

Submarine fresh groundwater discharge from a volcanic island into a coral reef (Lombok, Indonesia)

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ABSTRACT

Tropical volcanic islands might be associated with high submarine fresh groundwater discharge (SFGD) fluxes, due to high due to high aquifer permeability, steep slopes and high precipitation rates. We identified several submarine springs which discharge terrestrial groundwater into a coral reef in western Lombok, Indonesia. The source of terrestrial groundwater in this area was investigated using stable isotopes of water. Discharge rates were estimated using multiple methods including offshore Radon time series stations, a salinity mass balance model and a point source model. Parameters used for discharge estimates were evaluated using sensitivity analyses, and discharge estimates were further constrained using Monte Carlo Simulations. For comparison, groundwater recharge rates based on precipitation and evapotranspiration rates in the coastal catchment area were estimated. Recharge and discharge estimates agree fairly well. Stable isotopes of water indicate a rapid recharge due to high permeability of volcanic soils and low urbanization in the catchment area (little sealed areas). In terms of volumetric discharge the submarine springs in western Lombok provide a potential water resource, as they are located in shallow waters and are easily accessible, while the brackish nature of the discharging water limits its use to agricultural and sanitary purposes.