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Submarine Groundwater Discharge and Coastal Geochemistry

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Submarine Groundwater Discharge (SGD) is a natural phenomenon caused by a hydraulic gradient between groundwater and seawater levels causing freshwater from aquifers and recirculated sea water from subterranean estuaries to flow from the ground to the sea. SGD accounts for a large portion of the hydrological cycle, contributing water in quantities comparable to riverine flow. SGD also has higher concentrations of metals, nutrients, and carbon, which combined with high volume being transferred adds up to be a significant number. Along with nutrients and metals, SGD can also carry contaminants from groundwater to the sea. Contaminants of Emerging Concern are one such group of compounds that might be carried to the ocean by SGD. CECs such as Pharmaceuticals and Personal Care Products and microplastics are widely used, seldom regulated, and improperly discharged into the environment. These contaminants are often discharged through domestic, hospital, industrial and agricultural wastewater. It is also possible that these contaminants might be discharged from underground septic tanks into the groundwater aquifers, which are then carried to the sea by SGD. CECs are known to have strong impact on the environment, especially on microbes causing hormonal changes and antibiotic resistance among other issues.

In this study, we aim to quantify the SGD from zones previously identified as potential SGD areas in coastal Karnataka and quantify the metals being discharged into the sea. We also hope to investigate the presence of CECs in the aquifers and subterranean estuaries and to examine if SGD is a vector for CECs going to the sea.