PROJECT FACTSHEET

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STORE-AGE

Tackling issues related to watershed management focused on catchment functions of water collection, mixing, storage and release

Inspiration

Understanding the impacts of climate change on the fundamental hydrological and biological functions of catchments is essential for ensuring sustainable water supply and quality of water bodies 'at risk' within the European Union. A current obstacle to progress in this understanding is the complex natural heterogeneity of catchments and high diversity of streamflow generating mechanisms. Catchment hydrologists have had water source, flowpaths and transit time on their research agendas for decades. Understanding the variability in space and time of hydrologic processes is indeed the key to success when it comes to anticipating how catchment functions of collection, storage and release will respond to climate changes and/or human activity. As an additional difficulty, we know that hydrosystems can show significant time lags in their response to these agents.

Innovation

The STORE-AGE project builds on past and current research carried out within a number of projects by the Luxembourg Institute of Science and Technology (LIST) and will follow three complementary lines of research focusing on catchment storage dynamics; time variance of transit time (TT) and transit time distributions (TTD); and the relationships between storage dynamics and catchment processes. To determine the potential of catchment storage, researchers will investigate the spatial and temporal variability of dynamic storage in a nested catchment set-up of the Alzette River basin, located in Luxembourg, covering a wide range of geological settings, catchment areas, contrasted landuse, and hydro-meteorological and tracer data series.

To investigate the time variant TTD, researchers will determine the various age components of streamflow through a multi-tracer approach, as well as investigate the physiographic controls on the variance and irregular shape of TTD as a result of antecedent wetness conditions, meteorological boundary conditions, and changing storage. Finally, in order to investigate the relationships between storage dynamics and TTD, researchers will use flow and streamflow isotope data for 16 catchments that drain into the Alzette River basin, located in Luxembourg.

Impact

The approaches developed and tested within STORE-AGE will help solve issues related to the assessment of catchment-scale mixing by linking catchment functions of storage and release through time-varying TT and TTD calculations. This is of particular interest to the City of Luxembourg as nearly 50% of the city's drinking water supply is based on contributions from the Luxembourg sandstone aquifer. Researchers will work with representatives from the city's water and technical services to share information on potential applications of project outcomes for water management and organise the sampling and measurement campaigns carried out within the project. The project has the potential to increase understanding of how catchments collect, store and release water, paving the way for improved water resource management and climate change impact mitigation.

Partners

University of Saskatchewan (CA) , Eidgenössische Technische Hochschule Zürich - ETH (CH) , Slovak Academy of Sciences (SK) , GNS Science (NZ)

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