



## UFZ-Seminar



Research Unit

## Water Resources and Environment



12 September 2022, 10 a.m.

Room E 01, Theodor-Lieser-Straße 4, Halle/Saale

## Manuela Brunner

University of Freiburg, Germany

will give a talk on:

### Reservoir effects on streamflow seasonality and hydrologic extremes

Reservoir regulation affects various streamflow characteristics including variability, seasonality, and extreme events. Assessing these impacts remains challenging because of a lack of information on reservoir regulation, in particular at larger spatial scales. In this talk, I present three different approaches to assess the impacts of reservoir regulation on streamflow seasonality, hydrological extremes, and water scarcity. First, I introduce a statistical model to extract reservoir regulation signals from observed streamflow time series, which highlights periods with reservoir storage and releases. I apply this approach to a large sample of catchments in the Alps to identify groups of catchments with similar reservoir operation strategies. Second, I assess the impact of reservoir regulation on flood and drought characteristics using a large-sample dataset of natural-regulated catchment pairs in the United States. Last, I quantify the potential of reservoirs to alleviate water scarcity in a future climate for catchments in Switzerland by estimating both water supply and demand.

My results demonstrate that reservoir regulation can lead to substantial shifts in the seasonal water balance, particularly in mountain regions where reservoirs are often operated for hydropower production. They further show that both droughts and floods can be alleviated by reservoir operation and that this alleviation effect is only weakly dependent on reservoir purpose. Finally, they suggest that water scarcity can potentially be reduced if the regions prone to water scarcity are physically connected to water-abundant storage regions. Overall, this talk highlights that reservoir regulation affects both the seasonal water balance and hydrological extreme events, which we need to consider in climate, hazard, and risk assessments..