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Water scarcity and adaptation strategy under climate change in Luni river basin, India

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Scientists and experts are considered that India is the one of the world's most vulnerable countries to climate change due to rapid growth of population, land degradation and other related environmental and socio-economic problems. Agriculture and related activities constitute the specific largest part of India's gross domestic product (GDP) and employment. Weakness Indian agriculture is fundamentally dependent on the weather.

This research study purposed to define the vulnerability situation (sector and people who rely on agriculture for their livelihood) of Luni river basin, India under the climate change condition and recommend proper adaptation strategy in case of particular districts of Rajasthan state. The Luni is ephemeral (monsoonal) river and water availability is low, receiving flow from high-intensity rainfall during the monsoon. The area produces bajra, maize, in the monsoon season. In the non-monsoon season, wheat, barley and jowar are the dominant crops, especially in irrigated areas.

WEAP 21 model were used to simulate current and future crop water demand of irrigated area in the Luni river basin. The land use and meteorological data were obtained from India Water portal and Indian National Statistics websites. A period of 1970-2002 of the meteorological data and a period of 2002 of land use data have been chosen for base year estimation. FAO Crop requirements approach is typically used to represent agricultural water demand nodes. Regarding to size of area Jodhpur district has the highest water requirement and Sirohi district has lowest. For the different types of crop, wheat is highest water consumer crop due to crop coefficient –Kc in the area.

According to the IPCC last report (2007), three climate change scenarios were used to define future climate impacts for crop productivity. The evaluate the effect of crop water deficit on yield decrease through the quantification of relative evapotranspiration (ETc-adj/ETc), FAO undertook an analysis of research results from a large amount of crop water studies. Climate change impacts on crop yields are likely in area, under IPCC scenarios.

The hydrological cycle is likely to be altered and the severity of droughts and intensity of floods in Luni basin is likely to increase. Simulations using dynamic crop models indicate a decrease in yield of crops as temperature increases in different crops by different ranges.

Based on the model result the properly adaptation strategies, such us water transfers between basins, change of crop types were recommended.