# The European Common Agricultural Policy and its effects from the hydrological perspective: Scenario studies for a low mountainous German catchment

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The aim of the European Common Agricultural Policy (CAP) is to provide consumers with quality food at fair prices and to provide farmers with a reasonable standard of living. The way the governments have tried to meet these aims has changed over the years. The key concept of CAP was to subsidise production of basic foodstuffs in the interests of self-sufficiency. The current CAP emphasises direct payments to farmers as the best way of guaranteeing farmer incomes, food safety and quality, and environmentally sustainable production.

In this study, the agro-economic simulation model ProLand is used to predict land use distributions for the Dill Catchment that are optimal from an economic point of view under historical and current CAP. The Dill catchment is a low mountainous German catchment with an area of ($693$ km$^2$). ProLand is an agro-economical model that calculates optimal agricultural and forest production systems assuming that all farmers maximize their profit. It accounts for different natural, technical, economic and political boundary conditions. ProLand delivers spatially differentiated land use maps that are used within the eco-hydrological model SWAT to investigate the effects of the CAP on water fluxes. Prior to model application, SWAT is automatically calibrated by the use of the combined ScuffIed Complex Evolution Metropolis algorithm (SCEM-UA). Results for various hydrological fluxes of the CAP scenarios such as discharge, groundwater recharge, and direct runoff are compared and set in relation to the current land use distribution. Further, an uncertainty analysis based on Latin Hypercube sampling is conducted to investigate the significance of changes in the hydrological components fluxes.