Research objectives and use of obtained data

The streamflow prediction tool[1] provides 10-day discharge forecasts for major streams in Nepal using the global European Centre for Medium-Range Weather Forecasts (ECMWF) forecasts. It was initially developed for flood forecasting purposes. The nation-wide coverage of the forecast could be used for other purposes such as operation of hydroelectric systems. In contrast to flood forecasting, hydroelectric operations require much finer accuracy. This research aims to explore the utility and applications of the streamflow prediction tool for hydroelectric systems in Nepal. This research will focus on potential operation scenarios faced by run-of-river hydroelectric systems, which have been overlooked by comparable studies in this field. One of the scenarios of interest for Nepali hydropower owners, is forecasting future energy yield. The ability of the streamflow prediction tool to forecast future energy yield will be one of the topics of exploration in this research.

The first objective involves exploring the accuracy of the forecasts. The accuracy of the forecasts is calculated by comparing the forecast values with the measurement values. The river segment where hydropower systems are located might not have regular streamflow measurement data. In such case, the comparison is made for another river segment that has similar river origin and catchment characteristics. Next, the expected energy yield is calculated using the forecast streamflow values for a given time period. The energy yield will be calculated using the same formula used by the hydro operators during their estimation. For both these analyses, forecast archives are used so that the measured values are already available, instead of creating future forecasts. This is where the daily energy yield values from the hydropower producers is used as available measured values.

Two potential conclusions could be drawn from this study. If the forecasts are accurate, but the energy yield is not, then we can conclude that the energy yield calculation has room for improvement. Otherwise, the streamflow forecast is the limitation. A numerical streamflow modelling system such as the streamflow prediction tool consists of hydrological (runoff calculation and routing) and meteorological (precipitation) components. Further study would then explore which of these components are the primary contributor to the streamflow forecasts' shortcomings.

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[1] http://tethys.icimod.org/apps/streamflownepal/