

Pollen and diatom-based reconstruction of late Holocene vegetation and climate, (Dutch) Caribbean.

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Introduction

To address Island(er)s at the Helm's main research question 'What set of innovative tools and practices is needed to develop sustainable and inclusive societally embedded solutions to climate challenges in the (Dutch) Caribbean', a thorough understanding of past climate change, and human adaptation strategies is essential. Past adaptation strategies have been found in archaeological records from the Caribbean islands (1,2), and will further be exploited in Work Package 1 of this project (period 2022 – 2025).



Fig. 1: The coastal lagoons on the Caribbean islands contain important sedimentary archives to reconstruct past vegetation and climate. Short sediment cores were taken in 2022 at 14 sites (red dots). Four sites are selected for further palaeoecological and palaeoclimatological work. The short cores allow the reconstruction of past vegetation and climate for the past approximately 50 – 200 years. At Saliña Bartol (Bonaire) a long sediment core will be taken in 2023 for a reconstruction much further back in time, up to the period before the first humans settled on the island.

The aim is to produce much needed palaeoecological and palaeoclimate records for the (Dutch) Caribbean, and compare those with the archaeological records to improve our understanding of past climate variability and past human adaptation strategies.

The project started in 2022 with the exploration of sedimentary archives on Saba, Sint Maarten, Curaçao, Bonaire and Aruba (Figs. 1 and 2). The sedimentary archives have been studied on their potential to reconstruct past vegetation (pollen), and climate (diatoms).



Fig. 3: Fresh Pond, core section 57-77 cm.



Fig. 2: Sampling with students of the University of Sint Maarten (supported by the Nature Foundation) at Simpson Bay (A), with Tilly Sarpong (STINAPA) at Saliña Bartol (B), with Emma de Mooij and Harold Kelly at Canashito (C), and subsampling with Antonio Carmona Báez (USM) at Fresh Pond (D).

Results

- Strong disturbance of sediments at sites on Sint Maarten (hurricane/storm impact).
- High sedimentation rates (1-3 cm yr⁻¹) at many sites (deforestation/urbanization in catchment).
- Pollen and diatoms are generally well preserved, albeit pollen concentration is low, and high pollen sums are needed to capture the regional vegetation signal.
- Saliña Bartol is the most promising site to develop a diatom-based palaeoprecipitation record.

Future work

- Detailed reconstruction of recent human impact at four coastal lagoons (Fig. 1).
- High-resolution reconstruction of vegetation and climate at Saliña Bartol, and the development of an automated counting technique for pollen and diatoms.



os: Willem van de Poll, 1947 (Nationaal Archief)

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Fig. 4: High run-off after intensive rainfall

on Bonaire (Nov. 9, 2022).

Photo: Caspar Douma (STINAPA)