

KN2 Groundwater typologies in the Indo Gangetic Basin

Alan MacDonald¹, Helen Bonsor¹, Someshwar Rao², Gopal Krishan², Frank van Steenburgen³, Kazi Ahmed⁴, Mohammad Shamsudduha⁵, Ajaya Dixit⁶, Marcus Moench⁷

¹British Geological Survey, Edinburgh, UK, amm@bgs.ac.uk

²National Institute of Hydrology, Roorkee, India.

³Meta Meta, Wageningen, The Netherlands.

⁴University of Dhaka, Dhaka, Bangladesh.

⁵University College London, London, UK.

⁶ISET-Nepal, Kathmandu, Nepal.

⁷ISET International, Denver, USA.

Abstract: The Indo-Gangetic plains comprise the large floodplains of the Indus and Ganges-Brahmaputra river systems. They are home to approximately 1 billion people and encompass northern and eastern India, much of Bangladesh, parts of southern Nepal and the most populous parts of Pakistan. The economy, poverty and health of the region are highly diverse and include areas of extreme poverty as well as highly successful and growing economies. Exploiting easily accessible water resources for drinking water, agriculture and growing industries has been fundamental to the region's success and will continue to play a large part in its future. Despite the presence of the large rivers, groundwater is highly exploited across the basin through an estimated 20 million boreholes. Hand pumps and rope and buckets co-exist with high yielding motorised pumps; shallow hand-drilled boreholes are present alongside large boreholes >200 m deep. The threats posed by population growth, rising incomes, greater food requirements and climate change will impose a high pressure on the water resources, and groundwater will respond differently across the basin due to the varying aquifer and climatic characteristics. In this address, we share the initial results of a 2 year project to improve understanding of how resilient groundwater resources in the Indo-Gangetic basin are to changes in climate and abstraction. Fundamental to this study is the use of *groundwater typologies*. Typologies are not strictly aquifer units but have a looser definition to allow the most useful aquifer management unit to be mapped and described. The typologies are framed around: the hydrogeological characteristics of a region (e.g. groundwater storage, aquifer productivity, chemistry); the recharge mechanisms; and the current and future pressures on the groundwater resources (e.g. climate, abstraction, land use, population). The current impacts of the pressures on groundwater could also be used to further subdivide typologies (e.g. an area where groundwater levels have significantly declined, or quality has already deteriorated). Seventeen initial typologies have been identified which draw on reviews of existing geological and hydrogeological data (Figure 1). The behaviour of groundwater within each typology is characterised by identifying longterm groundwater level and chemistry data. It is envisaged that use of typologies will give a much clearer picture of the complex hydrogeology in the basin to better inform policy and target appropriate management strategies to different regions.

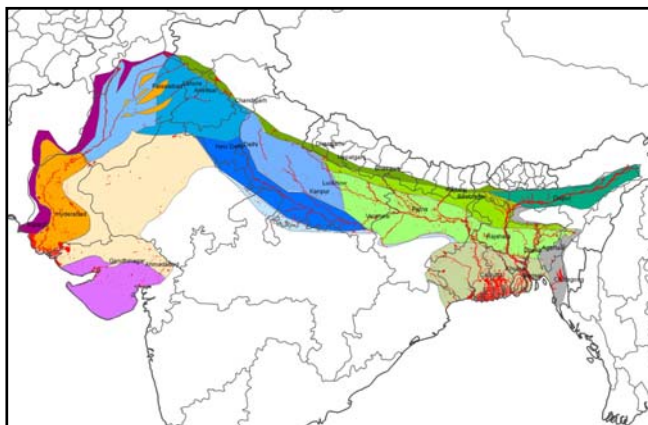


Figure 1. Draft typology map for the Indo-Gangetic basin