

# Impacts of climatic variability on crop water demand, productivity and groundwater table with some climate change adaptation options

G.Kar, A.Kumar, P.S.B.Annad, M. Ray Choudhury,  
C.Mayilsami, P.K.Singh, H.D.Rank

## Abstract

Under global warming and as well as increase in CO<sub>2</sub> concentration, the crop production is likely to be affected significantly by influencing the crop physiological processes. In this study, the crop growth, yield, water productivity and water footprints of maize were worked out with 1 °C and 2 °C increase in prevailing ambient temperature from the base line data 1983-2010 at present (370 ppm) and 550 ppm CO<sub>2</sub> concentrations using Decision Support System of Agro technology Transfer (DSSAT 4.5) model. The result of the model was validated with field experimental data of Dhenkanal, Odisha. Monitored ecosystem CO<sub>2</sub> emissions and sequestration by agricultural crops, gross primary productivity, ecosystem respiration, net ecosystem exchange and energy balances of rice based cropping system (rice-okra-tomato). The effect of climate change with respect to rainfall fluctuations on the groundwater water table and groundwater recharge was analysed. The available data set of rainfall and water table clearly reveals the uneven and erratic pattern and effect of climate change. To compensate the crop evapo-transpiration loss in view of the climate change, pressurized irrigation system was implemented in canal command and groundwater irrigated areas to enhance water use efficiency in vegetable crops. Location specific groundwater recharge techniques suitable for geo-hydrological conditions were developed and tested for their performance in terms of recharge rate and area of influence.

**Key Words:** Climatic change, crop water demand, crop evapo-transpiration, productivity, groundwater, recharge, adaptation