

Unexpected high number of endemics for the windward Dutch Caribbean Islands

In light of the mounting impact of humans on our planet, there is an urgent need to assess the status of all current living species so as to ensure their long-term survival through adequate conservation measures. Endemic species - defined as “native and restricted to a certain place” (Merriam-Webster, 2018) - have an especially important ecological value due to their limited geographical range. Their increased vulnerability to natural and anthropogenic threats such as hurricanes and habitat destruction stems from their uniqueness: their population is small and limited to a certain habitat/area and typically has low genetic diversity. Endemic species that have evolved isolated on islands are described by Lomolino et al. (2017) as “ecologically naive” due to their loss of competitive and anti-predator skills (Lomolino et al., 2017 in Bos et al., 2018). Despite their vulnerability to extinction, only a small portion of the world’s endemic species have so far been assessed by the IUCN Red List of Threatened Species, the worldwide reference on endangered species. The IUCN Red List assessments have focused on more wide-ranging species due to “a lack of information or perceived priority” (Leclerc et al., 2018 in Bos et al., 2018).

The Caribbean region is recognized as a biodiversity hotspot with to date 7,500 recorded endemic plant species and 880 vertebrates (BEST 2016, in Bos et al., 2018). We are only starting

to discover just how rich the biodiversity of the Dutch Caribbean is. Each island has its own unique natural history, its own special ecosystems and habitats teeming with rare and exotic life. The remarkable variety of terrestrial and marine habitats, including coral reefs, seagrass beds, mangroves, salinas, rainforests, cactus and woodlands means that the diversity of species is extraordinary. Recent biodiversity expeditions to the windward islands of the Dutch Caribbean (Saba, St. Eustatius and St. Maarten (the SSS islands)) and the Saba Bank uncovered many new species (Teruel, 2008; Teruel & Questel, 2011ab; Krings & Axelrod, 2013; Williams et al., 2010; Etnoyer et al., 2010), some endemic, but a thorough and complete assessment of the SSS islands’ endemic species has been lacking.

A new study carried out by Bos et al. (2018) aimed to take on this task by putting together a preliminary checklist of extant endemic animal and plant taxa (species and subspecies) of the SSS islands and Saba Bank. The goal of the study was to “increase knowledge of rare species, identify future research priorities and develop adequate nature policy to protect these species” (Bos et al., 2018). The research was commissioned by the Dutch Ministry of Agriculture, Nature and Food Quality to Wageningen Environmental Research in collaboration with, Naturalis Biodiversity Center and CARMABI (Curaçao), to assist with the drafting of the 2018 Nature Policy Plan for the Caribbean Netherlands (Bos et al., 2018). The

authors reviewed all literature available, including the 1997 biological inventories of Saba, St. Eustatius and St. Maarten (Rojer, 1997abc) and the 2015 Naturalis marine and terrestrial expedition to St. Eustatius which uncovered at least 80 new species for the island (Hoeksema & Schrieken, 2015).

The checklist of endemic species put together by Bos et al. (2018) surpassed all expectations and sheds light on just how rich and unique the biodiversity of the Dutch Caribbean’s windward islands is. In total, 223 endemic (sub)species were identified for the SSS islands and Saba Bank, including 198 endemic animal species and 25 endemic plant species. The majority (191) are species while 32 are sub-species (Bos et al., 2018). Over 70% of recorded endemic species are terrestrial (162 species) compared with 32 endemic species strictly related to marine habitats. A large number of the recorded endemic species and subspecies belong to the following five species groups: beetles, gastropods, arachnids, birds and locusts (Table 1). Some of the explanations put forward for the prevalence of terrestrial endemics over marine ones include “differences in dispersal power, the duration of geographical isolation and the speed of propagation” (Debrot, 2018). Another interesting finding from the study is that of the 223 endemic species, 35 are island endemics, meaning that they are restricted to one of the SSS islands or the Saba Bank (Bos et al., 2018).

Table 1: Breakdown of the 223 endemic species and subspecies according to larger taxonomic groupings (Bos et al., 2018)

Beetles (Coleoptera)	33
Gastropods	28
Spiders, scorpions and pseudoscorpions (Arachnida)	23
Birds	23
Grasshoppers, locusts and crickets (Orthoptera)	22
Spermatophyta (Vascular plants)	22
Reptiles	16
Butterflies and moths (Lipidoptera)	12
Cnidarians	5
Bivalves	5
Mammals (bats)	5
Flies (Diptera)	4
Bony fish (Actinopterygii)	4
True bugs (Hemiptera)	3
Sawflies, wasps, bees, and ants (Hymenoptera)	3
Red Algae	3
Copepods (Hexanauplia)	2
Dragonflies and damselflies (Odonata)	1
Worms (Polychaeta)	1
Amphipods	1
Crabs, lobsters and shrimps (Decapoda)	1
Isopoda	1
Pycnogonida	1
Sharks and rays (Chondrichthyes)	1
Amphibians	1
Flatworms (Platyhelminthes)	1

The other 188 species are endemic to a larger geographical area: 13 are endemic to the Northern Lesser Antilles, 110 to the Lesser Antilles and 58 to the joint Antilles (Lesser and Greater Antilles) (Figure 1; Bos et al, 2018). Of the island endemics, 26 inhabit terrestrial habitats, 8 marine habitats and one brackish water. St. Maarten has the most island endemics (10 animal species and 2 plant species), followed by St. Eustatius (8 animal species and 2 plant species), Saba (10 animal species) and the Saba Bank (3 animal species).

The information collected by Bos et al. (2018) was entered in the Dutch Caribbean Species Register (DCSR), an online resource created by Naturalis in 2017 which includes all research on the Dutch Caribbean's biodiversity. There are currently 8197 species registered for the Dutch Caribbean including all 223 endemic species identified in Bos et al.'s study. The register can be found on <https://www.dutchcaribbeanspecies.org/>. A search option enables the selection of geographical locations for endemism (Lesser Antilles, Antilles, Bonaire, Saba, etc.) and filter for all the species.

The list of endemic species put together in the study is impressive but Bos et al. (2018) believe that it is far from exhaustive. The authors excluded from the study certain species groups (e.g. Fungi and Chromista) that may contain endemic species. Certain species groups are understudied (spiders, moth flies, crickets, beetles and small mollusks) and likely to contain more species - some endemic - than what has currently been found (Bos et al., 2018). Furthermore, recent expeditions to the Saba Bank such as the 2006 Conservation International expedition and the 2018 NICO expedition discovered many more species than had not previously been recorded – some even new to science (fish, sponge and octocoral species) (Conservation International, 2006). Based on the species accumulation curve, researchers believe that there are likely more species of fish and algae present on the Saba Bank in addition to the species found, "with potential endemics within them" (Williams et al., 2010 in Bos et al., 2018).

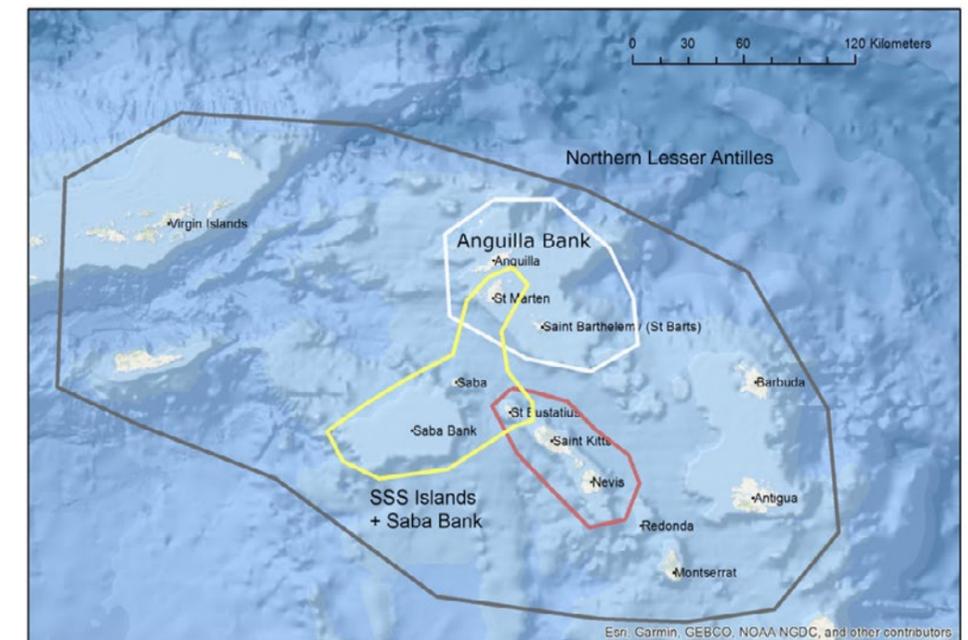
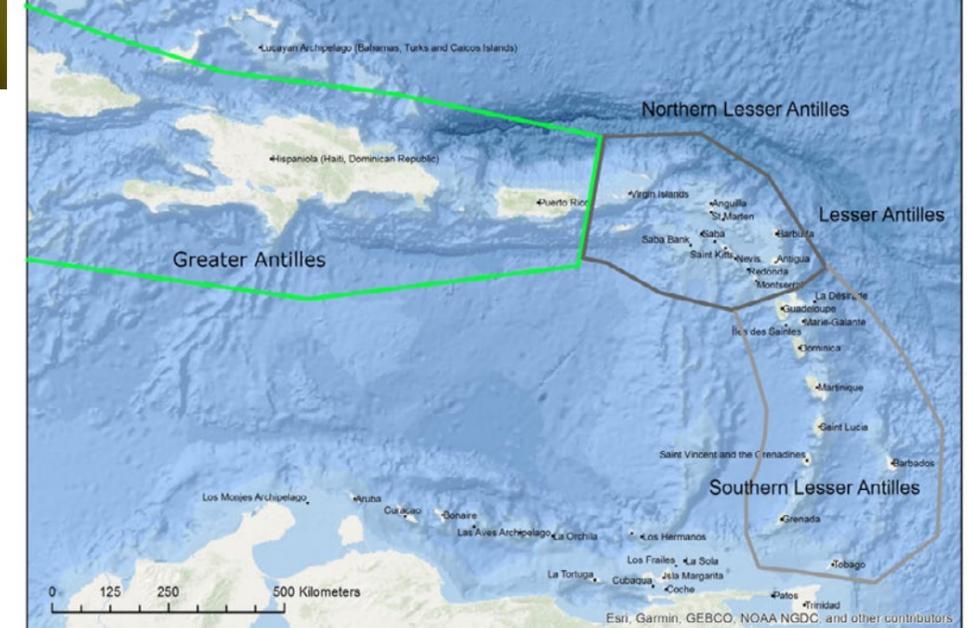


Figure 1: Geographical ranges of the endemic species on the windward Dutch Caribbean Islands and the Saba Bank. Island endemics of the SSS-islands and Saba Bank are restricted to the yellow line. Other endemics are restricted to one of the larger regions.

Image credit: Oscar Bos / Wageningen Marine Research

Unexpected high number of endemics for the windward Dutch Caribbean Islands

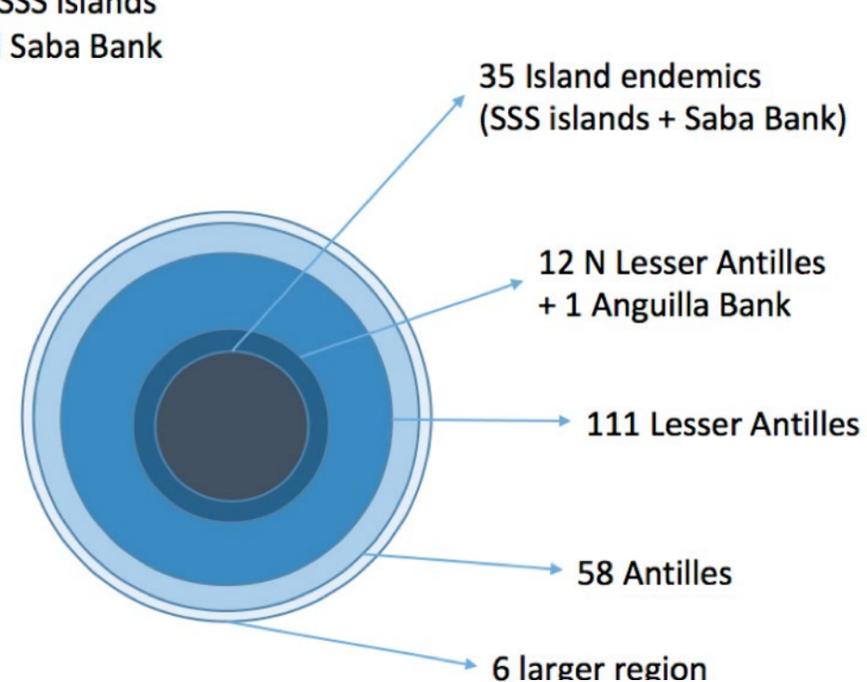
In addition to revealing the large number of endemic species that occur on the SSS islands and Saba Bank, Bos et al. (2018) highlight the urgent need to assess the status of these rare species. Assessments by the IUCN Red List are only available for 42 of the endemic (sub) species of the SSS islands and Saba Bank (Bos et al., 2018). Only the following six endemic terrestrial reptiles currently carry a IUCN threatened or near-threatened status: the Lesser Antillean Iguana (*Iguana delicatissima*) is classified as Critically Endangered, the Anguilla Bank racer (*Alsophis rijgersmaei*) and Anguilla Bank skink (*Spondylurus powelli*) as Endangered, the Saba racer (*Alsophis rufiventris*) and Anguilla Bank Bush anole (*Anolis pogus*) as Vulnerable and the St. Christopher Ameiva (*Pholidoscelis erythrocephalus*) as Near Threatened (Bos et al., 2018). It is highly likely that many more endemic species found in the windward islands of the Dutch Caribbean are endangered due to the increase in natural and anthropogenic threats facing the islands. Hurricane Irma (2017) caused much habitat destruction and the arrival of predatory invasive species that are likely to impact the island's vulnerable endemic species.

Looking forward, focus should be placed on assessing the conservation status of the endemic taxa of the SSS islands and Saba Bank collected by Bos et al. (2018). Once their status is formally evaluated, stakeholders can come together to develop conservation strategies that will help minimize the extinction risk of the most threatened endemic species (Bos et al., 2018). The list put together in this study does however require some more in-depth study, for example by refining the exact range of the species and improving their description (e.g. taxonomic status, ecology) (Bos et al., 2018). This may result in a revision of their endemic status and possible removal from the list. Species groups that are not included or considered understudied must also be given priority as research into these may yield many more endemic species.



**223 endemic species
for SSS islands
and Saba Bank**

Distribution:



Saban Anole, photo by: © Christian König (Left)
Statia Morning Glory, photo by: © Marjolijn Lopes Cardozo (Right)

Unexpected high number of endemics for the windward Dutch Caribbean Islands

Would you like to share a news item?
Please e-mail us: research@DCNAnature.org