

## **Hot-spot analysis applied to the identification of potential high and low regulating, providing and cultural ecosystem services in Vilnius Region (Lithuania)**

Paulo Pereira (1), Depellegrin Daniel (1), Lukas Egarter-Vigl (2), Artemi Cerda (3), Ferran Estebanz (4), and Ieva Misiune (1)

(1) Mykolas Romeris University, Environmental Management Centre, Vilnius, Lithuania (paulo@mruni.eu), (2) Institute for Alpine Environment, EURAC Research, Viale Druso 1, 39100 Bolzano, Italy, (3) Department of Geography, University of Valencia, Spain, (4) Sec. Zoologia i Antropologia, Dept. de Biologia Evolutiva, Ecologia i Ciències Ambientals, Facultat de Biologia, Universitat de Barcelona, Spain.

Ecosystem services (ES) potential assessment is crucial for a correct territorial planning at different scales of analysis (Depellegrin et al., 2016). In urban and peri-urban areas, sprawl, grazing and unsustainable agriculture practices contributed to land degradation and decrease of the quality and quantity of the services provided by these areas (Eldridge and Delgado-Baquerizo, 2017; Favretto et al., 2017). In order to understand the spatial pattern of these impacts, mapping ES potential is key to understand the areas that need to be restored and protected for an unsustainable use (Brevik et al., 2016; Egarter-Vigl et al., 2017; Pereira et al., 2017). Hot-spot analysis is a good method to identify clusters of areas with high and low capacity for ES capacity. This analysis is very useful to detect homogeneous areas, where ES have high or low quality. The objective of this work is to apply a hot-spot analysis to detect areas with high/low capacity for Regulating, Provision, Cultural and Total ES in Vilnius region. ES potential was carried out based on the matrix developed by Burkhard et al. (2009), which ranks ES capacity from 0=no capacity to 5=very high relevant capacity to a different land use type. The results showed that regulating, providing and cultural and total ES have a significant dispersed (low-clustered) pattern: Regulating (Z-score=-19.28,  $p<0.001$ ), Providing (Z-score=-29.28,  $p<0.001$ ) Cultural (Z-score=-8.13,  $p<0.001$ ) and Total (Z-score=-22.46,  $p<0.001$ ). This shows that ES capacity in Vilnius area is extremely fragmented and there is a lack of connectivity between the areas with high capacity of ES. There is lack of green corridors and connectivity between green areas is attributed to the urban sprawl observed in Vilnius area (Pereira et al., 2014).

### References

- Brevik, E., Calzolari, C., Miller, B., Pereira, P., Kabala, C., Baumgarten, A., Jordán, A. (2016) Historical perspectives and future needs in soil mapping, classification and pedological modelling, *Geoderma*, 264, Part B, 256-274.
- Burkhard B, Kroll F, Müller F, Windhorst W. 2009. Landscapes' capacities to provide ecosystem services—a concept for land-cover based assessments. *Landscape Online*. 15, 1–22.
- Depellegrin, D.A., Pereira, P., Misiune, I., Egarter-Vigl, L. Mapping Ecosystem Services potential in Lithuania. *International Journal of Sustainable Development and World Ecology*, 23, 441–455.
- Egarter-Vigl, L., Depellegrin, D., Pereira, P., De Groot, D., Tappeiner, U. (2017) Mapping the ecosystem service delivery chain: Capacity, flow, and demand pertaining to aesthetic experiences in mountain landscapes, *Science of the Total Environment*, 574, 442–436.
- Eldridge, D.J., Delgado-Baquerizo, M. (2017) Continental-scale impacts of livestock grazing on ecosystem supporting and regulating services. *Land Degradation and Development*. DOI: 10.1002/ldr.2668
- Favretto, N., Lueding, E., Stringer, L., Dougill, A.J. (2017) Valuing ecosystem services in semi-arid rangelands through stochastic simulation. *Land Degradation and Development*. DOI: 10.1002/ldr.2590
- Pereira, P., Brevik, E., Munoz-Rojas, M., Miller, B., Smetanova, A., Depellegrin, D., Misiune, I., Novara,

A., Cerda, A. (2017) Soil mapping and process modelling for sustainable land management. In: Pereira, P., Brevik, E., Munoz-Rojas, M., Miller, B. (Eds.) Soil mapping and process modelling for sustainable land use management (Elsevier Publishing House) ISBN: 9780128052006

Pereira, P., Monkevicius, A., Siarova, A. (2014) Public perception of the Environmental, Social and Economic impacts of Urban Sprawl in Vilnius, *Societal Studies*, 6, 256 – 290.