

The SEALINK research project: Submarine groundwater discharge (SGD) affecting coral reef health around semi-arid islands in the Dutch Caribbean

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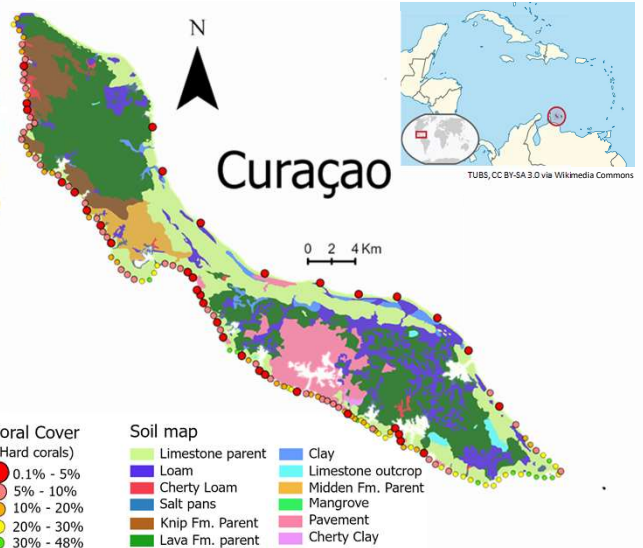
Introduction

Continuous submarine groundwater discharge (SGD) into marine environments around tropical islands can exceed episodic surface runoff. SGD carries pollutants (e.g., nitrates) into the marine environment. This negatively impacts coastal ecosystems such as coral reefs. SGD has been poorly studied, especially in semi-arid climates.

Our aim: Characterize and quantify the hydrological pathways towards coral reefs in the semi-arid Caribbean island of Curaçao, where coral reef health is impacted by pollutants.

Study Area

Curaçao covers 444 km². The island's geology features volcanic and limestone formations, hosting karst features. The climate is tropical semi-arid with an annual precipitation of ± 550 mm/y.



Methodology

Surface water balance

We determine the partitioning between groundwater recharge and surface runoff after rainfall events via assessments of the soil infiltration capacity.

Hydrogeology

To determine the fate of groundwater recharge fluxes we study the hydrogeological setting by:

- **Electrical Resistivity Tomography (ERT)** to map karst flow routes and locate the interface between fresh and saline groundwater.
- **Groundwater well level monitoring** to assess the hydrogeological connectivity between locations and layers.

Model simulations

We apply the infiltration/runoff model **LISEM** to simulate the hydrological response after rainfall events. **MODFLOW** and **SEAWAT** are used to simulate the groundwater pathways through transects in selected st

Marine inputs

To map inputs of ground and surface water into the sea, we conduct marine ERT surveys, seawater conductivity and temperature measurements along transects parallel to the coastline.

SEALINK

This study is part of the interdisciplinary SEALINK project, comprising nine PhD projects from different Dutch universities and research institutes (see QR). SEALINK aims to elucidate the link between terrestrial processes and coral reef health in semi-arid tropical islands.

