# Rainfall-runoff modeling of Bagmati River Basin, Nepal with the incorporation of APHRODITE precipitation data

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Spatially distributed physically based rainfall-runoff models are nowadays diffusely applied for scientific and technical purposes, in impact assessment studies, prediction in ungauged catchments and investigation of the effect of spatial variability of hydrological state variables. In fact, application of this type of models is today made easier by the increasing availability of computer power and the steadily development of geographic information systems and remote sensing techniques, which help in handling the bulk of data needed as model input.
In this regard, AFFDEF: a grid based rain-runoff model is being applied for the hydrological simulation in Bagmati River Basin, Nepal to investigate the impact of climate change on its stream -flow. The study investigates the impact by analyzing the peak flow, low and long-term flow series of the present term (1979-2003) and near future term (2015-2039). The present term daily discharge series was collected for the hydrological station Padhero Dovan (station index 589) which has a catchment area of 2700 km2. Using the calibrated rainfall-runoff AFFDEF model, future term daily discharge will be generated from the 20 km resolution global climate model (GCM) rainfall data of Metrological Research Institute - Japan Meteorological Agency. APHRODITE (Asian Precipitation - Highly-Resolved Observational Data Integration Towards Evaluation) precipitation data was brought in use for the calibration and validation of the model. The APHRODITE precipitation, which can be obtained in term of 0.25 and 0.50 degree grid data for Asia-Monsoon region, has been developed by Research Institute for Humanity and Nature and Meteorological Research Institute. In this study, precipitation data of 0.25 degree grid for the years 2000-2001 and 2002-2003 were used for the calibration and validation of the model respectively. Before applying the APHRODITE precipitation data, their reliability were checked by comparing the daily/monthly rainfall pattern with the corresponding nearer rain-gauge station rainfall data. The daily/monthly pattern was found to be quite satisfactory.

Keywords: AFFDEF, APHRODITE, climate change, GCM, rainfall-runoff modeling