



Cartography and GIS

has the honor to invite you to the public defense of the PhD thesis of

Philip STESENS

to obtain the degree of Doctor of Sciences

Joint PhD with Université Libre de Bruxelles

Title of the PhD thesis:

*Towards an ecological approach for sustainable urban planning:
the case of the Brussels-Capital Region*

Promotors:

Prof. dr. Frank Canters
Prof. dr. Ahmed Z. Khan (ULB)

The defence will take place on

Wednesday June 19 2019 at 16.00h

at Avenue Franklin Roosevelt 50, 1050 Ixelles,
Auditorium AY2.112, Campus Solbosch

Members of the jury:

Prof. dr. Rika Devos (chairperson, ULB)
Prof. dr. Fabio Vanin (secretary, VUB)
Prof. dr. Marijke Huysmans (co-promotor, VUB)
Prof. dr. Philippe Bouillard (ULB)
Dr. Francesc Baró (Univ. Barcelona)
Dr. Ann Van Herzele
(Instituut voor Natuur- en Bosonderzoek)

Curriculum vitae

Philip Stessens graduated at KU Leuven as Civil Engineer and Architect (MSc Architecture) and worked as architect and planning consultant in the office of current Vlaams Bouwmeester Leo Van Broeck. He supported a team of Mendes Da Rocha in São Paulo, and also worked as project leader for Bureau Bas Smets. In 2014 he started his PhD research at the Cartography and GIS Research Group of VUB and BATir (Building, Architecture and Town planning) of ULB, with Innoviris Prospective Research funding. Since the end of 2018 he is part of the CO-NATURE team (Innoviris Anticipate project) focusing on co-production of scenarios for nature-based urban regeneration.

Abstract of the PhD research

The environmental concern for **urban nature and re-naturing of cities** is at the heart of developing more **ecological approaches to sustainable urban design and planning**. As such, there is a need for a better understanding of the role of urban green in sustainable planning and design and for the development of evidence-based frameworks for planning that incorporate citizens' needs. This study intends to contribute to the development of a more ecological framework for sustainable urban design and planning aimed at integrating nature in the city more effectively and in an evidence-based way.

The first part of the research focuses on the development of a **spatially explicit tool for green space quality and proximity assessment** reflecting user's perception. Application of the model in the **Brussels** context reveals that user's perception of qualities of urban green spaces such as naturalness and spaciousness can be linked to green space characteristics as described by available GIS-based data. As such GIS-based modelling allows for an extrapolation of questionnaire-based quality assessments for a selection of parks to other public green spaces.

Analysis of the proximity of urban green spaces based on user's perception shows **spatial inequalities** in green space provision, with less than 50% of Brussels' citizens having good access to small (residential and play green) and to large green spaces (city and metropolitan green). By coupling multi-scale proximity assessment with quality assessment of green spaces, it is demonstrated that nearly two third of the Brussels population has no access to high quality public green spaces.

Through collaborative **research by design** workshops involving different stakeholders, indicators produced by the quality-proximity model are used to indicate and tackle problem areas. Three **alternative scenarios** for public green space development are defined. The analysis demonstrates that actions to provide low-income neighbourhoods with a good accessibility to public green spaces will require creative solutions, dealing with complex property and management issues, and levels of investment that go well beyond the cost of regular green space development.

The last part of the study presents a GIS- and design-based approach to **assess potential land cover change** for the Brussels-Capital Region **anticipating expected population growth**. By studying the everyday processes for parcel infill and densification, and by defining a **densification process** based on the principles of **sustainable urban design**, two **land use evolution scenarios** are formulated; a business-as-usual and a sustainable scenario. One of the main conclusions of the case study on Brussels is that densification can be deployed as a vehicle for positive land cover change and greening of the city.