



Quantifying and upscaling the effect of analogous green roofs on ecosystem services

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ABSTRACT

Unprecedented urbanization has resulted in a transformation of urban ecosystems owing to the reduction in green areas and increase in impervious surfaces. Thus, nature-based solution (NBS) such as green roofs become highly relevant especially in highly dense urban areas. In this project, analogous green roofs which consist of indigenous species are considered.

KEYWORDS

Analogous green roofs, ecosystem services, remote sensing, human wellbeing, Walloon region, cities

PROBLEM

Current studies relating to green roofs (GRs) are largely conducted at building or block level. Although, there are a few studies conducted at a city scale, not all ecosystem services are equally discussed. Moreover, the ecosystem services provided by GR can be highly context dependent. It might vary depending on the parameters such as building density and population. Apart from this, although the GRs are now mainstream, their social acceptability is still quite low. People's perception of GRs is often based on its visual appeal. Vegetation on GRs is often dependent on the local weather conditions and might appear different in different seasons.

OBJECTIVE

To quantify and upscale the effect of analogous green roofs on ecosystem services at landscape scale along with integration of citizen perception and participation in the context of Walloon region.

AUDIENCE

Researchers, environmental managers, landscape planners, urban and environmental planners

RESEARCH QUESTION

What is the potential of GR implementation in the Wallonia cities? What is the contribution of GRs to ecosystem services at a city scale? Does the existing potential of GR match with the public's perception?

ORIGINALITY

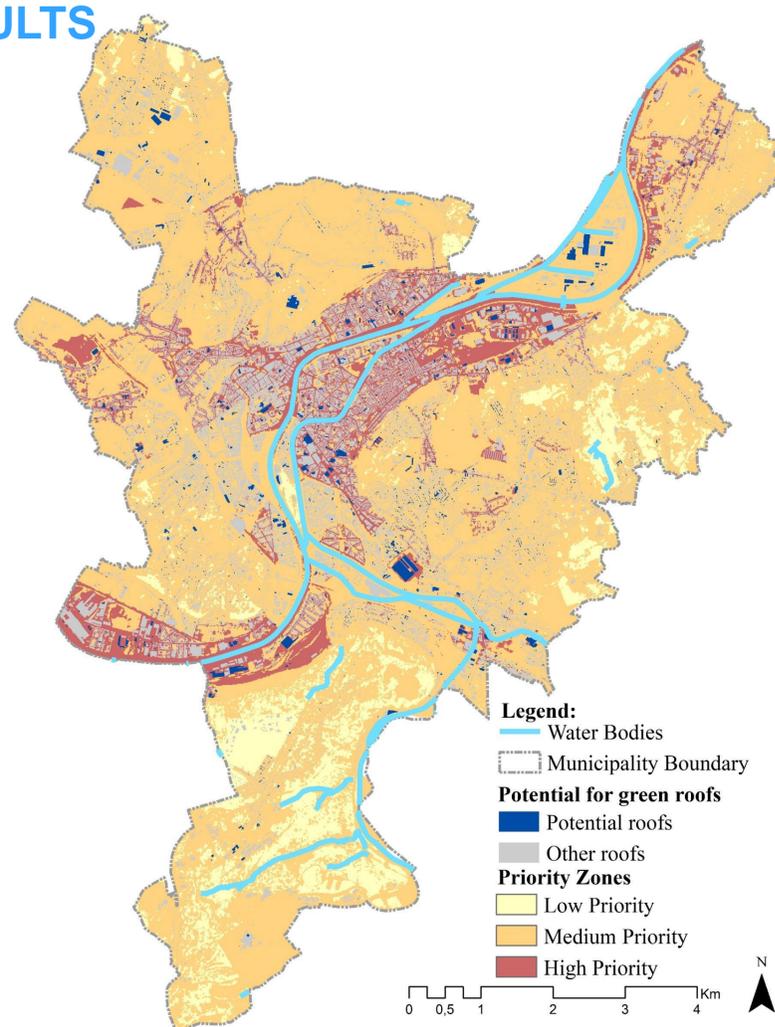
1. Development and validation of a methodology to identify existing available roofs for GR implementation in the cities of Walloon region.
2. Analyzing the role of GRs in enhancement and maintenance of urban ecological networks.
3. Analyzing the role of GRs in enhancing pedestrian/human thermal comfort
4. Comprehensive people preference and perception analysis about analogous green roofs

Resources: JOSHI, M.Y.; SELMI, W.; BINARD, M.; NYS, G.-A.; TELLER, J. Potential for urban greening with green roofs: A way towards smart cities. ISPRS Ann. Photogramm. Remote Sens. Spat. Inf. Sci. 2020, 87–94. MUSY, M.; MALYS, L.; MORILLE, B.; INARD, C. The use of SOLENE-microclimat model to assess adaptation strategies at the district scale. Urban Clim. 2015, 14, 213–223.

METHODOLOGY

Methodology for this project is specific to each of the research question. For identifying the potential of GR implementation in cities, three parameters such as slope of roof, structural strength of the building and area of the roof was considered. Additionally, priority areas were identified in order to maximize the impact of GR implementation. For assessing impact on ecosystem services, we focus mainly on microclimate regulation and contribution to ecological network. For analyzing GR's impact on microclimate SOLENE-microclimate tool will be used. Additionally, for assessing the contribution to ecological networks, existing ecological areas such as meadows and grasslands will be mapped and their distance from GR potential roofs will be assessed for different species. Lastly, for integrating public perception, landscape preference surveys will be arranged with a comprehensive list of questions after analyzing visibility of potential roofs. Geotagging will be further carried out for validation.

RESULTS



CONCLUSION

In the city of Liege, we identified that 20% of the roofs can be mobilized with GRs. Considering such large potential in one city, this project will enhance the knowledge on a sustainable solution of GR, its potential and role in regulating ecosystem services at a city and regional scale. Moreover, public being an important actor will be integrated in this project to meet the expectations of end users.