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Climate change impact on future water resources availability for a semi-arid area (Ferghana Valley, Central Asia)

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Considering increasing temperatures and glacier recession during the last decades, it is of high interest to study the climate change impact on water resources availability in semi-arid regions of Central Asia. The Ferghana Valley is surrounded by the Tien-Shan and Pamiro-Alay mountain systems that store big amounts of water in snowpacks and glaciers. In the valley the agricultural activity of local people strongly depends on available water from the Syrdarya River. The river is formed by the confluence of the Naryn and Karadarya Rivers, which are mainly fed by the glacier and snow melt from the Akshiirak and Ferghana ridges of the aforementioned mountain systems. The small upper river basins of the valley also contribute with runoff ($\sim$34 %) to the Syrdarya River. These small rivers are mainly fed by precipitation and seasonal snow melt. Thus, because of climate change and glacier decline, it is necessary to investigate the comparative contribution of the small catchments versus two big river basins to the Syrdarya River system, as these small upper catchments could become more important for future water consumption.

In this study the conceptual hydrological HBV-light model has been calibrated and validated for the period 1980-1985 over 18 upper catchments that feed the Syrdarya River from the surrounding mountain ridges. Dynamically downscaled climate change scenarios were then applied up to the year 2100 for these basins. The scenarios were generated by means of Global Circulation Model (ECHAM5) and Regional Climate Model (REMO) with a baseline period from 1971 till 2000. We will present modelling results of water resources, the contribution of small rivers to the Syrdarya River and to what extent this contribution is likely to change in the future. Moreover, the results of simulated potential runoff will be used to develop future climate change adaptation strategies regarding socio-economic and environmental sustainable water use.