Development of future runoff scenarios in Karnali River Basin of western Nepal Himalaya utilizing the CORDEX South Asia climate product

***Madan L. Shrestha**

madanls@hotmail.com

Nepal Academy of Science and Technology, Lalitpur,Nepal

Piyush Dahal

The Small Earth Nepal, Kathmandu, Nepal

Nepal is experiencing the impact of global climate change with significant warming trend and changes in precipitation pattern. The Himalayas, which are considered as the water towers for Asia and water source for the major rivers of Asia has been significantly influenced by this change in the climate system affecting about 1.3 billion people inhabiting the mountain and downstream. Basin-level water availability assessment in the context of climate change is now a major concern for many regional planners and decision makers in this area. The main objective of this study is to evaluate the projected impacts of climate change on water availability in Karnali River Basin of Nepal Himalaya. The Soil and Water Assessment Tool (SWAT), a basin-level hydrological model is utilized to determine future water availability based on climate scenarios. To identify the appropriate climate model for the complex terrain Himalayan region is a major challenge. An ensemble product of CORDEX South Asia future climate data for 2040-2069 and 2070-2099 for 2 emission scenarios – RCP4.5 and RCP8.5 has been considered. Results indicate that the average annual temperature could rise by at least 1.4°C by the mid-21st century (2040-2069) and can exceed by 3.4°C by the late 21st century (2070-2099) under a high-emissions scenario compared to the baseline period 1971-2000. The warming trend is projected to be stronger in northern highland than lowland. The analysis shows that precipitation will increase during monsoon but decrease during winter, indicating the increase of the extreme events. Annual precipitation could increase from lowest of 12% to highest of 30% under different scenarios and time frame considered. This change in precipitation has been reflected in river discharge. An increase in stream flow is expected in pre-monsoon and summer monsoon seasons with extreme flooding, whereas a decrease in stream flow is expected during winter.