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Submarine Groundwater Discharge in SW coast of India and its implications

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Submarine Groundwater Discharge (SGD), the direct discharge of groundwater to sea through aquifer medium, has been recognized as a small but significant component of hydrological cycle. Evaluation of SGD helps in assessing optimum exploitation of coastal fresh groundwater, locating feasible waste disposal sites and estimating seaward pollution transport levels. Due to interactions between multiple forcing mechanisms at any given location and time, SGD is temporally and spatially variable. Hence, site-specific investigations are often required to fully understand the timing, magnitude, and importance of SGD in any region [1,2,3,4]. We have mapped the horizontal and vertical extent of a unit coastal aquifer zone between Koyilandi and Kadalundi in the Indian state of Kerala to demarcate changes in hydrochemical facies and to determine temporal change in the dynamism of freshwater-salt water wedge.

Vertical and aerial movement of water masses in the coastal zone takes place according to the nature and distribution of underlying sediments and based on the life in the environment. Impact assessment of climate change on local scale depends on sea level rise, wave climate, storm surges, winds and currents, water temperature, salinity, tidal rise, river discharge, run-off and SGD. The indirect factors such as construction of ports and harbours; construction of reservoirs in rivers; dredging in navigational channels and other obstacles in the coast such as seawalls, groins, sewage outlets, river outlets, mudbanks etc. would also control the coastal groundwater regime.

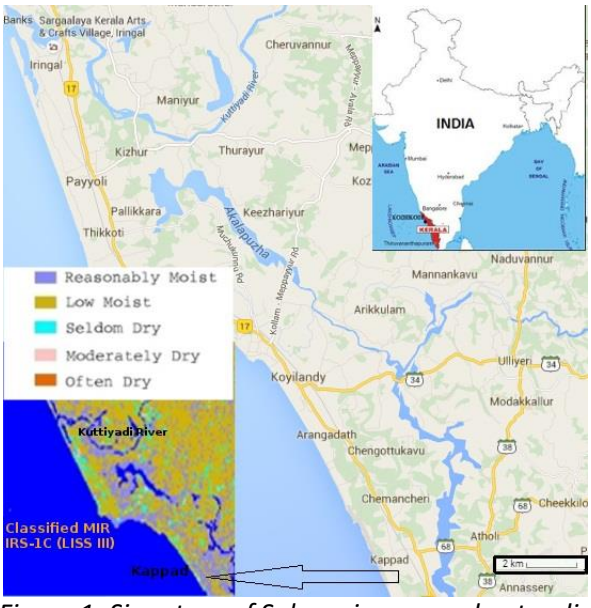

Figure 1: Signature of Submarine groundwater discharge, SW India

The potential of thermal remote sensing (IR imagery) was resorted to target the possible SGD zone in the initial phase. Subsequently, hydrogeological and resistivity surveys have provided adequate field evidences to delineate the discharge area. Hydrochemical evaluation on the densely available coastal wells suggested water quality and facies changes in the aquifer under consideration. Assessment on coastal geomorphological units such as beach, estuary, lagoon, ridge, bar, swale and dune was useful to discuss the long term adaptation to climate change as well as possible modifications in the interface zone of this aquifer unit.

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