

Impact of Climate Change on Water Resources in Northwestern Bangladesh

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Extended Abstract

The results of the study carried out to estimate the impact of climate change on water resources in northwest Bangladesh is presented here. Irrigation shares more than 96% of total water use in Northwest Bangladesh. Climate change may affect irrigation water use via changes in rice physiology, rice phenology, soil water balances, evapotranspiration and effective precipitation. Study the impact of climate change on irrigation water demand is therefore essential for long-term water resources development and planning in the region. MAGICC-SCENGEN software is used to project the future changes in rainfall and temperature in the study area. Changes in spatial and temporal distribution of irrigation water requirements in the context of global climate change are calculated by using FAO-56 model within a Geographical Information System. Penman-Monteith method is used to calculate the change in evapotranspiration. Thornthwaite soil water balance algorithm is used to model the impact on soil moisture deficiency. A temperature based crop phenology method known as degree-day method is used to model the change in rice growth period under increased temperature. The result shows that water required for land preparation will increase by 31.3 mm, the evapotranspiration from irrigated field will increase by 396 mm and the effective precipitation will increase by an amount of 48.5 mm during the irrigation period in the end of this century. The study shows that there will no appreciable changes in total irrigation water demand due to the shortening of irrigation period by approximately 13 days by 2100. However, as same amount of water will be used for irrigation for a shorter period of time, the daily use of water for irrigation will increase by approximately 18.3 million-m³/day. Since groundwater is the main source of irrigation in northwestern Bangladesh, higher per day abstraction to meet the irrigation water requirements may cause further declination of groundwater level which is already a major problem in the region. Some adaptive water management practices are proposed to reduce the negative impact of climate change on water resources in northwestern Bangladesh.