Biodiversity in agricultural areas. Modelling ecological processes

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Over the last few decades agricultural areas have experienced pronounced changes. This is due to the development of modern, intensive agricultural techniques which, through automation, soil amelioration and landscape alteration resulted in a more monotonous and impoverished environment with respect to flora and fauna. Due to the complex interactions of the ecological processes present in agricultural envi-ronments, the effects of changes in these environments are also very diverse. Presently, experts warn that the biggest threat to global diversity comes from land use change. Therefore, sustainable land use concepts are urgently needed for the long-term maintenance of biodiversity as well as for the social and economic needs of humans. The effects of environmental changes are very diverse: on one hand they affect the struc-ture and function of ecosystems (e.g. production of biomass), and on the other hand they affect interacting systems (e.g. atmosphere). These diverse processes and the changes they induce on ecosystems in cultural landscapes can only be measured empirically with a large amount of time and money. It is here that eco-logical modelling plays an important role. Models are able to display reality in a simplified manner and can therefore give a better overview of the complex interactions. More processes of natural systems can be successively added to this simple models. Models in biodiversity and population ecology can analyse com-plex structures and events in ecosystems as well as specific questions, e.g. the survival rate of single animal or plant species. Meanwhile, modelling and simulation of ecological processes has been established as a useful tool for scientific work in order to understand principles of organisations of ecosystems. In conjunc-tion with Geographical Information Systems, models can be important tools in helping with decision mak-ing in environmental and landscape management.

In this paper, models will be presented which simulate the effects of land use change on species ichness within an agricultural area (see Fig. 1). Through the use of these models it was possible to gain important findings about the direct and indirect effects of land use changes.