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The challenges of fresh groundwater at Reykjanes peninsula, Iceland

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Abstract

The recent and ongoing volcanic activity at Reykjanes is an added challenge to the freshwater on the peninsula. As the bedrock is young (<700.000 yrs) and covered with Holocene lavas, and though precipitation is rather high (exceeding 3000 mm/year in eastern part), there is no freshwater surface runoff to be found. The freshwater is at depth, forming a groundwater lens layered on top of the subterranean sea. This makes the freshwater on Reykjanes peninsula both a scarce and fragile resource (Sigurðsson, Freysteinn, 1986: Jökull, 36, p. 11-29).

The challenges facing the resource of cold groundwater at Reykjanes include the need to serve 30.000 people with potable water. Two high-temperature geothermal power plants are operating on the peninsula producing electricity, where the Svartsengi plant uses up to 600 L/s of cold freshwater for the co-production of hot water by heat exchanger. There are current plans for fish farming along the shores of Reykjanes, where production of subterranean sea will be substantial with possible effect on the freshwater resource. Other industries, such as food production, CCS, and e-fuel production are also to be found or planned. A factor in plans of industry in Reykjanes is that the only international airport in Iceland is located at the western tip of the peninsula.

We provide examples of challenges that fresh groundwater on the Reykjanes peninsula is facing. They are mainly controlled by the porous young bedrock surrounded by strong ocean tidal waves, ongoing volcanism and various demands made by new and innovative green industries.

The co-existence of fresh groundwater and subterranean sea in the bedrock has provided both opportunities and challenges. We recognize that effective communication between developers, consultants, and regulators is key to the sustainable development of the freshwater resource in Reykjanes peninsula.

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