

## **Ecological effects and chemical composition of fine sediments in Upper Austrian streams and resulting implications for river management**

Sarah Höfler, Christian Pichler-Scheder, and Clemens Gumpinger  
blatffisch e.U., Consultants in aquatic ecology, Wels, Austria (hoefler@blatffisch.at)

In the current scientific discussion high loads of fine sediments are considered one of the most important causes of river ecosystem degradation worldwide. Especially in intensively used catchment areas changes in the sediment household must be regarded as a reason, which prevents the achievement of the objectives of the European Water Framework Directive (WFD).

Therefore, the Upper Austrian Water Authorities have launched two comprehensive studies on the topic. The first one was a survey on the current siltation status of river courses in Upper Austria. The second study deals with two selected catchments in detail, in order to get a clear picture of the impacts of the fines on the aquatic fauna (trout eggs, benthic invertebrates), the chemical composition of these fractions, the crucial hydrogeological processes and to develop possible role models for measures both in the catchments and in the streams.

At eight sites within the two catchments sediment and water samples were collected at two dates for detailed chemical analysis. On one date additionally the benthic invertebrate fauna was investigated on the microhabitat level. Thereby it was possible to enhance the understanding of the range of ecological impacts caused by silting-up in different hydro-morphological circumstances and with different fine sediment loads.

The water samples as well as the sediment fraction samples <0.063 mm were examined for different metals, organochlorine pesticides, PAHs (Polycyclic Aromatic Hydrocarbons), PCBs (Polychlorinated biphenyls), BTEX (benzene, toluene, ethylbenzene, and xylenes), AOX (adsorbable organohalogens) and various nutrients. Additionally, the basic parameters dry residue, loss on ignition, TC (total carbon), TOC (total organic carbon) and nutrients were analysed. From the sediment eluates and the filtered water decomposition products of pesticides, remains of medical drugs, sweeteners, hormonally active substances and water-soluble elements were analysed.

Furthermore, a GIS-based analysis was carried out for the two examined catchments. The model included data gained from a digital elevation model, land use data and digital soil classification maps. This led to findings concerning the main sources and processes, which are responsible for anthropogenically induced high fine sediment loads in the streams. According to these results a GIS-based risk assessment tool for all Upper Austrian water-courses is developed, which will be used as instrument for the planning and measure implementation of the water management authorities.

Due to the necessity of highly integrative improvement measures covering whole catchments, fine sediments must be expected to be one of the most challenging future topics in aquatic ecology. Erosion, loss of soil, economical and social disadvantages due to that processes as well as ecological degradation of riverine systems and related flood risk issues, urgently have to be discussed and solved on a highly comprehensive basis.