifies trends for the future development (for 2020 and 2050). The project draws conclusions for regional planning and proposes new measures for controlling urban sprawl. To interpret the implications of the trends identified, the project develops and compares a set of alternative scenarios based on trend extrapolations and different assumptions on the development of the human population in Switzerland and on the spatial distribution of the new urban development (e.g., urbanization, suburbanization, extreme sprawl, strong or deficient protection of the BLN-areas, i.e., the “landscapes and natural sites of national importance”).

### *Expected Results*

The products of the project will include a map of the degree of urban sprawl, a diagram of the development of urban sprawl (time series of the degree of urban sprawl 1940-2002), and spatial comparisons of the degree of urban sprawl (among regions, cantons, and natural landscape units or ecozones). The time series of the degree of urban sprawl will be used as a sustainability indicator in the MONET project (Monitoring Sustainable Development) and for monitoring in the project "Swiss Spatial Monitoring Program" by the ARE (Federal Office for Spatial Development) and the BUWAL (Swiss Federal Agency for the Environment, Forests and Landscape). The project will also develop new measures for controlling urban sprawl according to the principles of sustainable development. The outcomes of the project are expected to significantly improve the data basis and the understanding of urban sprawl as a foundation for planning and decision making and therefore will be highly relevant to many social and economic issues related to urban development such as the conditions of working, dwelling, and recreation, and the costs of infrastructure.

### *Networking*

Implementation of the results will mainly be achieved through the collaboration with the ARE, the BUWAL, and several other national and international institutions as well as the administrations on the cantonal level (through canton-specific summaries that will be sent to the cantonal administrations).

National programmes: Monitoring der nachhaltigen Entwicklung MONET (ARE, BFS, BUWAL), Programm Raubeobachtung Schweiz (ARE), Projekt Wildtierkorridore (BUWAL, Vogelwarte Sempach), Projekt REN – Nationales ökologisches Netzwerk (BUWAL), Landschaft im Ballungsraum (WSL), Landschaft 2020 (BUWAL, WSL), Landschaftswandel im Schweizer Mittelland (Professur für Natur- und Landschaftsschutz ETHZ), Scenarios for sustainable development of the built environment in Switzerland 2005-2030 (NFP 54 project Prof. Schmid, ETHZ).

National institutions: Bundesamt für Raumentwicklung (ARE), Bundesamt für Umwelt, Wald und Landschaft (BUWAL), Vogelwarte Sempach, Abteilung Naturschutz und historische Ökologie der WSL, Professur für Natur- und Landschaftsschutz ETH Zürich, Institut für Raum- und Landschaftsentwicklung ETH Zürich.

International programmes: Development of environmental indicators to measure sustainable development (EURAC Bozen, Univ. Stuttgart), Applicability of environmental indicators in national reports of the state of environment (EURAC Bozen, Environment Canada)

International institutions: EURAC Bozen (Italy), Institut für Landschaftsplanung und Ökologie at the University of Stuttgart (Germany), Carleton University and Environment Canada (Canada)

### *Case Study Area*

Switzerland