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**Evaluating landscape impacts of climate mitigation; quantifying the loss of open space in land use change simulations**

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Bioenergy production can help mitigate climate change and is therefore part of various stimulation programs (e.g. EC, 2009). This climate control option is, however, causing concern for issues such as food security, food prices and major landscape impacts such as the loss of traditional agricultural open space. The latter is the focus of this study.

Although open space preservation has been a major spatial planning issue in many developed, densely populated countries for decades, the amount and quality of open space are diminishing rapidly, affecting both quality of life and viability of ecosystems. For the design of more successful spatial policies we need to anticipate the landscape effects of different future land-use configurations under different social economic and climate change scenarios. This paper presents a new method to analyse the landscape impacts on open space that are associated with the large-scale production of second generation energy crops such as reeds and willow. An essential component in the proposed method is the application of a land-use model to simulate future land-use patterns that will be evaluated for spatial effects with the help of a group of specifically designed indicators.

Apart from the challenging task of developing plausible land-use scenarios this methodology faces the difficulty of determining indirect spatial effects of land-use configurations using spatial data of common land use models of very limited quality in terms of spatial and attribute resolution. The latter problem offers a relatively unexplored research area as most landscape related research on openness is focussed on the spatial effects of current land use. To overcome the data quality issue additional data layers are used in the analysis that relate to landscape typology and cultural heritage. Furthermore, scenario dependent decision rules are used to value specific land-use changes in certain areas. Indicators are operationalised in a geographic information system using common spatial analysis techniques such as patch and neighbourhood analysis. To validate the results, derived indicator values for current land use are compared with the results of state of the art indicators for specific study areas. The assessment focuses especially on the areas that are likely to be used for the cultivation of biofuel crops and builds on a previous study into the potential of such crops in the Netherlands (Kuhlman et al., 2010).

**References**

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