

PROFOR (Austria): Integrating the effects of stream structure on nutrient loading patterns in restoration concepts for heavily modified streams

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Due to the high agricultural land use, most stream reaches in the northern part of Lower Austria are heavily modified and carry high amounts of nutrients. Together with the low precipitation in the region, this leads to a marked confinement of the streams' integrity and to a bad ecological status.

The aim of the proposed three-year project PROFOR (2008-2011) is to identify management options for such heavily modified low order streams which have the potential to influence the self-purification of these streams positively and to restore the good water quality according to the EC Water Framework Directive. The project focuses on biogeochemical processes which are linked to stream structures and river bed morphology and which can, thus, be influenced by restoration measures. For the study, characteristic stream reaches of different hydro-morphological features and degrees of modification, from semi-natural over restored to heavily modified reaches, will be selected. Nutrient loading and transformation patterns will be investigated at catchment (point vs. non-point sources), reach (four-dimensional nutrient transport and uptake patterns) and micro scale (individual uptake and release processes) and will be linked within functional models. Based on these results, a *Catalog of measures for small water bodies in agricultural landscapes* will be created. It will deal with various model situations and will provide management options for the long-term improvement of the water quality by either raising the in-stream nutrient uptake or, at least, by avoiding negative feedback loops on the water-sediment-interface or secondary eutrophication following restoration measures. The catalogue will be applied to pre- and post restoration sites for the verification and comparison of this process-based approach to the stream evaluation by the biotic components of the WFD.

In 2007, a pre-study was conducted in the project area to measure the range of the self-purification potential of differently affected streams via short term nutrient addition experiments. First results show the influence of ambient background conditions on the nutrient uptake. The pilot study is funded by the Government of Lower Austria.