Plantation Bolivia- A Wilderness Area of Exceptional Conservation Value Requiring Protection
(Digest of more than 20 reports, Foundation Save Plantation Bolivia, W.J. Nijland-van Kooten, June 2020)

"Bolivia serves as an important 'land bridge' connecting the northern and southern halves of the island. If this 'bridge' is severed, as would happen if the area is developed, native species of both flora and fauna would be fragmented and be at even greater risk of extinction."
(CARMABI Report- February 1998)

INTRODUCTION

Much like protected areas of Klein Bonaire and Washington-Slagbaai National Park, the unspoiled natural area along Bonaire's rugged east coast known as Bolivia is a kingdom treasure that deserves protection and preservation. Home to flora and fauna not found elsewhere, this natural landscape houses a diverse and fragile ecosystem. Just as the marine park defines and protects an irreplaceable part of Bonaire's natural landscape, the same protection should be granted to Bolivia to preserve this one-of-a-kind area.

It isn't just eco-minded island residents who understand the environmental importance of protecting Bolivia from development. Attached are 22 environmental reports (1998 to present), that all attest to the uniqueness of the ecosystem found at Bolivia on Bonaire.

Unfortunately, local island history suggests that when protection decisions like this fall to a small number of local politicians, who are extremely susceptible to local political and economic pressures, development consistently trumps preservation. This is especially true when the financial gain of prominent island individuals rests on the decision to approve development at all costs.

This inherent conflict-of-interest is why the protection of Bolivia requires kingdom-level intervention to achieve designation as a permanent national park. Leaving this decision to the island government is an invitation to continue more of the historic same, where development is pursued with little to no thought to the island's long-term environmental health.

The time is now to declare Bolivia a special place worth saving. The time is now to begin the process to make this area a national park that is revered and protected like Washington-Slagbaai and Klein Bonaire. We are the environmental stewards for future generations. As such, we must take a stand against the greed and corruption that often accompanies development projects of the scope proposed for this historic and revered area. We owe it to dushi Bonaire to take a stand and put long-term environmental protection for everyone's enjoyment over short-term profit for a few.

Executive Summary

Over the past 20 years numerous studies have reported on the condition and threats to Bonaire's natural environment. The conclusions of these 22 reports are summarized below. The reports mention that the health of the ecosystems and iconic species, is without exception, already in a moderately unfavorable to very unfavorable state and that without environmental protection there will be grave economic and natural consequences.

Preservation of the environment is most important for the island as the relatively unspoiled nature of Bonaire is the magnet that draws tourists to the island and is the competitive edge the island holds over similar Caribbean destinations. Tourism is the overwhelming economic factor and source of employment for Bonaire.

Currently there is little or no legislated governmental protection for the natural environment of Bonaire.

Foremost among the areas requiring protection is the former Bolivia Plantation. Plantation Bolivia is a wilderness area of about 3,000 hectares (7,400) acres) of mostly undeveloped land located in the northeast corner (the elbow) in the middle of the island of Bonaire. It is about 10% of the island's land area with a coastline facing the prevailing wind. (see map)

Its central location provides a land bridge connecting the hilly north and flat southern parts that supports critical biodiversity necessary for the survival of the native flora and fauna of the entire island.

Bolivia provides the habitat for numerous important protect species of birds, plants, cactus, trees, coral, and fish as well as elements of cultural and historical importance. Two environments are most critical:

The first is Bolivia's dry tropical forest. The dry tropical forest is the world's most endangered forest ecosystem. The forest supports the island's keystone cactuses that bloom during dry seasons and provide an important food source for native species of lizards, bats and birds. Among these are endangered species like the Yellow shouldered Amazon Parrot, the Barn Owl and nine indigenous bat species. Bolivia is one of the six Bonaire Important Bird Areas listed in the BirdLife International protocol in the Caribbean. The area is important for six bird trigger species. Additionally, a healthy resilient dry tropical forest is better able to absorb the consequences of climate change.

The second is the system of dry and wet caves that provide homes and breeding grounds for birds, bats and different endemic freshwater crustaceans. Tranquility is of paramount importance for the protection and preservation of the cave fauna. These caves cannot be isolated from the surrounding ecosystems and their conservation requires integration into the protection of the whole area. Moreover, the presence of known and, perhaps, yet un-discovered pre-Columbian Amerindian petroglyphs make this area important for both cultural and scientific reasons.

According to recent studies the total economic value (TEV) of the ecosystem services provided by the island's marine and terrestrial ecosystems, including Bolivia Plantation, is $105 million per year. With the current threats unmanaged, the TEV will decrease from $105 million today to around $60 million in 10 years' time and to less than $40 million in 30 years.

Measures must be put in place to protect Bolivia to preserve the economic and environmental health of Bonaire. Currently most of the land is zoned as "open landscape," a designation that provides little or no environmental protection. Moreover, it is within the power of the local government to protect or grant exemptions for any environmental regulations not enforced by national or international laws.

Referenced Report Summaries

1-2. Carmabi Foundation, Feb 1998 and update March 1998

The inventory was conducted by Carmabi researchers in November 1997. It is clear from this report that there are compelling reasons to preserve as much of Bolivia as possible. Some of the preservation priorities as noted in the report are:

1. Nesting habitat of the endangered Lora: the rock cliffs and overhangs bordering the coastal plain have been documented to be "the most important breeding area for the endangered Lora."
2. Ecologically important food sources for native species: the large stands of kadushi and datu cactus are considered "a keystone species (and a) key food source for the terrestrial fauna including the vulnerable endemic subspecies of West Indian parakeet, the endangered endemic sub species of Yellow-shouldered Amazon parrot and various endangered bats."
3. The cave systems of Spelonk and Roshikiri: these "play a critical ecological role as shelter for the endangered bats and other rare species such as the endangered Barn Owl." "Without these bats the terrestrial ecology of the Leeward Islands would literally collapse." Bolivia harbors the most important concentration of (undisturbed) caves on Bonaire."
   The report makes special note that preserving the caves without a concomitant effort to preserve "significant surrounding habitat" would be a "crucial mistake" as was made in Barcadera. "Conservation of an individual cave is meaningless unless its ecological connectedness to the surrounding areas is also recognized in the form of conservation of sufficient surrounding wilderness areas."
   Moreover, the presence of known and, perhaps, yet un-discovered pre-Columbian Amerindian petroglyphs make this area important to the Netherlands Antilles for both cultural and scientific reasons.
4. The terrace edge area along the length of the coastline: this area is "ecologically quite important" as it provides shelter and water for birds, insects and plants, many of which are threatened or endangered. In addition, it is important to protect the subterranean cavern water from pollution.
5. The coastal rubble vegetation between Spelonk and Boven Bolivia: this area is principally important as a protective covering for migrating species of land crabs which are important to the terrestrial ecology as detritivores and scavengers.
6. The Brasia terrace woodlands on the plateau above Beneden Bolivia and extending to Midden Bolivia: "We suggest that this vegetation may be rare on Bonaire and recommend conservation of significant tracts of this vegetation."

7. The Washikemba woodlands in the southern part of Bolivia: which represent some of the best wooded areas of Bolivia. Conservation of "significant portions" of this region is recommended.

From their observations, the authors of the draft have concluded that the "wildlands of Bolivia serve the crucial ecological role (emphasis added) of natural corridor for much of the native fauna between the northern and southern halves of Bonaire. Therefore, to avoid ecological fragmentation at the island level, significant sections of Bolivia will need to be conserved to fulfill this longterm function.

When some might argue that with Washington-Slagbaai Park in the north and Lac Bay in the south, Bonaire has sufficient land set aside for preservation. The CARMABI Report argues otherwise:

- Washington-Slagbaai Park is currently overgrazed out of necessity to use much of the land as a "goat park" to raise operating funds, as the report states, while Bolivia has also been heavily grazed.
  "Bolivia appears to possess greater vitality at this point. In the future the wildlands of Bolivia may prove vital to survival of the flora and fauna of Bonaire in general."
- Most of the caves outside Bolivia, including the cave of Seru Grandi in Washington-Slagbaai Park are quite small and the only relatively large caves outside Bolivia (Barcadera and Onima) are threatened by tourism and, in the case of Barcadera, pollution.

3. Bonaire Nature Management Plan 1999-2004 (Natuurbeleidsplan 1999-2004) (BNMP)

Natural monuments (in the report mentioned as Category III, for example caves), smaller areas with visiting possibilities, where it concerns the protection of a single special natural or cultural-historical element.

Caves

Bonaire has a number of caves that are of special significance for various reasons. As a geological appearance, they provide a picture of the oldest history of the island. In several places, caves are provided with petroglyphs made by the original Indian inhabitants of Bonaire: among others at Onima, Spelonk and Kueba di Roshikiri. Some offer accommodation for bats or for special aquatic species, such as the blind Typhlatia shrimp. The significance of caves for the conservation of bats is particularly important. This group, which represents the majority of native mammals on land, has an important function in the ecosystem.

Status: The caves are not protected and are not managed.

4. Landscape ecological vegetation map of the island of Bonaire, 2005
The Bonaire Nature Management Plan 1999-2004 (BNMP) has categorized and mapped a number of areas of the island according to the (varying) degree of protection they should receive. In the present publication a number of areas are presented that are not yet afforded adequate protection in the BNMP or that should be upgraded to a category that gives more protection. No part of the Middle Terrace of Bolivia has been designated as a conservation area in the BNMP. Considering the presence of important cave areas (Rojer, in prep.; Wagenaar Hummelinck 1992), the very rare Bonaire Barn Owl (Prins *et al*., 2003) and the potential of the vegetation to develop into a more valuable vegetation type (e.g. 'Dry evergreen woodland' in Stoffers 1956), a broad area of the Middle Terrace of Bolivia should be added. This will help ensure the protection of a broader zone of the (north-south) combination of (depositional) Middle Terrace and the important Higher Terrace and Plateau land areas. This expansion area should minimally receive the status of "Island Park," the same status as the limestone terraces of the nearby "Terrace landscape of central Bonaire."

5. Environmental report for the wind / diesel power plant of Ecopower Bonaire (*Milieu rapport voor de wind/diesel energiecentrale van Ecopower Bonaire*, 19 Feb, 2008) The Barn Owl is the only owl species present on Bonaire; in addition, a small number of resident and migrant birds of prey occur (Nijman et al. 2005).
With a rich food supply Barn Owls need a hunting area with a radius of about 500 meters around the breeding ground and with a small food supply sometimes up to 5000 meters (website Barn Owl Trust). In Bolivia two breeding grounds have been found close to each other, so the owls are occupying a relatively small territory. When the probable breeding grounds are also taken into account, it seems that generally relatively small territories are occupied.

6. Evaluation report Bonaire Nature Management Plan 1999-2004 (*Evaluatierapport natuurbeleidsplan Bonaire 1999-2004*, Jan. 2010)
Natural monuments: smaller areas with visiting possibilities, where it concerns the protection of a single special natural or cultural-historical element.
Caves
Caves are part of the heritage and have great ecological, geological, archaeological and cultural value. Since 2003, caves have been concluded between the government and a number of interested parties, in which a code of conduct for excursions to caves has been established. On the basis of the new Island Ordinance on Nature Management, *it is possible to legally protect caves.*
The Bat census of 2007 (*Vleermuizencensus*, Carmabi 2008) shows the great importance of caves in preserving the small and vulnerable bat population.
Status: The caves are (still) not protected presenting a significant threat to the bat population.

7. Strategic environmental assessment (*Strategische Milieu Beoordeling (SMB*), June 2010
In the SMB, based on the available data, two scenarios have been outlined, with the expected growth being translated into a spatial picture.
The first scenario assumes growth in the form of housing companies and recreational facilities through further densification (expansion) within the existing urban contours and by expansion in several contiguous areas that border (existing) areas (West Coast).
The second scenario is more extreme and involves developing much of the west coast from the boundary of the national park including undeveloped land inland to the south of Kralendijk.
Growth, while retaining the quality of nature, cultural identity must be sustainable and balanced. The report indicates five locations where the desired growth can be achieved, which have no significant effects on landscape and nature.
According to the SMB, it would not even be necessary to use all five locations to meet the need. A total of 3,980 houses can be built at those five locations. Three of the residential expansion locations with a have been included in the spatial development plan. The other two locations have been assigned a nature or open landscape designation. The intended growth for residents and tourists can easily be accommodated within the three residential locations.

Important natural values on land include the Important Bird Areas (IBA), caves with endangered bat species and endemic invertebrates. Spatial development should be avoided as much as possible in ecologically valuable areas. The creation of corridor and buffer zones is desirable for adequate protection.

8. Zoning Plan Bonaire 2010 (*Ruimtelijk ontwikkelingsplan* Bonaire 2010)
Bolivia's designation mentioned in this zoning plan is open landscape "*open landschap*". Land with the designation "open landscape" is intended for the preservation of open terrain and natural scientific values; parts of Bolivia have the dual designation of Archeological and Environmental. For example, the pre-Colombian painted kueba (caves) and/or and the ruins of an original plantation house.

Dual destination Archeology, category 60:

1. The grounds with the destination "Value – Archeology" are, in addition to the other destinations, intended for the preservation, restoration and development of the archaeological values. This function overrides the functions of the other designation.
2. Although building possibilities may have been given in the other destinations, building on the grounds to which this destination relates is not permitted on the basis of this double destination.

3. The Executive Council may grant exemption from the aforementioned building ban and permit construction in accordance with the other designation, if research has shown that the buildings or structures in question do not affect the archaeological values.

Dual designation Kueba, category 62:

1. Areas with the designation "Value – Kueba" are an addition to the other designation, intended for the preservation, restoration and development of the quality of caves. This function overrides the functions of the other designation.
2. Although building possibilities may have been given in the other designation, building on the land to which this destination relates is not permitted on the basis of this double designation.
3. The Executive Council can grant exemption from the aforementioned building ban and permit construction in accordance with the other designation, if research has shown that the buildings or structures are not buildings that do not affect the quality and preservation of the caves.

Throughout the zoning plan it is mentioned that the "Executive Council can grant exemption" or that exceptions are possible with a permit.

9. Biodiversity for the BES islands: Bonaire, St. Eustatius and Saba. IMARES 2010
(*Biodiversiteit voor de BES-eilanden: Bonaire, St. Eustatius en Saba*. IMARES 2010)
The Strategic Environmental Assessment (SMB) shows that an increase in population and tourism leads to increasing pressure and an increasing environmental impact on the surrounding area. An increase in the population and the number of tourists leads to an increasing burden on nature, including an increase in visits to nature reserves, which can lead to a decrease in bird species and biodiversity and greater fragmentation and disturbance.
Wastewater can also cause eutrophication and negative effects on groundwater and coral reefs.

10. Nature reconnaissance 2010-2040, views on the development of nature and landscape
(*Natuurverkenning 2010-2040, visies op de ontwikkeling van natuur en landschap, 2012*)

Administratively, a major responsibility for nature policy rests with the local government on the islands, but the ultimate responsibility for the policy lies with the Dutch government. This has increased the responsibility of the Dutch government for internationally mandated environmental policy. In the Caribbean coral reefs, dry tropical forests, mangroves and other biotopes, many species are found that are threatened on a global scale. The nature of Bonaire also has an important

economic function, mainly because of the tourist significance, and nature offers many ecosystem services, for example, coral reefs and mangroves which are of great importance for fishing, but also as a barrier against tidal waves.
The national government has an important task to create opportunities for local government to be able to pursue a good nature and environment policy.

11. Preliminary inventory of key terrestrial nature values of Bonaire, 2012
Bolivia Plantation is designated as “open landscape.” The inventory shows that several nature values important to the environment are found within this area.
Found within the Middle Terraces of Bolivia caves are several bat species (Rojer, 2000). The Barn Owl (*Tyto alba sp*.) nests on the rocky escarpment within this area. The presence of Crested Caracara and White-tailed Hawk have also been documented in the Middle Terraces of this area. The Lower Terraces of Bolivia are popular nesting areas for the Least Tern (*Sterna albifrons* and the preferred hunting grounds of the Peregrine Falcon. Other birds such as the Bananaquit, the Brown Throated Parakeet, the Pearly-eyed Thrasher and the Yellow-shouldered Amazon parrot are found within this area of Bolivia as well.
The three species of large columnar cacti *Subpilocereus repandus*, *Stenocereus griseus* and *Pilosocereus lanuginosus* are ubiquitous elements of arid vegetation on Bonaire. These species are listed in Appendix II of CITES and protected according to Island Legislation. *Subpilocereus repandus* and *Stenocereus griseus* provide food for several species of animals during the dry season, when many other plant species are non-productive. They constitute a critically important group of plants to the island ecosystem (Petit, 2001). Therefore, the cacti species *Subpilocereus repandus* and *Stenocereus griseus* are an example of a keystone species. The *Melocactus macracanthus* is often found on surfaces with a high percentage of surface stoniness (De Freitas *et al.*, 2005). Such surfaces can be found on the Lower, Middle and Higher Terraces of Bonaire. This species is listed in Appendix II of CITES and is protected according to Island Legislation.
The large “open landscape” areas of Bolivia may harbor a few rare plant species and an important population large area of cacti, which are crucial for species such as birds and bats. Hence the “nature” and “open land” areas outside national parks do possess unique and critical nature values.

The entire open terrain of Bolivia is essential as a corridor along the northern coast that provides ecological connectivity between Lima and Lac Bay to the rest of Bonaire. The Strategic environmental assessment (SMB, 2010) also states: Important natural values on land include the Important Bird Areas (IBA), caves with endangered bat species and endemic invertebrates. Spatial development should be avoided as much as possible in ecologically valuable areas. The creation of corridor and buffer zones is desirable for adequate protection.

Recommendations:

- For future research it is recommended to execute a complete and extensive inventory of Bonaire, through fieldwork to implement the necessary protective measures to ensure the conservation of these nature values. The present study shows that the area of Bolivia may be of priority as this area seem to harbor a concentration of unique and critical plants.
- It is necessary to identify areas with a high potential for the concentration of natural values, rare species or scarce vegetation species in order to secure the survival of these species to be able to implement the necessary protective measurements.
  The open areas of Bolivia meet these requirements.
- For future research it is recommended to define areas with high corridor values to create and maintain ecological corridors and buffer zones on Bonaire like the Bolivia Plantation.

12. The total economic value of nature on Bonaire, TVU Feb. 2013

The total economic value (TEV) of the ecosystem services provided by the marine and terrestrial ecosystems of Bonaire is $105 million per year. This TEV and its underlying components can be used to build a strategy for effective conservation measures on Bonaire. After extensively analyzing different scenarios for future ecosystem services values, one result becomes very clear: an ounce of prevention is worth a pound of cure. In other words, it is more efficient to prevent extensive environmental damage than revitalizing the environment while there are still threats at hand. With the current threats unmanaged, the TEV of Bonairean nature will decrease from $105 million today to around $60 million in 10 years' time and to less than $40 million in 30 years.

13. Nature Policy Plan Caribbean Netherlands 2013-2017, April 2013 (*Natuurbeleidsplan Caribisch Nederland 2013-2017*, April 2013)

The Caribbean Netherlands is part of the "Biodiversity Hotspot Protocol" of the Caribbean Islands (Conservation International, 2004), areas of exceptionally varied ecosystems, rich in plant and animal species.

The varied nature in the Dutch Caribbean is not only important at the local level but also from a regional and global perspective.

The Kingdom of the Netherlands is party to treaties that are important for nature conservation in the Caribbean, namely: The Convention for Biological Diversity (CBD), the Agreement on Wetlands of International Importance (Ramsar Convention), the Cartagena Convention with the Protocol on Specially Protected Areas and Wildlife (SPAW protocol), the Convention for Migrants Species (CMS,

or Bonn Convention), the Convention on International Trade in Endangered Species (CITES), and the Inter-American Convention for the Protection and the Sea Turtle conservation (IAC).
The obligations under international treaties are anchored in national legislation. For the Caribbean Netherlands, this is the BES Nature Management and Protection Fundamentals Act.

14. Important Bird Area in the Caribbean Netherlands, IMARES May 2013
Washikemba-Fontein-Onima (of which Bolivia is a part), one of the six Bonaire Important Bird Areas (IBA) under the BirdLife International protocol of important bird areas in the Caribbean, is the only one of the six that is not environmentally protected. The area has been designated as IBA AN011. The IBA AN011 is important for six bird trigger species (Caribbean Coot, Least Tern, Bare-eyed Pigeon, Yellow-shoulder Amazon, Caribbean Elaenia, Pearly-eyed Thrasher. One species is restricted to the breeding season, one species is wintering, four species are year-round residents. Apart from the trigger species Bolivia is a breeding site for the Bonaire Barn Owl (Prins et al, 2003). In this coastline area many wading birds are also found.
Additionally five endemic land-snails, two endemic lizards and six endemic arthropods comprise the fauna of this IBA.

15. Policy Vision 2014-2029 Agriculture, Livestock and Fisheries Bonaire, March 2014 (*Beleidsvisie 2014-2029 Landbouw, Veeteelt en Visserij Bonaire*, March 2014)
Traditionally, goats and sheep are kept on the kunuku. Until the 1960s, there were forest rangers to ensure that the herbivores did not roam free. In addition, there was still social control. This supervision respected the property of other people's land and did not damage nature.
Good management is essential for successful goat and sheep farming. This management is based on keeping goats and sheep in kunuku (farm) enclosures. This strategy must also apply to Bonaire's many donkeys. For example, when the OLB (local island government) ensures that donkeys are kept inside the Donkey Sanctuary, the importance of preserving nature and enforcing existing rules is emphasized.
According to policy framework, the protection of the island's nature and the environment is important for maintaining the attractiveness of Bonaire for the local population and tourists. Sustainable agriculture, livestock and fisheries will enhance the biodiversity of nature and thereby protect the environment and nature. Environmental problems such as erosion, water and dust nuisance will decrease.

16. Population estimate goats on Bonaire (*populatieschatting geiten op Bonaire*, IMARES Aug. 2015)
The island has a calculated population of 32,200 goats.
The total economic value (TEV) of the ecosystem services provided by the marine and terrestrial ecosystems of Bonaire is $105 million per year.

Economic calculations have shown for Bonaire that nature is just about the most important natural resource for the island and that if no action is taken (also) in the field of extensive livestock farming, the economic value of nature as a motive for tourism in the coming years will seriously decrease (Van der Lely et al. 20012; Schep et al. 20013). The recently completed TEEB study calculates that the "do nothing" option (for goats and lionfish) means that within 10 years the total economic value (TEV) nature will decrease from $105 million today to around $60 million in 10 years and to less than $40 million in 30 years.
Based on results in nearby and comparable Curaçao, it appears that livestock densities of one goat per 10 hectares are sufficiently low to allow rapid ecological recovery, including the recovery of many rare species.
The estimates yield densities of an average of 1.41 /ha (minimum 0.86 and maximum 2.30). This is much higher than what is sustainably possible for extensive livestock farming. A new form of livestock farming is therefore recommended not only to offer real opportunities to the sector but also to reduce the negative environmental and economic consequences of the current system.

17. State of nature of the Caribbean Netherlands, WUR 2017 (*Staat van de natuur van Caribisch Nederland*, WUR 2017)

Dry tropical forest

Dry tropical forest is the most endangered type of forest in the Caribbean.
An indication of international protection status can be derived from the classification within the WWF Neotropical Ecoregion. The dry tropical forests of Bonaire have the status: critical / threatened (WWF, 2017a).
The Bonairean dry forests are largely dominated by cacti up to 6 m high with dominant species such as *Stenocereus griseus*, *Cereus repandus,* and *Pilosocereus lanuginosus* (Petit & Pors, 1996). These species bloom and produce fruit during the dry season and are therefore of great ecological value for the various fauna species, including bats and birds.
Healthy dry tropical forests provide important ecosystem services, such as:
• sediment retention and coastal erosion prevention;
• retention of fresh water;
• capture of CO_2 in soil and plants;
• favorable effect on the local climate.
The surface loss of dry tropical forest, mainly due to increasing urbanization, is substantial. The quality is also strongly affected by the grazing and invasive exotics. An end to this problem does not seem to be in sight. What the effects of climate change will be, such as longer dry periods and more and more severe tropical storms, will show in the future. A healthy resilient dry tropical forest will be

better able to absorb the effects of climate change than the current degraded habitat. Overall, the future outlook is judged to be very unfavorable.
What actions should be taken by the government to ensure ecological corridors and improve the quality of the dry tropical forest to reduce local threats such as development in order to realize the most vital and resilient dry tropical forest, which is better able to absorb the consequences of climate change, protection of so-called bat caves?

Caves

Caves are a protected habitat type under the European Habitats Directive of the EU, mainly because of the presence of bats and other often unique fauna. Unlike many habitats in Europe, Caribbean caves do not have international protected status as habitats.
Bonaire has hundreds of limestone caves. These are especially important for bats which they use as a resting place and nursery. In addition, shrimp and many different endemic freshwater crustaceans are also found in the aquatic caves.
Nine species of bats are known from Bonaire. They are the only animal species that can pollinate night-blooming columnar cacti (*Cereus repandus, Stenocereus griseus* and probably *Pilosocereus lanuginosus*; Nassar et al., 2003) on Bonaire. These flowers and fruits of the columnar cacti are a very important food source for the fauna of Bonaire during the dry period. Ensuring tranquility is of paramount importance for the protection and preservation of the cave fauna. The future perspective is currently assessed as moderately unfavorable.
What actions should be taken by the government/ law enforcement to prevent habitat loss (e.g. in relation to building permits and changing land use)?

Lora, Yellow-shoulder Amazon (Amazona barbadensis)

Habitat loss for these parrots, especially because of urbanization, is substantial. Much of the remaining habitat inside and outside the urbanized area has been degraded, mainly due to overgrazing by stray goats, donkeys and pigs. After restoration, this degraded habitat has potentially great ecological value for the species. For the time being, the habitat is assessed as very unfavorable. The future prospects associated with the decline of rural areas due to development into a residential area are considered moderately unfavorable.
What actions should be taken by the government? The main objectives are awareness, law enforcement, preservation of habitat, restoration of habitat by reforestation of rural areas, as well as the removal of free-living non-native grazers.

On the plus side, several recent reforestation experiments indicate that recovery can be very rapid and extensive once livestock is banned from an area (Debrot 2013, 2015).

Climate change

The rising sea level and the increase in the intensity of tropical storms are a direct threat to all human structures on the coast (Min. HEN, 2014). In addition, these infrastructures disrupt the proper

functioning of natural coastal protection such as reefs and mangroves and destroy the coast as a green-blue connection zone on which a large number of animals depend on for their survival, such as crayfish, hermit crabs and shrimp. A spatial policy aimed at coastal development at a distance from the coast (setback policy) has many economic and ecological advantages (IUCN, 2007; Debrot and Bugter, 2010).

Healthy ecosystems have a higher resilience to the pressure of climate change. An ecosystem includes all habitats necessary for communities of organisms in all their life stages. In addition, those habitats must be large enough and interconnected (corridors) to function (Soule and Simberloff, 1986). A coherent system of nature areas, with connecting zones (corridors), contributes to greater resilience, robustness of systems (van der Sluis et al., 2004) and allows species to adapt their acreage to changing climatic conditions and vegetation zoning (Cormont, 2011; Vonk et al., 2010).

The authors conclude that the Caribbean Netherlands' biodiversity, health of the ecosystems and iconic species, is without exception is already in a *moderately unfavorable* to *very unfavorable* state. The existing approach addressing threats and pressures in the Caribbean Netherlands is inadequate. The predominantly negative trends will most likely continue, as there is no reason to assume that the rate of biodiversity loss will decline or stop. In general, many threats and pressures have been identified and too little is being done to stop or decrease the impact of these threats and pressures. The report states that continued inaction regarding the most significant threats and pressures will result in the state of nature becoming 100% *moderately unfavorably* or even *very unfavorable*. Moreover, the ecosystems that have been observed in an unfavorable state are also not sufficiently resilient to mitigate current and future effects of climate change.

18. Convention on Biological Diversity (CBD), sixth national report of the kingdom of the Netherlands, WUR 2019

The recent sixth national report of the Kingdom of the Netherlands to the Convention on Biological Diversity (CBD, September 2019) describes a very unfavorable state of affairs of nature, concluding that only four of the 20 Aichi Targets of the CBD have been achieved in the Caribbean Netherlands and *highlighting the increased need for conservation management actions.*

The report also states the wildlands of Bolivia serve the crucial role of natural corridor for much of the native flora and fauna between northern and southern halves of the island. Therefore, to avoid ecological fragmentation at island level, significant sections of Bolivia will need to be conserved to fulfill this long-term function.

19. Human disturbance impedes growth of coral reefs around Bonaire, Oct. 2019
The coral reef around Bonaire is known to be one of the healthiest in the Caribbean. However, new research by Wageningen Marine Research shows that a large part of these reefs is not in good shape. Most of the shallow parts are hardly growing and in some cases they are even eroding away. The researchers found a negative correlation between local human activity and the growth capacity of the reef.
In locations with considerable human activity, the reef appears to hardly grow and even erode. At the same time, the reefs in the marine reserves, to which access is strictly prohibited, are relatively healthy. This wide variation in growth rate within one reef system has not previously been so accurately linked to human land-bound activity.

20. Natureplan Bonaire 2020-2024 (*Natuurplan Bonaire* 2018-2022), Feb. 2020 (*Concept natureplan Bonaire* (2018-2022) *Ontwerp natuurplan Bonaire* 2018-2022, sepSept. 2019)
Both the risks of increasing pressure on nature and the importance of nature for economic development have been common on the island since the publication of the Pourier report in 1992. The report concludes that when nature is successfully protected, the value of nature reserves will increase due to the degradation of nature in the greater region and worldwide.
The total economic value (TEV) of the ecosystem services provided by the marine and terrestrial ecosystems of Bonaire is $105 million per year.
Economic calculations have shown for Bonaire that nature is just about the most important natural resource for the island and that if no action is taken (also) in the field of extensive livestock farming, the economic value of nature as a motive for tourism in the coming years will seriously decrease (Van der Lely et al. 2012; Schep et al. 2013). The recently completed TEEB study calculates that the “do nothing” option (for goats and Lionfish) means that within 10 years the total economic value (TEV) nature will decrease from $105 million today to around $60 million in ten years’ time and to less than $40 million in 30 years.
Objectives with a high priority:
-Sustainable use and protection of the special environments of Bonaire.
-Protection through legal anchoring and active marine management.
-Protecting landscape in Bolivia.
-Protecting and enhancing native biodiversity

21. Nature and Environmental Policy Plan Caribbean Netherlands 2020-2030, Feb 2020
The contribution of nature to the Caribbean island economies and the well-being of its residents is profoundly clear for Bonaire. It is understood that a lack of investment in the local ecosystems will have negative impacts on the well-being of current and future generations on the island. Providing support through an integrated framework is essential to ensure that the provision of services from the natural environment continues to support society and the local economy.

The economy of the island is highly dependent on tourism and fisheries, and thus on the natural environment. On average, the direct and indirect added value of tourism to the local economy of Bonaire represents approximately 30% of its gross domestic product (GDP), while roughly 23% of employment within the local community is related to tourism.
Bonaire is heavily dependent on repeat visitors who come for the underwater natural environment: 55% of the tourists on Bonaire are repeat visitors, and only 10% of those visitors would still be willing to return if the coral reefs became degraded. In the growing market of eco-tourism, Bonaire has a significant competitive advantage considering its intact natural environment. In other regions of the Caribbean mass tourism has already taken place and affected the coral reefs and ecosystems.
In short, prosperous sustainable economy on Bonaire is not possible without healthy ecosystems. As indicated in the *Staat van de Natuur 2017 Caribisch Nederland* the health of the ecosystems and iconic species on the islands is in a poor state.

The island government decides which areas should be protected. Their decision-making must be led by criteria described in international treaties and conventions such as SPAW, Ramsar and the CBD. It is important that a comprehensive system of protected areas is put in place, with specific types of management to ensure conservation of biological diversity, taking into account size and connectivity (corridors) to avoid the isolation of species in areas that are too small to ensure their survival.

The responsibility for the decision-making, funding, monitoring, and promotion lies with both the national and local government.

On Bonaire, building resilient and healthy coral reefs is a crucial topic. Healthy coral reefs result in the increased well-being of island residents and support their cultural identity, contributing to public health and enhancing sustainable economic development. Erosion control is a key challenge that must be addressed to achieve this sustainable development. The negative effects of construction in the coastal zone need to be addressed through a revision of spatial planning, including the delineation of a buffer zone from the shoreline in which construction activities are not allowed.

To conserve the key habitats for current and future generations, increased protection and restoration of degraded habitats is required. In addition, keystone and flagship species need to be targeted to ensure healthy populations.
Most of the important habitats in the Caribbean Netherlands are currently officially designated as protected areas. There are still some that are not, such as Bolivia.
Cave systems and important breeding areas for sea and shorebirds need to be protected by local regulation and management.

The current system of protected areas will be reviewed to ensure the protection of key habitat functions, such as migratory corridors, nursery and foraging areas in the context of the second State of Nature Caribbean Netherlands 2024. Finally, eligible protected areas that are of national interest should be designated as National Parks.
The Ministry of ANF will work together with local partners to support restoration efforts in dry and tropical forest ecosystems and mangroves to stimulate the regeneration of endemic vegetation. It is crucial that the problem of roaming livestock is resolved before any large-scale restoration efforts take place. All livestock must be kept within fenced-off properties by 2024.

Strategic goal- Restore and conserve the unique habitats and species on Bonaire:
Effective conservation of key habitat functions (e.g. migratory corridors, nursery areas, foraging areas), designate currently unprotected key habitats as protected areas, protect caves and other key bat habitats, structural reforestation of dry forest by 2030.

22. STINAPA year reports, 2005-2015, Strategic Plan STINAPA 2015-2020
Over the years from 2005 to 2015, (after 2015 there were no more yearly reports published) the annual Stinapa report listed a project whose aim was to buy Bolivia: *Bonaire Bolivia Park; funding pending, in progress, protect this natural corridor between the north and south and also the evidence of tsunamis and hurricanes that have hit the island in the past*.
In the strategic Plan 2015-2020 STINAPA stated an important aim will be to increase the number of land parks with (parts of) Bolivia and the caves.

References/Reports

1. Dr. A.O. Debrot, Drs. J.A. de Freitas, Ir. A.C. Rojer, Brief Biological Inventory of Bolivia Bonaire, Netherlands Antilles, Feb 1998
2. Dr. A.O. Debrot, E. Newton, Bolivia Plantation: a unique opportunity, update March 1998
3. Department of Environment & Nature, Natuurbeleidsplan 1999-2004,
4. J.A. De Feitas, B.S.J. Nijhof, A.C. Rojer, A.O. Debrot, Landscape ecological vegetation map of the island of Bonaire (Southern Caribbean), 2005
5. EcoVision N.V., Milieurapport voor de Wind/Diesel energiecentrale van Ecopower Bonaire, 19 Feb 2008
6. Evaluatierapport natuurbeleidsplan Bonaire 1999-2004, Jan 2010
7. Mw. Mr.drs. M.C. Lammens, Strategische milieu Beoordeling (SMB), June 2010
8. Ruimtelijk ontwikkelingsplan Bonaire, vastgesteld 8 Oct 2010
9. R.H.G. Jongman, H.W.G. Meesters, A.O. Debrot, Biodiversiteit voor de BES-eilanden: Bonaire, St. Eustatius en Saba. IMARES Oct 2010
10. Prof. Dr. Maarten Hajer, Natuurverkenning 2010-2040, visies op de ontwikkeling van natuur en landschap, 2012
11. Sarah R. Smith, Narangerei Davaasuren, Adolphe O. Debrot, Fernando Simal, John A. De Freitas, Preliminary inventory of key terrestrial nature values of Bonaire, March 2012
12. Jorge Amrit Cado van der Lely, Pieter van Beukering, Lidia Muresan, Dario Zambrano Cortes, Esther Wolfs, Stijn Schep, The total economic value of nature on Bonaire, VU 12 Feb 2013
13. Ministerie van Economische Zaken, Natuurbeleidsplan Caribisch Nederland 2013-2017, April 2013
14. SCV Geelhoed, AO Debrot, JC Ligon, H Madden, JP Verdaat, SR Williams, K Wulf, Important Bird Area in the Caribbean Netherlands, IMARES 6 May 2013
15. Beleidsvisie 2014-2029 Landbouw, Veeteelt en Visserij Bonaire, March 2014
16. Sander Lagerveld, Dolfi Debrot, Paulo Bertuol, Narangerei Davaasuren, Francesca Neijenhuis, Populatieschatting geiten op Bonaire, IMARES 25 Aug 2015
17. Debrot, A.O., Henkens, R.J.H.G., Verweij, P.J.F.M., Staat van de natuur van Caribisch Nederland 2017, WUR 17 Nov 2018
18. M.E. Sanders, R.J.H.G. Henkens, D.M.E. Slijkerman, Convention on biological diversity, sixth national report of the kingdom of the Netherlands, WUR May 2019
19. Dr. E.H.W.G. (Erik) Meester, Human disturbance impedes growth of coral reefs around Bonaire, 25 Oct 2019
20. Natuurplan Bonaire 2020-2024, Feb 2020 (Ontwerp natuurplan Bonaire 2018-2022, Sept 2019)
21. Ministeries van Landbouw Natuur en Voedselkwaliteit, Infrastructuur en Water en Binnenlandse zaken en Koninkrijkrelaties, Nature and Environmental Policy Plan Caribbean Netherlands 2020-2030 Feb 2020
22. STINAPA year reports, 2005-2015, Strategic Plan STINAPA 2015-2020

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