



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Programme of Study : Ph.D.

Thesis Title: Hydrological and hydrodynamic modeling under climate change scenarios in snow-glacier induces Himalayan catchment

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Thesis Submitted to the Department/ Center : Civil Engineering

Date of completion of Thesis Viva-Voce Exam : 16-May-2016

Key words for description of Thesis Work : Climate change, downscaling, hydrological modeling

SHORT ABSTRACT

In this study, a Teesta river Catchment (up to Chungthang gauge), which is a part of North Sikkim eastern Himalaya India, has been selected for the completion of the research work. In this study, the latest Coupled Model Intercomparison Phase 5 (CMIP5) Global Circulation Models (GCMs) with multiple Representative Concentration Pathway (RCP) experiments have been used for the downscaling of daily minimum, maximum temperature and precipitation datasets. For this research work, three GCM models such as CM3 model, CM2P1 model and ESM-2M model have been used. For downscaling of GCM variables such as maximum and minimum temperature, and precipitation, the Statistical Downscaling Model (SDSM) has been used. As per the observed precipitation and temperature datasets (1979-2005), the 21st century scenarios of daily precipitation and temperature have been projected utilizing the above three GCM models with their extreme (RCP8.5 & RCP4.5) to low emission (RCP2.6) scenarios of multiple RCP experiments. For downscaling, reanalysis data sets (e.g. AMIP controlled scenario) has been taken into account. After downscaling of daily minimum-maximum temperature and precipitation data sets, significant increase and decrease in precipitation and temperature were evaluated using various statistical, non-parametric and parametric evaluation methods such as Mann-Kendall test, quantile regression method (QR) etc. Based on these test, a significant change in temperature and precipitation variables has been calculated. To find out the extremity in temperature and precipitation projection scenarios, temperature extreme indices (TEI) and precipitation extreme indices (PEI) have been computed. The TEI and PEI highlight the severity of climate change on the temperature and precipitation scenarios in the future time domain (2006-2100). Many TEI indices show that the temperature is increasing over eastern Himalayan catchment. The TEI also exhibited that the minimum temperature will be more acute in the 21st century decades. The PEI shows that the variability in precipitation pattern will be frequent and enhanced in future time decades.