# Modelling long-term phosphorus and trace metal accumulation in Swiss agricultural soil

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Application of manure and inorganic fertilizers is the main pathway for the input of phosphorus (P) and some trace metals (e.g. zinc) into agricultural soils. Accumulation of these elements in soil is undesirable. Above certain levels they negatively affect soil fertility. Their accumulation also implies elevated risks of export with runoff and erosion into surface waters. Furthermore, excessive application of nutrients is a waste of limited resources. A sustainable management of agricultural land and other environmental resources requires that the accumulation of P and trace metals in soils is avoided.

The overall objective of the project is the development of a tool that allows the identification of areas where P surplus inputs and trace metals accumulation are likely to take place, using available information from agricultural statistics and other sources. The specific objective of this work is to model long-term P and trace metal fluxes at field scale for representative sites in Switzerland. To this purpose the EPIC model was calibrated by using data from well documented soil monitoring sites. On these benchmark sites, soils have been sampled every five years and agricultural management has been recorded annually since 1986, allowing the estimation of P and trace metal fluxes. The EPIC model was chosen because of its capability to predict the effects of agricultural practices on soil, water and nutrient fluxes and the resulting impacts on soil loss and water quality as well as on crop yields. Adaptations have to be made so that it can also be used to simulate trace metal fluxes.

The calibrated model will then be used to estimate P and trace metal accumulation in the agricultural soil of the two Swiss cantons Thurgau and Fribourg and to analyze scenarios related to agricultural management options and their impacts on the accumulation of P and trace metals in soil in the long term (see abstract by Gärtner et al.).