

Context

The problem of hydropeaking depends on hydraulic, morphological and ecological parameters. An interdisciplinary approach is necessary to address all issues in order to improve the environmental conditions downstream of hydropower schemes (EPFL, EAWAG and industrial partners).

- **Hydropeaking**
- Degradation of river ecosystem

Approach

High-head storage hydropower plants in Alpine areas are able to complement the irregular production of renewable energy sources, (wind power) in the European power supply system. Sudden opening and closing of the turbines produces highly unsteady flow conditions in the river downstream of the powerhouse outlet resulting in:

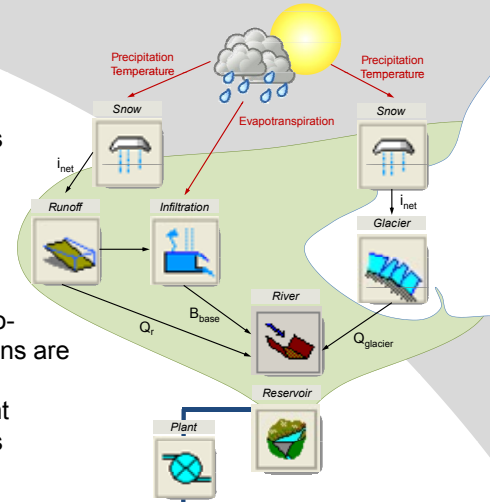
- **Mitigation measures**
- Improvement of river ecosystem

Modelling

A numerical model has been developed, calibrated and tested. In the hydrological forecasting tool three-dimensional rainfall, temperature and evapotranspiration distributions are taken into account for producing the dominant hydrological processes (Schälchli 2005):

- Snow pack constitution
- Snow melt
- Glacier melt
- Soil infiltration
- Runoff

- **Simulation of Alpine catchments**

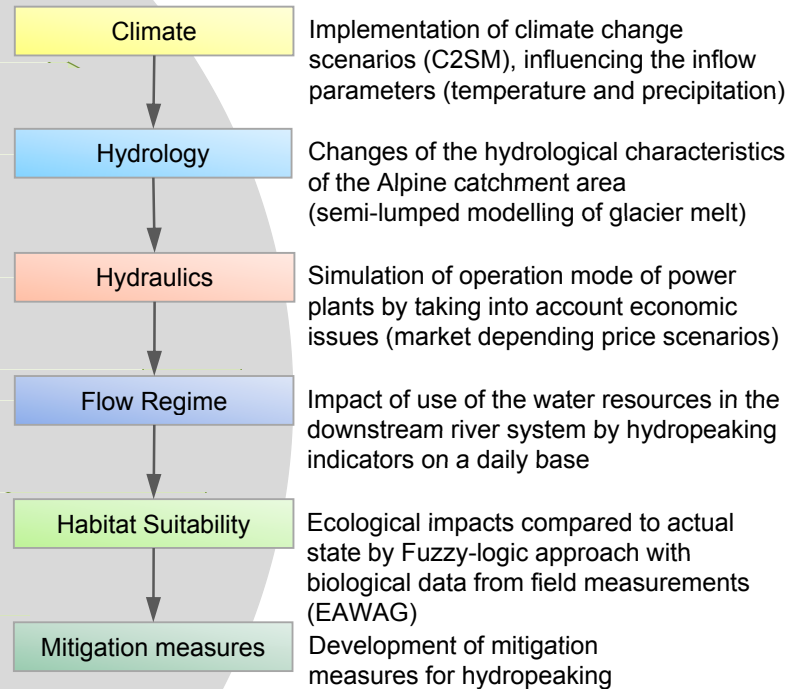


Routing System (Jordan 2007):

- Integration of routing in rivers
- Hydraulic structures (water intakes, reservoirs, spillways and turbines)

Parameter study

- **Evaluation of mitigation measures**



- **Economic, ecological and social rating**
- Multipurpose hydraulic schemes (Basin, tunnel, cavern, distributed system)
- Identification and location in the system

- **Case study**

Generally applicable methodology, which is tested for the Hasliaare River (CH)

