

# Combating Erosion and Nature Restoration on Bonaire

**As a result of extensive deforestation for the production of charcoal and then aloe, export of wood and overgrazing through the years most of Bonaire's natural areas have a low flora diversity. This xerotrophic vegetation is very susceptible to water erosion (Cornelis, 2006) due to its low vegetation cover and the soil's poor water retention. On an island like Bonaire where precipitation is low but sometimes intense during the rainy season, torrential rainfall loosens the soil and quickly transports large volumes of sediment run-off to salinas<sup>1</sup> or directly into the sea. In the past few decades, anthropogenic activities have exacerbated the island's erosion problem. Coastal development to accommodate the sharp increase in residents and tourists has led to more land clearing and mining for residential and infrastructural development leaving behind barren landscapes. Invasive grazing species such as goats and donkeys also significantly contribute to the island's erosion problem. These grazers consume the island's vegetation at such a rate that it does not have time to regenerate, leaving the ground bare, the soil vulnerable to erosion and a vegetation of low diversity.**

Erosion and resulting sediment run-off are big environmental concerns throughout the Caribbean Region and for good reason. Not only does the removal of soil and sediment particles reduce soil quality for native plants, but it also poses a serious threat to adjacent coral reefs. Soil carried

to the ocean as sediment run-off smothers corals and hinders their growth and is typically associated with coral mortality. An ambitious three year-project to reduce Bonaire's erosion problem, improve water management and restore some of Bonaire's natural areas is currently in progress thanks to funding by The Netherlands Ministry of Economics through the *Nature Fund*. The "Combating Erosion and Nature Restoration" project started at the end of 2016 and will end in October 2019. It is led by Bonaire Agri and Aqua Business NV (Sherwin Pourier), Wayaká Advies BV (Jan Jaap van Almenkerk) and coordinated by the Island Government, Directorate of Spatial Planning and Development .

Bonaire has a variety of fresh- and saltwater bodies that support a rich flora and fauna including fringing coral reefs, two lagoons, several salinas and a few freshwater wells. Water management on a dry, arid island such as Bonaire is vital to protect these bodies of water and associated biodiversity from pressures such as erosion. It also gives residents access to clean water, provides farmers with sufficient water to grow crops, and can help prevent floods. Through improvements in water management, this Nature Funded project aims to benefit both the island's nature and residents by reducing erosion and resulting sedimentation on reefs, protect neighborhoods from flooding, increase fresh water available for farming, stimulate groundwater regeneration and increase the biodiversity and tourism value

of nature through the provision of new wetland habitats for birds. Over the course of the project several Master of Science students from the Vrije Universiteit (VU) and the Universiteit van Amsterdam (UvA) will visit the island to study the island's erosion issues and investigate concrete measures to reduce them.

The island has around fifty dams that collect rainwater, protect from flooding and slow down run-off. Additionally, natural salinas filter the sediment rich water transported by the rain into the sea, thereby playing a vital role in maintaining the health of Bonaire's coral reefs. A study by Koster (2013) highlighted the high sediment trapping efficiency of the many reservoirs in Bonaire's Playa catchment, helping trap most of the upland sediment before it has a chance to reach the sea (Koster, 2013). However, many of the dams silted-up due to lack of maintenance and also some salinas have silted up resulting in more floodings and poor (storm) water storage capacity, meaning that they cannot perform their important ecological function of trapping new washed down sediments and nutrients before it is carried to sea. During the course of the project, certain dams in the Kralendijk area and in the vicinity of Rincon will be restored and maintained. So far, the ten most important dams in Kralendijk have been restored, including 'Mona Passage' on the way to Cai. A maintenance plan for the dams should be put in place by the end of the project.



Public wells are an indispensable source of water for farmers and are used for livestock and to cultivate fodder, vegetables and fruit. Photo by: © Wayaká Advies

<sup>1</sup> Natural salt-water buffers, separated from the sea through a coral rubble barrier (Koster, 2013).

Two saltwater ponds will also be ecologically restored: the eastern part of Saliña di Vlijt (in Kralendjik) and possibly a part of Saliña Onima (near Rincon). Accumulated sediment will be removed and used to create islands around which mangroves or other plants will be planted. A bird watchtower and public bird watching walking path will be made at Onima to create opportunities for tourism. The Islands act as a natural refuge for foraging and nesting birds as many of these bird species are preyed upon by cats, rats and other introduced species.

In order to improve access to freshwater, 17 of the island's 25 public water wells will be restored. The project has already restored ten public wells, many of which were in bad shape but very important to local farmers: Pos di Flor, Pos Bara di Karta, Pos Wanapa, Pos Rincon, Pos Fontein, Pos Flor di Cuba, Pos Mexico, Pos Angola, Pos Shon Pinpina and Pos Bentura. Other wells which hold

water with too high salinity levels for agricultural or livestock watering purposes will not be restored as the water is of little use.

Bonaire has numerous "mining sites", excavated sites which are often filled with solid waste. Part of the project is to clean up one or two of these mining sites and restore them in such a way that they create a wetland holding freshwater. The mining area at Bonaire's LVV wastewater treatment plants is currently being transformed into a permanent freshwater wetland with a bird watchtower. This area is already popular for birdwatchers as it attracts a high range of different migratory and local bird species. *"There are barely any permanent freshwater wetland areas on Bonaire. Studies have shown that migratory birds are in desperate need of these areas, particularly those migrating from the northern hemisphere to the south"* (Frank van Slobbe, personal comments, 23 November 2017).

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*Sediments entering the sea from Saliñas di Vlijt after heavy rainfall.*

Photo by: © Directie R&O, Public Entity Bonaire.



*Overflow of Saliñas di Vlijt directly to the sea after heavy rainfall.*

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