Investigation of the effects of hydrometeorological and vegetation conditions on nitrate flushing from a small forested catchment with high-frequency in-stream monitoring

Klaudija Sapac, Andrej Vidmar, and Simon Rusjan

University of Ljubljana, Faculty of Civil and Geodetic Engineering, Ljubljana, Slovenia (klaudija.sapac@fgg.uni-lj.si)

Nutrients such as nitrates (NO_3-) are biologically reactive solutes. Their exports from catchments are controlled by a combination of hydrometeorological conditions and biogeochemical processes. In order to be able to study the dynamics of control mechanisms for nutrient flushing, high-frequency measurements are required, especially discharge data (high-frequency water level measurements) and streamwater solutes concentrations. While the areas with increased nitrogen intake (e.g. agricultural and urban areas) are studied mainly from the environmental pollution and water resources management point of view, the studies of forest areas without anthropogenic impacts are of great value for understanding background natural processes which retain or trigger nutrients from the catchments.

Therefore, in the forested Kuzlovec catchment, located NW of Ljubljana, Slovenia, we have established an experimental measuring network. The network comprises measuring equipment for high-frequency in-stream monitoring of nitrate (NO_3-) concentrations, pH, conductivity, water temperature, and other physico-chemical parameters as well as equipment for continuous water-level measurements. In addition, several tipping-bucket rain gauges are installed in the wider area of the catchment for monitoring rainfall data, which can be used for determining rainfall rates and total amounts. Based on the intensive field monitoring campaigns we obtained large dataset that will be analysed to determine the effects of hydrometeorological and vegetation conditions on the nitrate flushing from the forested Kuzlovec catchment and will be further used for knowledge discovery by applying several data mining techniques. Vegetation conditions, which change seasonally, are measured discretely with the leaf area index (LAI), since LAI is an indicator of forest phenology and vegetation dynamics.