

## Environmental hazard of reservoir sedimentation

Wildi Walter\* & Jüstrich Stéphanie\*

\*Institut F.A. Forel, Université de Genève, 10 route de Suisse, CP 416, CH-1290 Versoix (Walter.Wildi@terre.unige.ch)

At the end of the 20th century, approximately 45'000 major dams have been exploited around the world for irrigation, hydroelectricity and as drinking water reservoirs (WDC 2000). Most of these dams and reservoirs have been evaluated and are monitored with respect to flood and seismic hazard, whereas environmental aspects linked to the sediment fill are not considered.

In a series of applied and academic studies, the following reservoirs down stream of major Swiss cities have been investigated with respect to sediment quality and environmental impact: The Wettingen Reservoir, located on the Limmat River down stream from the city of Zürich, the Klingnau Reservoir on the lower Aare River, the Wohlen Reservoir down stream from Bern, the Verbois Reservoir down stream from the city of Geneva (Wildi et al. 2004). As a comparison with a natural lake, Vidy Bay (Lake Geneva), close to the city of Lausanne is also considered (Pardos et al. 2004, Poté et al. 2007).

For almost all the contaminants and all the sediment cores investigated, one observes a general trend from either elevated or increasing values at the base and in the lower part of the sediment cores, towards lower concentrations in the upper part and at the top of the cores. Strong contamination dates from the late 50<sup>ies</sup> to the late 70<sup>ies</sup> of the 20<sup>th</sup> century. Also, for each site and each contaminant, some specific features are recognised. The highest concentrations in organic and inorganic pollutants have been measured in Vidy Bay, due to the discharge of effluent water from the urban sewage treatment plant under particular lake current condition. The highest concentrations in reservoir sediments are those of the Wettingen dam.

Applying the criteria of the Swiss ordinance on soil protection, parts of the investigated sites have to be classified as contaminated. Concentrations may also exceed concentrations defined as quality goals by the International Rhine Commission (IKSR 1997). A comparison with "mean probable effect concentrations" (mPEC, Long et al. 2006) of the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life indicates that adverse effects on biota may be expected in certain cases.

The main environmental risk linked to the presence of contaminated sediments is remobilisation of the contaminants, and their return to the food chain, either by the uptake of sediments or suspensions by aquatic organisms of sediment feeders, or by infiltration into groundwater. A further question to be answered is the future of these sediments in the case of the end of exploitation and of deconstruction of the dam.

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