



Distributed hydrological modeling in a mountainous snow dominated watershed with scarcity of hydropower data.

Kazi Rahman, Anthony Lehmann, and Emmanuel Castella

Institute of Environmental Science University of Geneva, Switzerland. (kazi.rahman@unige.ch)

Complex physically-based distributed hydrological model requires detailed spatial and temporal datasets for better predictive model performance. Soil and water assessment tool (SWAT) was applied in a mountainous glacier-dominated watershed in the upstream part of Rhone River in Switzerland. The catchment area covers 776.5 km² with strong anthropogenic influences together with water controlling for hydropower production through pipe network. In this study, which is part of the FP7 European project ACQWA, an attempt was made to develop a synthetic discharge dataset from hydropower stations based on available discharge signals together with overall catchment peaking. SWAT 2009 version developed in ArcGIS 9.3 was used for this study. Automatic calibration and sensitivity analysis were used for parameterization of the model. At first stage the catchment area calculation was done from where the hydropower reservoir receives water and compared with the overall watershed. Discharge of overall area were split based on the relative ratio and finally compared with the downstream hydro peaking. Three different scenarios were considered for the model performance. The first scenario was without implementing hydropower reservoir, the second with hydropower reservoir with real data, and finally hydropower reservoir with synthetic data through outlet. It was found that spatial and temporal resolution of outlet discharge plays significant role for model performance. The simulation seems promising and gives an improved capacity to integrate anthropogenic perturbations into river discharge models.