

Assessing the effect of scale enlargement on the provision of landscape services in a rural landscape in Germany

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Scale enlargement and intensification of agricultural management is an issue of growing concern in post-Soviet Eurasia (Visser and Spoor, 2011) and also in Eastern Germany, where land market dynamics resulted in an increase of land prices by 132% between 2006 and 2013, while it was only 19% in Western Germany, causing high pressure and competition for local cooperatives and individual farmers to leave their fields to larger companies. These changes are currently affecting the spatial structure and composition of the rural landscapes being often associated with the risk of removal of landscape elements following the changes in field plot sizes (Stoate et al., 2001, 2009). This paper presents a methodology to model and to analyse the effect of landscape elements removal on the land system architecture in the “Märkische Schweiz”, central eastern Brandenburg, a case study area of the EU project CLAIM with a cultural landscape characterised by its small-scale and semi-open landscape structure.

To assess potential changes in landscape characters and services, we simulate the increasing removal of landscape elements such as single trees, tree groups and lines, hedgerows, alleys and windbreaks following field enlargements and intensification of agricultural management. The methodology is based upon a probabilistic approach to landscape services spatial modelling and assessment making use of geostatistical simulations (Goovaerts, 1997). It allows the quantification of spatial heterogeneity (Garrigues et al., 2006) and modelling of changes in the whole landscape architecture associated with the different rates of landscape elements removal. In setting different scenarios, plots of increasing size are merged and associated elements removed. Effects of these elements removal are assessed via observations of landscape elements at random points within a regular reference grid, followed by indicator coding, variogram analysis and kriging of single indicators via sequential simulations.

The operational relevance of this method is related to its use for benchmarking maximum extent of endowment with different landscape elements. As it is flexible and generally applicable, it can support mapping and complement participatory expert or stakeholder assessment based approaches and decision making.

References

- Garrigues, S., Allard, D., Baret, F., Weiss, M., 2006. Quantifying spatial heterogeneity at landscape scale using variograms models. *Remote Sensing and Environment*, 103, 81-96.
- Goovaerts, P., 1997. *Geostatistics for Natural Resources Evaluation*. Oxford University Press, Oxford, New York.
- Stoate, C., Boatman, N.D., Borralho, R.J., Carvalho, C.R., Snoo, G.R., Eden, P., 2001. Ecological impacts of arable intensification in Europe., *Journal of Environmental Management*, 63, 337-365.
- Stoate, C., Báldi, A., Beja, P., Boatman, N.D., Herzon, I., van Doorn, A., de Snoo, G.R., Rakosy, L., Ramwell, C., 2009 Ecological impacts of early 21st century agricultural change in Europe – A review . *Journal of Environmental Management*, 91(1), 22-46.
- Visser, O., Spoor, M., 2011. Land grabbing in post-Soviet Eurasia: the world's largest agricultural land reserves at stake. *The Journal of Peasant Studies*, 38(2), 299-323.