

Origin and volume of fresh submarine groundwater discharge from a volcanic island (Lombok, Indonesia)

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Fresh submarine groundwater discharge (FSGD) from tropical volcanic islands might be high due to high aquifer permeability, steep slopes and high precipitation rates. In eastern Lombok (Indonesia) FSGD is captured in offshore wells and used as a water resource for the local population. In western Lombok several undeveloped submarine springs were identified in a coral reef, which provide a potential water resource for the local population. The source of FSGD 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. The discharge rates were then compared with recharge estimates based on precipitation and evapotranspiration rates in the catchment area.

The results indicate rapid recharge due to high permeability of volcanic soils and low urbanization in the catchment area (little sealed areas). Recharge and discharge estimates agree fairly well, while the volume under study in general has the largest influence on volumetric discharge estimates. In terms of volumetric discharge the submarine springs in western Lombok provide a potential further water resource, as they are located in shallow waters and are easily accessible, while the brackish nature of the discharging water inhibits its use as drinking water resource.