MSc Degree in Environmental Science

PROJECTION OF PRECIPITATION VARIATIONS UP TO 2050 IN THE WESTERN PROVINCE SRI LANKA BASED ON REPRESENTATIVE CONCENTRATION PATHWAYS (RCP)

A dissertation submitted

By

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Abstract

Global temperature has been increasing steadily causing many climate variations, especially in precipitation. Anthropogenic induced entrapment of solar radiation and particularly the forcing resulted from anthropogenic emissions of Greenhouse gases (GHG) is identified as one of the main causes for this rise. The Intergovernmental Panel on Climate Change in its fifth report has introduced four Representative Concentration Pathways (RCP), to help predict future climate variations through Global Climate Models (GCM).

Sri Lanka, is a tropical Island which has four main seasons of rainfall, which are named the monsoons. Variations, in the form of extremities in rainfall, for a densely populated area such as the Western Province in Sri Lanka, is much needed to be studied, for an efficient service of precaution and prevention of future events of flooding and scarcity of water especially considering as a vastly progressing region in terms of population, technology, economy and structure.

This study was conducted to explore variations of the predicted future rainfall (2016 to 2050) in the Western province, based on Representative Concentration Pathways. Observed monthly rainfall from 1986 to 2015 (30 years) pertaining to five major cities Colombo, Kalutara, Katunayake, Labugama and Rathmalana were used as historical data. Model selection was done by comparing historical data with data generated from six models (CANE, MRI, GDFL, CNRM, NCAR and CSI from the NEX GDDP data series of the Coupled Model Inter-comparison Project Phase 5) for RCP values 4.5 and 8.5. Mean Average Deviation, Mean Absolute Percentage Error, Root Mean Squared Error and visual analysis were used as evaluation criteria for model selection. The selected models were used to calculate the 90^{th} percentile (heavy rain extreme events), 10^{th} percentile (low rainfall extremes), monthly averages, anomalies and annual rainfall volume.

It was clearly seen that urbanized cities under study showed positive for extreme trends in heavier rainfall, while more rural Labugama showed a negative trend to such extremities. Also, while observing that the 1^{st} monsoon and 2^{nd} inter monsoon gradually accumulate around July to October for the urbanized areas with total annual rainfall volumes decrease, Labugama, showed a different trend. Such observances point that, apart from the variations given by the GHG emission trapped radiative forcing, less variation to the total climate model may change due to the influence by vegetation induced micro climate. Hence, Western Province's governance, must be efficient, as the principles in the province's land and utility usage may have detrimental effect on the life of it's population.