

New research in the conservation of sea turtles on their nesting beaches



Photos by: © Jannie Koning (Turtle hatchlings) & Selma Ubels (Quill)

New research led by Swansea University's College of Science and recently published in Scientific Reports has reported effective conservation strategies that can mitigate the impacts of climate warming on sea turtle nesting success. A range of experiments were conducted between 2012-2017 in St Eustatius Marine Park in the Dutch Caribbean in association with St Eustatius National Parks, Wageningen University and Groningen University in the Netherlands and Deakin University in Australia.

Swansea University researcher, Dr Nicole Esteban said: *"Sea turtles do not have sex chromosomes and it is the incubation temperature in sand surrounding a clutch of eggs that determines the sex of a turtle hatchling which is known as Temperature-Dependent Sex Determination. Eggs incubating at cooler temperatures (generally lower than 29 °C) produce male turtles and eggs incubating at warmer temperatures produce females. This has led to concerns that, in the context of climate change, warming air temperatures may lead to female-biased sea turtle populations. Our previous work in St Eustatius showed that incubation temperatures are relatively high (mean of 31 °C) so that the majority of turtle hatchlings born at these beaches have been female biased during the past decades. There is therefore a real concern that not enough male hatchlings would be born on the beaches in future to sustain the local population and we decided to investigate options for conservation actions to reduce incubation temperatures"*.

The researchers developed a series of trial experiments to test the effect of various shading treatments that were easily available (white sand, white sheet, palm leaves). The sand temperatures below the shaded areas were recorded using small temperature loggers buried at turtle

nesting depths on Zeelandia and Oranjebaai beaches in St Eustatius. The data were combined with long-term beach temperature data to estimate the effect of shading and relocation between the beaches on hatchling sex ratios.

The results of the study showed that the most effective shading material was palm leaves, decreasing temperature by a mean of 0.6 °C. Variation between beaches that are only 1 km apart was an average of 1.9 °C. Relocation between beaches and shading could shift hatchling sex ratio from the current ranges (97-100% female) to 60-90% female. A conservation mitigation matrix is presented to summarise evidence that artificial shading and nest relocation can be effective, low-cost, low-technology conservation strategies to mitigate impacts of climate warming for sea turtles.

"This research underlines that there is real need for effective conservation measures to be put in place to prevent the localized extinction of these turtle populations in St Eustatius. We are planning to relocate turtle clutches to the cooler beach and have already trialed relocation of turtle eggs to a cooler site" reported the Marine Park Manager Jessica Berkel.

Read the research *"Optimism for mitigation of climate warming impacts for sea turtles through nest shading and relocation"* published by Scientific Reports (2018) online: <http://www.dcbd.nl/sites/www.dcbd.nl/files/documents/s41598-018-35821-6.pdf>

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