

## **Section Sciences et Ingénierie de l'environnement Design Project 2014 (semestre de printemps)**

### **Proposition n°12**

### **Estimation of future scenarios for energy production and its impacts on hydrology in the Hasliaare**

#### **Encadrant externe**

Steffen Schweizer  
Kraftwerke Oberhasli AG  
Grimselstrasse  
3862 Innertkirchen  
Téléphone 033 982 2019

Email: [steffen.schweizer@kwo.ch](mailto:steffen.schweizer@kwo.ch)

#### **Encadrant EPFL**

Prof. Paolo Perona  
EPFL ENAC IIE GR-PER  
GR A1 454 – Station 2  
CH – 1015 Lausanne  
Tél: 021/ 693 38 03  
Email: [paolo.perona@epfl.ch](mailto:paolo.perona@epfl.ch)  
Site web: <http://ahead.epfl.ch/>

#### **Descriptif du projet**

The flexible energy production with hydropower can change the short- and longterm discharge regime below the wateroutlet of a power plant (hydropeaking). E.g. a very fast increase in discharge can lead that many water insects (Macrozoobenthos) get removed from the river bed; or the risk of stranding can be very high for fish in the case that discharge decreases too fast. The revision of the Swiss Law for the Protection of Waterbodies requires that the ecological disturbances caused by hydropeaking have to be reduced until 2031.

In April 2013, the Kraftwerke Oberhasli AG (KWO) has begun with the construction of a retention basin and a storage cavern to mitigate the adverse effects of hydropeaking in the Hasliaare river (between Innertkirchen and Lake of Brienz). The construction will be completed in 2016.

Current experiments in Austria showed that stranding of fish depends on the season, day-/nighttime, age of fish and form of a gravel bar. To test if these new recommendations can be

fulfilled with the retention basin and storage cavern, hydrological simulations have to be conducted.

Several ecological investigations and hydrological / hydraulic simulations have already been conducted, e.g. two design projects in 2011 (Scheiss A., Rouge M., Stalder P.) and 2012 (Perona P., Theiler Q., Maire A.). Th design project proposed here would be a continuation of the already conducted projects. Different algorithms already exist.

### **Objectif**

To learn about aquatic ecology and hydraulic construction with respect to hydropeaking.

To test if new recommendations with respect to the rate of decrease in discharge can be fulfilled with the planned storage volume. Therefore already existing algorithms have to be adjusted.

In addition, further examinations with respect to drifting insects and increasing rate of discharge are possible.

### **Descriptif tâches**

- Introduction into the topic and region
- Adjustment of already existing algorithms
- Plausibility tests
- Representation of the results in a report
- Several meetings with the project leader (roughly every 3 weeks are disired)
- one or two field visits

### **Divers**

- Several meetings and a field visit are required.
- For the correspondance email is favoured.
- Language for the report and for the collaboration can be English or German.
- Hydropeaking will be an important topic for aquatic ecology and general water constructions within the next 20 years.