PHOSPHORUS RUNOFF IN THE AUSTRIAN MONDSEE CATCHMENT RELATED TO CLIMATE CHANGE PROJECTIONS

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ABSTRACT

The Mondsee catchment is embedded in the pre-Alpine Lake District to the east of Salzburg city, Austria. During the last decade lake Mondsee suffered from too high loads of phosphorus to surface water bodies during extreme events; namely the snow melting period and the 2-4 extreme precipitation events annually. In this poster we draft our approach to model phosphorus runoff scenarios during extreme events. We place some assumptions to characterise the dependency of the nutrient cycle and mobility of particles and substances in the landscape. The holistic and system based analysis shows that phosphorus emission increase with the intensity of grassland use, steepness of slopes and inundation areas. Phosphorus is an essential nutrient for grassland growth and needs to be replaced after grassland harvests. With each organic fertiliser application the probability of phosphorus emission increases, especially if extreme events happen directly after the fertilisation. Not only dissolved but also particle bound phosphorus is washed out with the water. Furthermore, increasing slopes and flooding zones contribute to an increase in phosphorus surface runoff, especially when buffer stripes are missing and/or applications have been brought too close to the surface water body. The model example shows annual total phosphorus loads per hectare. Plainfeld to the west, the area around the Irrsee (north) and the municipalities Thalgau and Sankt Lorenz (central part) have high phosphorus emission rates. In the overall study we analysed the Mondsee catchment according to a number of environmental indicators, among them the spatial-temporal distribution of precipitation, flooding, grassland harvests, elevation parameters (e.g. slope) to derive fields at risk of phosphorus emissions during heavy rainfall events. We based our semi-automated scenarios on past heavy rainfall events and calculated likely phosphorus emissions assuming a different number of days after fertiliser application. The overall phosphorus emissions correspond with the few in situ stream phosphorus measurements taken at low flow and high flow conditions in 2005, however, we could not compare our findings to real-time measurements during extreme events yet. Thus, so far the modelling results are just an estimation which we need to underpin with a method briefly described below. With our new Water In-situ Analyzer (WIZ) from Systea, uniting the presently unique possibility of measuring total phosphorus, dissolved phosphorus and PO_4^{3-}, and the setup wireless sensor network in our research field in the Mondsee catchment we will be able to measure phosphorus loads in water bodies during extreme precipitation events and hopefully will underpin our modelling results.