Value and challenges of embedding hydrogeology-research in agriculture, livelihoods and Natural Research Management programmes on East India Plateau (EIP)

Siddharth Patil, Neha Bhave and Himanshu Kulkarni
Advanced Centre for Water Resources Development and Management, India
E: acwadam@vsnl.net

Abstract
Groundwater in India received significant consideration during the last decade. The government and civil society, as well as research institutes, has started to focus on this resource that forms the backbone of India's agricultural economy. After decades of watershed development programmes that concentrated on surface hydrology with an assumption that water stored on the surface leads to groundwater recharge, a deepening crisis of groundwater resources throughout India has forced the scientific community as well practitioners to re-examine the policies and programmes surrounding groundwater. This has led to the realignment of various government programmes for conservation of groundwater as well as mitigation of groundwater quality issues due to over exploitation. More than ever, practitioners began realising and acknowledging the importance of hydrological and hydrogeological inputs to water management programmes. The green revolution in India introduced modern practices for higher yielding crops. This package of intervention aimed at improving crop yields was directed at farmers with access to irrigation. The demand for irrigation was created by the practices introduced by the green revolution, but the resource availability across different hydrogeological formations was assumed to be uniform, often with the perception of unlimited storages of sub-surface water. With north-western India facing a severe groundwater crisis, water logging and soil salinity issues, policymakers are looking to the East India Plateau as the region for launching India's second green revolution. The East India Plateau forms one of the largest contiguous rain-fed areas covering almost the entire state of Jharkhand, parts of south Bihar, western West Bengal and large parts of Chhattisgarh. Although this part of India receives high rainfall, rain-fed agriculture remains vulnerable given the erratic nature of the monsoon, including the 'unpredictedness' of weather advisories. Large-scale groundwater irrigation is being promoted in this area as the region has a history of being in the 'safe' zone of various national groundwater assessments. This paper tries to demonstrate the importance of collaboration between soil scientists, agriculturists and hydrogeologists with implementing agencies for developing approaches that are suited to the East India Plateau. The geological diversity in the East India Plateau forms a naturally limiting factor when compared to the high yielding alluvial aquifer systems of north western India, and this is directly reflected in terms of the availability and inequitable distribution of the groundwater, both laterally and vertically. Collaborating on understanding soil moisture, vadose hydrology and aquifers will assist in developing a contextual alternative to sustainable cropping practices and agricultural systems that are typically dependent on rainfall, soil moisture and the critical but sustainable use of groundwater as a priority over spreading large-scale irrigation to large swaths of the landscape.

Key words: Groundwater, rain-fed agriculture, aquifers, soil moisture, vadose hydrology, East India Plateau