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Exploring the potential for biofuel crops in the Netherlands

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Bioenergy, defined as energy from biomass, has the advantage that the carbon dioxide released into the atmosphere by its combustion is compensated for through the carbon dioxide that was initially stored by the vegetation from which the energy was derived. The first-generation biofuels are, however, generally discredited because they are considered to compete with food crops and are suspected of causing as much greenhouse gas emission as they save. Much hope is therefore placed on second-generation biofuels such as cellulose-based ethanol. This requires the bulk production of biomass.

In a densely populated country such as the Netherlands one would not expect much scope for producing such a low-value crop. Yet, if it is combined with other forms of land use such as water retention, it can be economically feasible – if not under present conditions, but under a climate change scenario. Climate change can not only lead to an increased demand for land for water retention, but also to a lower profitability of alternative agricultural land use. If we add to this the likelihood of increasing energy prices, the feasibility of growing reed and/or willow for biomass production comes into view. These are plants that grow naturally in the wetter parts of the country, and can produce high yields even under waterlogged conditions.

To explore the potential location of such biomass production a combination of two different types of land-use related models at different scales is applied. The global multi-sectoral models LEITAP and IMAGE (Eickhout et al., 2007; Van Meijl et al., 2006) are used to define the demand for different types of land use, including the cultivation of biofuel crops. The models are based on scenario-based assumptions on world-wide economic drivers and policies related to the stimulation of biofuels in Europe (Perez-Soba et al., 2010). The aggregate outcomes (at the national level) are then used in the Land Use Scanner model (Koomen et al., 2008) to simulate local land-use patterns.

References

Eickhout, B., Van Meijl, H., Tabeau, A. and Van Rheenen, T. (2007) Economic and ecological consequences of four European land use scenarios. *Land Use Policy* 24: 562-575.

Koomen, E., Loonen, W. and Hilferink, M. (2008) Climate-change adaptations in land-use planning; a scenario-based approach. In: Bernard, L., Friis-Christensen, A. and Pundt, H. (eds.), *The European Information Society; Taking Geoinformation Science One Step Further*. Springer, Berlin, pp. 261-282.

Perez-Soba, M., Verburg, P.H., Koomen, E., Hilferink, M., Benito, P., Lesschen, J.P., Banse, M., Woltjer, G., Eickhout, B., Prins, A.-G. and Staritsky, I. (2010) Land use modelling - implementation; Preserving and enhancing the environmental benefits of "land-use services". Final report to the European Commission, DG Environment. Alterra Wageningen UR/ Geodan Next/ Object Vision/ BIOS/ LEI and PBL, Wageningen.

Van Meijl, H., Van Rheenen, T., Tabeau, A. and Eickhout, B. (2006) The impact of different policy environments on agricultural land use in Europe. *Agriculture, Ecosystems & Environment* 114(1): 21-38.