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UNDERGROUND TAMING OF FLOODS FOR IRRIGATION (UTFI): GLOBAL SUITABILITY ASSESSMENT

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Underground Taming of Floods for Irrigation (UTFI) is an approach to co-manage floods and drought/groundwater depletion at the river basin scale. It involves targeted recharge of excess wet season flows in aquifers to protect lives and assets downstream and boosting agricultural productivity in the region. Global spatial analysis on a grid scale resolution of 0.5° is done to assess and classify the land for UTFI suitability. For the spatial analysis, data on flood and drought hazard frequency, mortality, economic losses, groundwater level, aquifer type, aquifer salinity and groundwater depletion is grouped into three categories: Flood occurrence and Impact (FOI), Technical (T) and Demand (D) related factors. In each category, data layers are given a weight (w) and within each layer, data features are ranked (r) based on suitability for UTFI from the dual perspectives of mitigating drought and groundwater over-exploitation. This is followed by overlaying of basin boundaries to assess the suitability of basins. Results showed that total land area with over 600 million hectares of crop land and supporting over 3 billion people distributed across prominent basins in Asia (Ganga, Chao Phraya, Mekong), Sub Saharan Africa (Volta, Awash, Tana, Niger) and South America (Uruguay, Magdalena) lie in high to very high suitability classification. A detailed characterization of selected basins from secondary data was done to ascertain the accuracy and limitations of global suitability classification. Regional economic assessment of two selected basins: Ramganga (in the upper Ganga basin) and Chao Phraya (Thailand) has been carried out to ascertain the economic feasibility of implementing UTFI. Both basins are identified as highly suited to UTFI with benefits higher than costs. The major benefits (utility) of UTFI are different in different regional contexts - notably enhancing water security for the Ramganga basin compared to flood mitigation for the Chao Phraya basin.