

Climate and contaminants in agricultural drainage water

Biological food and fiber production markedly affect soil and water quality due to the use of agrochemicals such as nutrients and pesticides, as well as application of animal waste containing heavy metals (growth promoters) and other discharges. An expected effect of global change is changes in precipitation patterns, temperature and soil water regime. These changes are expected to affect physical, chemical and biological processes as erosion, redox, adsorption, degradation and the chemical speciation of bioactive contaminants in drainage water. In addition, changes in cropping patterns and in the use of fertilizers, manure, growth promoters and pesticides will change loads and dynamics of potential pollutants added to soils and leached from soils to ground- and surface waters. It is difficult to predict even whether the bioavailability and release of contaminants will increase or decrease.

This PhD-project will focus on the influence of climate changes on degradation, retention, leachability and bioavailability of potential pollutants in drained soils with preferential flow pathways. As part of the soil water regime, preferential flow and coupled phenomena (e.g. macropore transport of contaminants directly to field drains, colloid-facilitated transport) are particularly sensitive to changes in the precipitation patterns. Mathematical modeling of climate change scenarios will be a central approach. An experimental part will include the study of bioavailability and sorption/desorption kinetics of selected compounds with different properties. Copper (non-degradable element used in animal production) and one or two pesticides (sorbing, degradable) may be used as model compounds.

Contact: Associate Professor Peter E. Holm (peho@life.ku.dk), Department of Basic Sciences and Environment, University of Copenhagen. See also LIFE Water Research Initiative homepage at www.viva.life.ku.dk.