



Development of agricultural land use scenarios in a southern Bavarian mesoscale catchment for implementation into a hydrological water quality model

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In an on-going study in southern Bavaria, future land use scenarios for the upper Altmühl watershed, to the gauge at Treuchtlingen (980 km²), were developed up to 2040. A spatial resolution (pixel) of 100 m by 100 m was used. To establish the land use scenarios, three spatial levels were studied; the farm level (local and municipal), the regional level (rural district and state) and the national level (country or continental). A particular emphasis was placed on the farm level because the local scale of study can be very helpful to link specific land use changes to resulting impacts on water quality.

In order to describe land use change at the farm systems scale, the necessary drivers of change were determined based on factors influencing the decisions made by producers in the watershed. These were gauged through a postal questionnaire sent to a subset of farmers in the watershed. To perform such an interrogative analysis, a number of steps were undertaken, which included liaising with stakeholders at the federal ministries and with the local authorities, as well as with local farmers. Stakeholder involvement included in-depth discussions and meetings on the challenges facing water quality in the watershed, interviewing farmers, and collecting relevant digital data pertaining to the watershed from the authorities (e.g. DEM, soil, topography, precipitation, historic land use/land cover).

Agricultural land use change scenarios of the future quantities and spatial distribution of crops in the watershed were consequently modelled (2040 time horizon) using the established driving factors of change, at the three spatial levels, as input into the CLUE-S model (Conversion of Land Use and its Effects- Small Scale) (Verburg et al. 2002). A range of scenarios were developed based on the breadth of answers from the questionnaires, and on a variety of markets and policy influencing factors.

How the land use scenarios were developed and the range of future land use scenarios will be expounded in the oral presentation. Consequent steps of the study will include determining the impacts of the agricultural land use changes, along with future climate change scenarios, on the quality of surface water in the Altmühl watershed. The effects of these changes will be evaluated on surface water quality by applying the hydrological water quality model SWAT (Soil and Water Assessment Tool) (Arnold et al. 1998).