

‘The conservation of Caribbean nature requires courage’

The six Caribbean islands that are part of the kingdom of the Netherlands enjoy very rich nature that needs protection from threats such as overgrazing and lionfish. Wageningen’s contribution is intervention-focussed research. ‘Without interventions, you will just be describing continued deterioration and we can’t afford that any longer.’

TEXT KOEN MOONS PHOTO JEF PATTYN



Mangrove restoration work in a bay on Curacao formerly used for salt production.



‘Goats are disastrous for the vegetation’

The 2018 Wageningen report ‘The state of nature in the Dutch Caribbean’ contains a long series of warnings of dangers to nature, from invasive species to climate change, overfishing, eutrophication, and the devastating impact of roaming livestock. Ecosystems on the brink of collapse, you might think. And yet nature on the islands is flourishing, says Dolfi Debrot, a senior tropical marine ecologist at Wageningen Marine Research. ‘If you take a helicopter view, nature is in much better condition here than in the European part of the Netherlands’ says Debrot on a video call from Curacao. The Caribbean islands are very rich in nature, he explains, referring to both the ‘Caribbean Netherlands’ (the Dutch municipalities of Bonaire, Sint-Eustatius and Saba: the BES islands) and the independent countries that are part of the kingdom of the Netherlands: Curacao, Aruba and Sint-Maarten. ‘The islands have 130 endemic species, species which only occur here,’ says Debrot. Aruba, Bonaire and Curacao all have their own unique whiptail lizards. The islands are also home to species such as the unique Tudora land snails, the Bonaire palm, the Saba least gecko and the Lesser-Antillean iguana, as well as internationally endangered species including many marine animals such as the black-capped petrel, the whale shark and the hawksbill turtle. Debrot: ‘The islands have not been nearly as spoiled by agriculture and infrastructure as the European Netherlands. But nature here is extremely vulnerable because these are small islands and the

pressure is high. There are some positive developments going on, though. Wherever there are interventions, such as on Curacao, recovery is quickly apparent. Species that had almost disappeared, such as the endemic tree *Myrcia curassavica* and breeding seabirds, are coming back. That gives hope.’

Wastewater is a serious threat to coral reefs, research by WUR has shown. ‘Coral reefs are extremely vulnerable to nutrient enrichment,’ says Debrot. ‘Our studies show that reefs thrive much better along undeveloped coasts than close to hotels, restaurants and villages.’ In addition to nutrients, which can cause reefs to become overgrown with algae, another problem is pesticides, which kill fish and shellfish. Wastewater is sometimes even dumped directly in the sea, but from many drains and cesspools on Bonaire the water eventually reaches the sea through the porous limestone soils. ‘So it is important to concentrate construction on the islands in certain areas, where it then becomes feasible to install a sewer system, purify the water and protect the corals that way,’ says Debrot. He grew up on Curacao and currently lives in the Netherlands, but he can frequently be found conducting research on one of the islands. ‘This afternoon I’ve got an appointment at the ministry here, to talk about fisheries. We have interesting new data about annual and seasonal trends in the masbangu catches around Curacao. This small mackerel-like fish is one of the most commonly eaten fish on the Leeward Islands, but very little was known about it until recently. ‘Now we know that they pass the island mainly early and late in the year and that the shoals yield an average of 1500 kilos of fish.’

INVASIVE EXOTICS

Researchers at Wageningen University & Research estimate that there are more than 210 non-native species on the Dutch Caribbean islands, including 27 marine species, 65 terrestrial plants, 72 land and saltwater animals and 47 agricultural pests and diseases. All six of the islands have been affected by the lionfish that spreading fast and reduce juvenile populations of many local reef fish. Aruba has problems with the boa constrictor, Sint-Maarten with the green monkey, and Sint-Eustatius with exotic iguanas and the rampant ornamental plant coral-lita. Sometimes Wageningen researchers recommend eliminating or controlling exotics that are already established, but usually the focus is on how prevent the introduction of new species, for instance by means of better control of freight transport.

HOLISTIC APPROACH

The topics that Debrot and his Wageningen colleagues are working on are exceptionally broad. Debrot calls it holistic, or integrated, research. ‘Especially on small islands like these, everything is interlinked. What happens on or around the islands affects the islands’ resilience in the face of climate change. One example is how erosion during the rainy season can cause muddy runoff that suffocate the corals and mangroves that serve to protect the coast. The condition of the nature here is also crucial to the economy of the islands – their fisheries and tourism for example,’ says Debrot. On the other hand, fisheries and tourism can themselves pose a threat to the region’s nature.



PHOTOS CASFER DOUJMA

Roaming goats on the Caribbean islands create a bare landscape with loose soils, which are easily washed away and clog up mangrove swamps and coral reefs.

One thing that has ecological implications at many levels is the overgrazing by roaming livestock, especially goats. This is a problem on all the islands, and it is generally not being addressed. The goats eat anything that isn't thorny, preventing the recovery of original hardwood forests. The result is a bare landscape, sometimes dotted about with thorny shrubs and cacti, and with loose soils that are easily washed away by heavy tropical rains. 'It's a sad story, because goat farmers earn very little from their goats, but everybody pays a high price for the damage they cause,' says Debrot. 'Not only are goats disastrous for nature, but the population is directly affected by it too. Just look at all the road accidents. And rich agricultural soil gets washed away, making farming practically impossible. You can't plant anything without it being devoured, there is erosion, and houses and computers are beset with dust.'

FAST INDUSTRIALIZATION

Relocating and culling the goats are sensitive options on the islands. Not for reasons of animal welfare but because they have become part of the scenery. 'An often-used argument for not doing anything about it is that roaming goats are part of the cultural heritage. Which is utter nonsense,' says Debrot decidedly. 'Actually it's a deterioration of culture. Small-scale domestic agriculture really is part of the cultural heritage, but has become almost impossible now due to roaming goats.' The Caribbean islands went through fast industrialization in the 1950s, which spelled the end of agriculture there. 'People began to work in the refineries and later in tourism and the financial sector. Since then,

people have turned a blind eye to roaming goats because there's no more agriculture to protect.'

On Bonaire, nature manager Stinapa started capturing goats in Washington-Slagbaai National Park. 'Last year they caught or shot 1400 goats, but that is way less than 40 per cent of the animals present. If you get rid of less than 40 per cent, due to their rapid reproduction rate, the population will just grow back to the same level again, so you can go on catching and shooting them forever. Fortunately they have recently come up with a new approach to goat removals.'

FENCED-OFF AREAS

In several experiments he led, Debrot saw that nature can recover after goats are removed from the scene. 'On Bonaire, we fenced off several areas and in no time the vegetation started to grow and flourish. On Curacao, rare plants have been growing all over the national park again since the goat problem was radically tackled in the 1990s and systematic control of the goat population was put in place. Nature really has a very big capacity to recover.' And by tackling the problem of roaming livestock, you also reduce the pressure on the coral and the mangroves, which is ultimately good for your fisheries; you make farming possible again; natural reforestation is more likely to happen, which makes the island more climate-proof; and there is less erosion of roads and fewer falling rocks.' Besides measures to protect it from threats, nature sometimes needs a helping hand with recovery. In recent years, WUR and local partners have been running a recovery project on Aruba called Turning the Tide. The funding came from the EU Resilience, >



PHOTO CASPER DOUMA



PHOTO JEF PATTYN

Left: restoration work in a mangrove swamp; right: artificial reefs that corals latch onto.

Sustainable Energy and Marine Biodiversity programme for European territories overseas, and Wageningen researchers have been running the pilot project for three years with nature management organization Fundacion Parke Nacional Aruba (FPNA), the Scubblebubbles foundation and the University of Aruba. The aim is to identify the right methods for restoring corals and mangroves. ‘We didn’t have any experience with European subsidies or with leading such big projects,’ says Natasha Silva, director of FPNA. ‘Wageningen had previously had good results in comparable projects involving many partners, so it was a logical step to make them the lead partner in this one.’ Two types of artificial reef were laid down on 26 loca-

makes use of concrete reinforcing steel. Silva says both systems seem to work well. ‘Nearly all the bits of coral have stayed alive and have spread.’

Turning the Tide is also working on the recovery of mangrove swamps, important nurseries for fish. ‘The mangroves can play an important role as buffer zones for everything that gets washed off the land and which has a negative impact on coral,’ says Silva. ‘Here on Aruba, we have dry riverbeds that only transport water at tremendous speed during the rainy season, filling up the mangrove systems and covering the corals with sediment. We are trying to catch that sediment in constructed “silt traps”. We are also going to dig a lagoon in the mangroves, which should allow saltwater to flow into the mangrove swamp again and restore the natural balance of fresh and saline water.’

‘Wherever there’s an intervention, recovery is soon visible’

tions, to test and compare how they worked. One of them was made by the Dutch company BESE, which makes modular reef structures from biopolymers from potato waste streams. Little bits of live coral are attached to the structures, with the idea that the coral will grow to cover the artificial reef with a natural reef, after which the artificial material will eventually disintegrate. The other system, Mars reef stars – a product of Wageningen alumnus Jos van Oostrum’s company –

SUSTAINABLE FISHERIES

The work done by Wageningen University & Research is not limited to nearshore areas. Extensive studies of fish catches, coral cover and ecosystems have been going on for 10 years at the Saba Bank, a submarine atoll of 2000 square kilometres located six kilometres south of Saba. The research is being carried out by WUR and local authorities under the Saba Bank Management Unit, at the behest of the Dutch ministry of Agriculture, Nature and Food Quality.

‘It is a vast area with relatively few fishers, and they are collaborating very nicely with the research,’ says Debrot. ‘We are doing our best to keep them up to date on the latest developments, such as whether fish stocks are increasing or decreasing, but the main objective of our support is to monitor the various fish stocks. So when

it's the spawning season for a vulnerable species, or when certain fish stocks are low, fishers can focus on a different species for a while. One of the species that has benefitted from management recently is the Caribbean queen conch, a large edible sea snail. Because the Netherlands intervened and chased foreign fishing boats off the bank, the population recovered so well that a limited amount of fishing is now possible. It is a species that the CITES treaty on trade in threatened species bans from free trade, but catching and consuming conch locally is no problem. Spiny lobsters are doing quite well, and so are the various species of red snapper. If such populations thrive, together we can create and enhance sustainable fisheries for the Saba Bank. Whenever there might be a need to impose a moratorium on a particular species, there will still be alternatives for the fishers to harvest and earn a good living.'

THE RETURN OF FARMING

Much of the research targets the sustainable exploitation of nature. However, some research has also been done on how to bring back farming to the islands. 'Not to produce cheap staples like grains; the islands are too small for that,' says Debrot. 'You have to focus on small-scale farming like there used to be, and like there still is on Saba, especially. The question is what high-value crops you should go for. With colleagues from Wageningen Plant Research and others, we have looked at what types of small-scale farming could be used to increase self-sufficiency.'

There have been various successful agricultural pilots on the islands, says Debrot. 'The most appealing examples are one for producing cactus wine, one for growing vegetables in greenhouses on Bonaire, and one for growing aloes on Curacao for making a range of food and cosmetic product. It is best to target indigenous species that don't require much water and that can be used to make creative and high-quality products for the market. There are a lot of cacti growing on most of the islands. They have tasty fruits, you can use them for brewing or making soup, and they have medicinal value. If you want to make sustainable use of the limited resources on an island, you should also keep the value chain local. So instead of exporting raw materials, you produce high-value drinks and skincare products yourself and sell them to tourists and locals, thereby avoiding expensive imports.'

Whether it addresses fisheries, coral or agriculture, most WUR research focuses on active intervention. 'Traditionally, tropical sciences were a matter of passive observation, evaluation and description. But we have already known for 50 years that the coral reefs are deteriorating. Without intervention, you will just be describing the deterioration, and we can't afford that any longer. It's time to focus on what can be done to halt or reverse the trend.

So we are doing research on interventions that facilitate recovery. Questions like how do you restore coral or mangroves, or how do you get rid of an invasive iguana that is pushing out the indigenous iguana, and do so as quickly as possible. With an eye on the limited budgets available for nature management and conservation, setting impactful priorities is key and it becomes your moral duty as a researcher to make sure your research has impact.'

Debrot also stresses that 'the restoration of nature takes courage on the part of local government. For example, the governments of the islands have long been reluctant to intervene when it comes to goats, or getting rid of other harmful exotic species. Far too little money from the island budgets is being spent on nature. Although we are all dependent on it, too often we take nature for granted. But we can't do that anymore. The islands have got to start taking nature seriously, make funding available for it and muster the courage to implement interventions. Our role as Wageningen University & Research is to provide the governments with options for action. And luckily, there are plenty of options.' ■

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COLLABORATION WITH THE UNIVERSITY OF ARUBA

Early this year, collaboration on the Turning the Tide mangrove and coral project led to a long-term plan for collaboration between the University of Aruba and Wageningen University & Research. The institutions are going to work on joint research initiatives with an emphasis on sustainability, ecological resilience and the socio-economic welfare of island communities. The collaboration agreement paves the way for exchange programmes for students at Bachelor's, Master's and PhD levels.