Contribution of drainage areas to P input of a small watershed in Upper Austria

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In Austria, phosphorus input of agriculturally used land into surface waters is frequently attributed to soil erosion. However, due to the high intensity of drained land in various regions, approaches in detecting hot spots of nutrient leaching into surface waters may also be needed. At present nutrient input via drainage and leaching is an unknown variable in Austria and it is difficult to extrapolate results of other European areas because of the different management intensities, and soil- climate conditions.

Testing all water influents of a headwater catchment within an intensively used farmland in Upper Austria, we estimated the contribution of drained areas to the total P loads of the area. The watershed was chosen because it is known to be a criticaI area for the 2015 WFD period due to high phosphorus contents. The tested catchment (260 ha) is partly drained and mainly used for maize, barley, wheat and rape. All incoming flow from tile-drainages and subcatchments were mapped (7 subcatchments, 25 inlets – tile-drains, wells). At two different discharge conditions snap shot sampling runs were done. During normal discharge conditions snap shot sampling was done in summer, the second campaign was run within a snow melt event in January. For all mapped inlets discharge was measured and water samples were taken to calculate loads and concentrations of phosphorus. Discharge was measured either using a salt dilution method or cylinders (when no upstream access was possible).

The two sampling campaigns from January and July were compared for total phosphorus loads at the catchment outlet, for the subcatchments and for percentage of tile-drain contribution. Discharge at the catchment outlet in summer was 43 l.s-1 , with a total phosphorus load of 19 mg P.s-1. During the snow melt event discharge of 186 l.s-1 was measured with P loads of 240 mg P.s-1. For the normal discharge conditions (summer sampling) 10% of the total phosphorus load could be attributed to tile-drains, this represents a percentage of discharge of 8.0% from total discharge. During snow melt (winter sampling) about 16% of the P load was leached from tile-drains which represents a percentage of discharge of 13.5% from total discharge at the catchment outlet.

So far, no clear conclusion can be made for detecting hot spots at this catchment, partly due to non-identified tile-drained areas, partly due to the totally different sampling conditions. A simpler answer might be that the area as such does not contain particular hot spots of P input, but P input is homogeneously distributed. Another sampling run in summer, with comparable discharge conditions is planned to obtain more information about spatially distributed P input.