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## A Conceptual Framework for Modelling the Climate Change and its Impacts within a River Basin using Remote Sensing data

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### Abstract

In general, modelling the climate change and its impacts within a hydrological unit brings out an understanding of the system and, its behaviour with various model constrains. The climate change and global warming studies are being under research and development phase, because of its complex and dynamic nature. The IPCC 5<sup>th</sup> Assessment Report on global warming states that in the 21<sup>st</sup> century, there may be an increase in temperature of the order of ~1.5°C. This transient climate may cause significant impacts or any discrepancies in the water availability of the hydrological unit. This may lead to severe impacts in countries with high population such as India, China, etc., The Remote sensing datasets play an essential role in modelling the climatic changes for a river basin at different spatial and temporal scales. This study aims to propose a conceptual framework for the above-defined problem with emphasising on remote sensing datasets. This framework involves five entities such as the data component, process component, impact component, feedback component and, uncertainty component. The framework flow begins with the data component entity that involves two significant inputs, such as the hydro-meteorological data and the land-hydrology data. The essential attributes of the hydro-meteorological data entities are the precipitation, temperature, relative humidity, wind speed and solar radiation. These datasets may be obtained and analysed from empirical or statistical methods, in-situ based or satellite-based methods, respectively. These mathematical models on long-run historical climate data may provide knowledge on climate change detections or its trends. The meteorological data derived from the satellites may have a measurable bias with that of the in situ data. The satellite-based land-hydrology data component involves various attributes such as topography, soil, vegetation, water bodies, other land use / land cover, soil moisture, evapotranspiration. The process component involves complex land-hydrology processes that may be well established and modelled by customizable hydrological models. Here, we may emphasise the use of remote-sensing based model parameter values in the equations either directly or indirectly. Also, the land-atmospheric process component involves various complex processes that may take place in this zone. These processes may be well established and solved by customizable atmospheric weather models. The land components play a significant role in modelling the climate changes, because these land processes may trigger global warming by various anthropogenic agents. The main objective of this framework is to emphasise the climate change impacts using remote sensing. Hence, the impact component entity plays an essential role in this conceptual

framework. The climate change impact within a river basin at various spatial and temporal scales are identified using different hydrological responses. The feedback entity is the most sensitive part of this framework, because it may alter the climate forcing either positive or negative. An uncertainty model component handles the uncertainty in the model framework. The highlight of this conceptual framework is to use the remote sensing datasets in climate change studies. The limitations on the correctness of the remote sensing data with the insitu data at every location is not feasible.