

## Potential for future hydropower plants in Switzerland: A systematic analysis in the periglacial environment



Griessee reservoir drawdown in Summer 2015 with Griesgletscher in the back (Photo: D. Ehrbar, VAW)

The expected glacier retreat in the coming decades due to atmospheric warming will offer new perspectives for the construction of reservoirs and hydropower plants in newly formed landscapes in front or just beyond the outer limits of glaciers (periglacial environment). However, the immediate proximity to the glacial environment will pose challenges in terms of construction, operation and maintenance, as the temporal evolution of glacier runoff and sediment transport have to be considered.

Especially reservoir sedimentation is of major importance in the periglacial environment. Several reservoirs in the Swiss Alps already face severe sedimentation rates, whereas others are observing accelerating sedimentation processes that are possibly linked to climate change. So far, the governing processes of reservoir sedimentation in highly glaciated catchments are not fully understood. In order to predict future reservoir sedimentation and guarantee sustainable reservoir management, additional research is needed.



ADCP measurements on Griessee (Photo: D. Ehrbar, VAW)

This research project will focus on the reconstruction of past and future sediment yield using current measurements of sedimentation volumes in the reservoir. An extensive measurement campaign will provide information about suspended sediment concentrations and the spatial and temporal variation of grain diameters and fractions within the reservoir. Amongst water and sediment samples, new measuring techniques such as Acoustic Doppler Current Profilers (ADCP) and Laser In-Situ Scattering Transmissometry (LISST) will be used. This data can be linked to the evolution of sediment transport in the catchment caused by glacier meltdown.

The obtained data set will allow to model sedimentation processes in the reservoir and forecast the reservoir sedimentation for the next 80 years. Furthermore, they allow to quantify the possible energy production of the hydropower plant and its contribution to the energy turnaround.

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