Potential Impacts of Climate Change on Hydrological Cycle: Reference to Semi-arid Regions of Andhra Pradesh, India

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A large proportion of world's population is stressed by inadequate water resources due to population growth and decreased rainfall which is the result of climate change. The arid and semi-arid regions are expected to experience severe stress of climate variability. Although temperatures are expected to increase over land and during all seasons of the year, and precipitation is expected to increase in many river basins and to decrease in many others (IPCC, 2007). The vulnerabilities due to climate change are expected to be largest in semi-arid and arid regions, where precipitation and stream flow are spread over a few months, and year-to-year variations are high (Lenton, 2004). In a changed climatic regime, the effect of lower rainfall and more evaporation would lead to decreased run-off, and less availability of freshwater.

Climate change will have a direct effect on both hydrological cycle and biosphere. Global mean surface warming will be accompanied by an increase in global precipitation by about 1-2% per Kelvin increase in temperature because of the increase in evaporation, particularly from oceans (Ramanathan et el., 2001). The poleward vapour transport and the pattern of evaporation minus precipitation increases proportionally to the lower-tropospheric vapour, and because of this wet regions get wetter and dry regions drier (Held and Soden, 2006). These changes will have direct bearing on the ground water tables as they are determined primarily by changes in precipitation, river inflows and evapotranspiration. Climate change will also affect groundwater recharge rates.

In the present paper, we discuss the climate change in terms of temperature and rainfall variations and its effect on hydrological cycle vis-à-vis water resources and its cycling in a semi-arid region of southern Andhra Pradesh, India. The rainfall and ground water levels in the semi-arid region of southern Andhra Pradesh of India for the last 20 years are presented and discussed. The data suggest uneven distribution and decreased rainfall, and deepening ground water levels in this region. Further, the effects of depletion of ground water resources on agricultural and societal aspects are presented.

Keywords: Climate change, hydrological cycle, semi-arid region of Andhra Pradesh, India

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