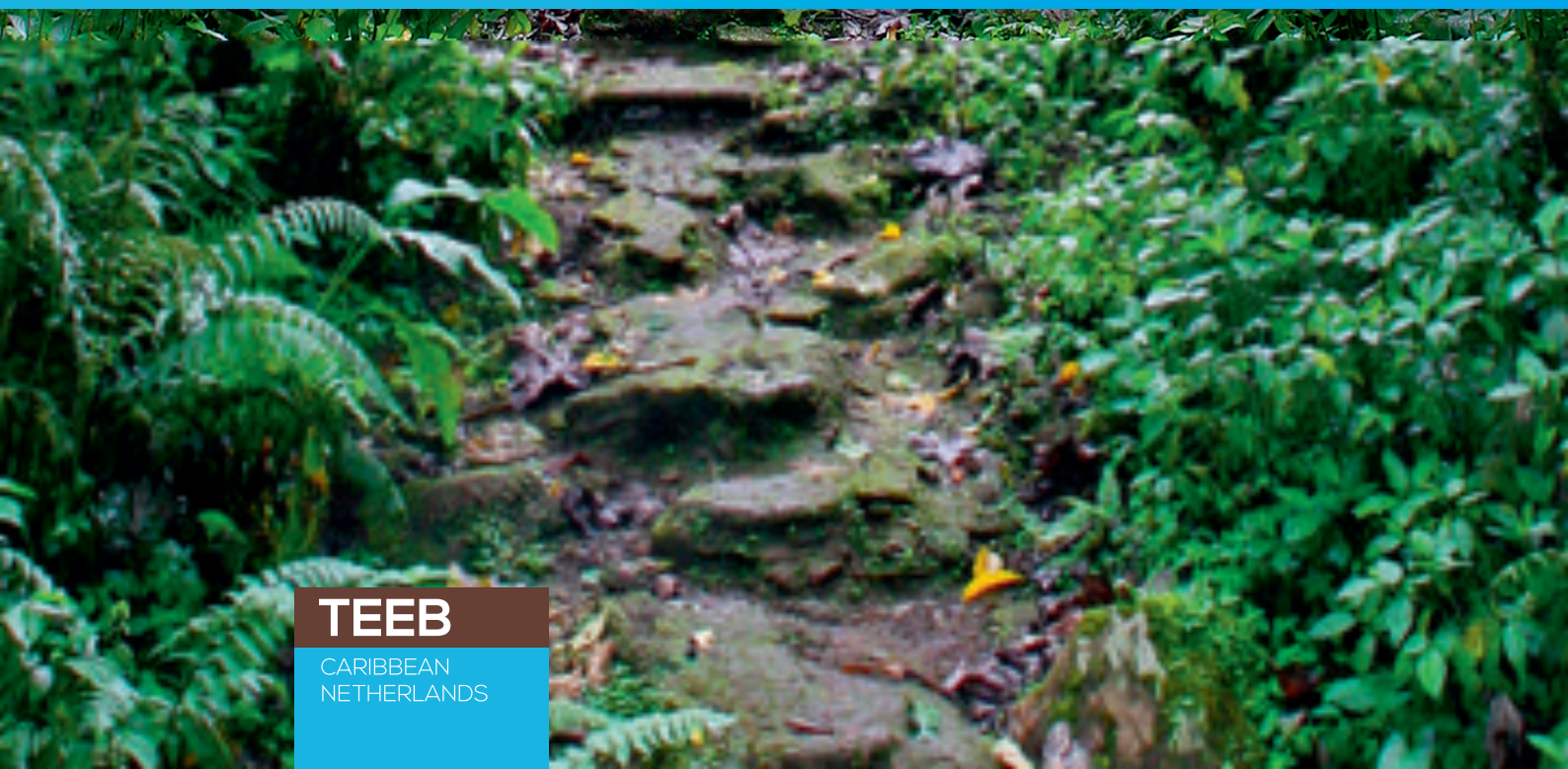




The Economics  
of Ecosystems  
and Biodiversity  
on Saba

# What is Saba's Nature Worth?



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## The Economics of Ecosystems and Biodiversity on Saba

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This study is part of "The Economics of Ecosystems and Biodiversity Netherlands" (TEEB NL) study. It is being conducted for the Caribbean Netherlands on behalf of the Dutch Ministry of Economic Affairs

### The Challenge

Healthy ecosystems such as the corals reef patches and forests on the characteristic Mount Scenery are critical to the Island of Saba. Local people call Saba 'The Unspoiled Queen', showing how proud residents are of their cultural heritage and pristine nature. In the last decades, various local and global developments resulted in serious threats to these fragile ecosystems, thereby jeopardizing the foundations of the island's economy. To address these threats in an effective manner, it is crucial to understand how nature contributes to the economy and wellbeing of this beautiful tropical island. This research aims to determine the economic value of the main ecosystem services that are provided by the natural resources of Saba and their overall importance to the island's society. The challenge of this project is to deliver insight that supports decision-makers in the long-term management of the island's economy and the natural environment.

### The Approach

By assigning economic values to the main ecosystem services of Saba, this study draws attention to the economic benefits of biodiversity and highlights the growing costs of biodiversity loss and ecosystem degradation. From the onset of the study, stakeholders participated by facilitating data and simultaneously creating support for the concept of ecosystem services among the target audience. The study applies a range of economic valuation and evaluation tools. By surveying over a 1,000 people including tourists, local residents, and citizens of the Netherlands, this study estimates the willingness to pay of individuals for the protection of nature of Saba. Furthermore, scenario analysis is conducted to inform decision-makers about the most effective strategies to protect the ecosystems of Saba to improve the economy and wellbeing on the island.



## Country Overview

Saba is a small island located in the Leeward region of the Caribbean covering an area of 13 km<sup>2</sup> and is home to approximately 2,000 permanent inhabitants. Since 2010, Saba is formally part of the Netherlands as a 'public entity'. The island consists mainly of a non-active volcano called 'Mount Scenery', which at 877 metres is the highest point in the Kingdom of the Netherlands. Because of the local microclimate, a rare 'Elfin forest' is found on top of Mount Scenery. The natural environment of Saba supports unique biodiversity including some endemic species, such as the Saban Anole and the Saba Least Gecko. The tourism industry is largely focused on nature-based activities such as diving, snorkelling and hiking. The Saba Conservation Foundation (SCF), established in 1987, is responsible for the management of the Saban National Marine Park and the numerous hiking trails around the island.

Also, the marine ecosystems of Saba are unique in different ways. For example, with an area of 2,000 km<sup>2</sup> the Saba Bank, which is located 3 to 5 km southwest of Saba, is one of the largest atolls in the world. The Saba Bank contains rare and unique marine species such as turtles, sharks, lobsters, whales and different types of coral. Fish and lobster stocks on the Saba Bank are a popular catch by Saban fishermen.

## The Results

The total economic value (TEV) of the ecosystem services provided by the marine and terrestrial ecosystems of Saba is estimated at \$29 million per year. With the current pressure on Saba's ecosystem services, the TEV of the natural environment on Saba, will decrease from \$29 million today to around \$22 million in 30 years. After extensively analyzing different development scenarios for the value of future ecosystem services, one result prevails: Unsustainable short-term gains lead to long-term losses for the economy of Saba. In other words, economic progress on Saba is certainly feasible, yet excessive development will ruin the fundament of the Saban economy which is tourism. Furthermore, increased support of nature conservation proves to be a profitable investment.



## The Challenge

In the current era of financial insecurity and environmental degradation it becomes clear that conventional investments often increase pressures on the environment. In response, a growing community of practitioners and researchers is trying to show that the economy and environment are strongly interlinked, and that in fact a healthy environment is critical to financial as well as human wellbeing. To make well-founded decisions when managing the economy and the environment of a country, it is crucial to recognize all benefits that are derived from ecosystems and their importance to society. This challenge requires tailor-made methods to accurately measure and value these ecosystem services in the

local context. This task is complex because most ecosystems are either public or quasi-public goods: there are no specific property rights assigned nor can people be excluded from using them. Such situations are often referred to as 'a tragedy of the commons', because they often lead to overexploitation and degradation.

By assigning a monetary value to these systems, environmental economists create an insight about the benefits for different stakeholders. This enables local governments to intervene when the free market fails to coordinate the supply of ecosystem services efficiently and equitably. By designing appropriate mechanisms and policy strategies (e.g. taxes, property rights) the optimal supply of ecosystem services can be restored.

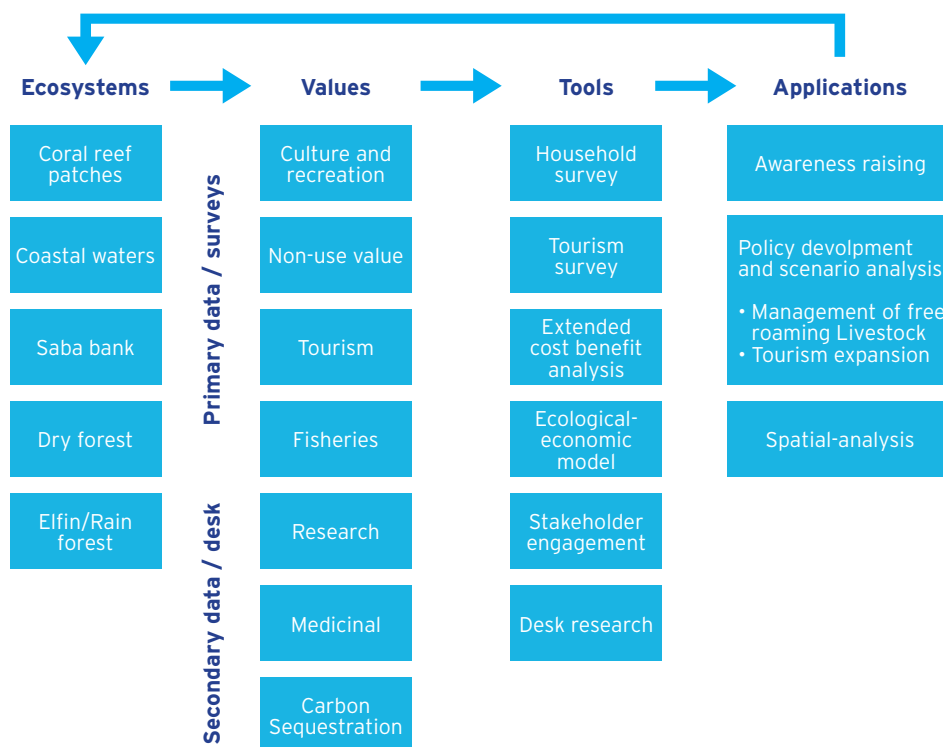
## The Approach

The unique environment and biodiversity of Saba are part of the Kingdom of the Netherlands. The coastal waters contain coral reefs, sea grass beds and one of the biggest submarine atolls in world: the Saba Bank. On land, the island is characterized by dry forest on its lower slopes that turn into rain and even cloud forest on the top of Mt Scenery. Historically, Saba's inhabitants lived in balance with their natural environment and used its natural resources for survival through agriculture and fisheries. Nowadays, tourism is the main source of income, which is an activity that is highly dependent on the natural beauty of the "Unspoiled Queen" as Saba is caressingly dubbed. However, many pressures have led to environmental degradation and a subsequent loss of the ecosystem services on which the people of Saba depend. Therefore, it is crucial to understand how nature contributes to Island's economy and human wellbeing of its inhabitants.

This study estimates the economic benefits of ecosystems and biodiversity on Saba and highlights the costs of biodiversity loss and ecosystem degradation. A better understanding of the value of ecosystems and biodiversity can support decision makers to make wise and inclusive decisions for long-term sustainable economic development on Saba. To inform decision makers about the most effective strategies to preserve nature as an important economic source a full-scale valuation of all ecosystem services on the island of Saba has been undertaken by Wolfs Company and the VU University Amsterdam. The study addresses all relevant ecosystems and ecosystem services for Saba and applies a range of tools to determine the economic value of nature on the island. Figure 1 shows the overall project framework providing an overview of assessed ecosystem services and developed tools and application.

Figure 1:  
Overall project  
framework

Figure 1





## Results

This extensive study has resulted in the economic valuation of all natural resources on Saba. The main outcome of the study is the Total Economic Value (TEV) of nature on the island of Saba. The TEV is the sum of the main ecosystem services provided by the marine and terrestrial ecosystems of Saba. In total, eight different services have been valued in monetary terms. This TEV and its underlying components are used to build a strategy for effective conservation measures and sustainable development. The most relevant services that were assessed are summarized in the following sections.

### Local cultural and recreational values

The importance of the natural environment to the residents of Saba has been assessed through a public household survey. A total of 300 households on Saba participated in this survey, addressing a wide range of issues such as ecosystem threats, benefits, and preferred environmental management options. The Willingness-To-Pay (WTP) by all households on Saba to improve the overall marine and terrestrial environment is estimated at \$150,000 per year. Residents identified waste, oil spills and erosion as the main threats facing nature on the island. Interesting is the WTP for the management of roaming goats on the island. This indicates that active

goat management will be supported by a majority of the Saban population.

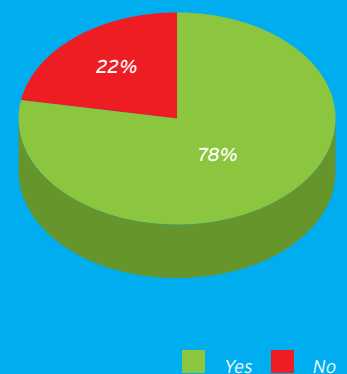
A crucial next step is raising awareness among the residents of Saba about the vital role of nature on the island, which will result in stronger support for additional environmental measures and more responsible behavior by the local community.

### Tourism value

Both the marine and terrestrial ecosystems of Saba support tourism activities that mostly depend on the quality of the natural environment, such as hiking and diving. Although the tourism sector is the main component of the economy of Saba, the economic value of the contribution of nature to its tourism industry has never been quantified before. To determine the tourism value of Saban ecosystems a exit survey among tourists visiting Saba has been conducted, recording visitors' expenditures as well as their WTP for protection of the natural environment of Saba. The expenditures by tourists on Saba are found to be around \$30 million per year. The estimated tourism value of Saba's natural environment is estimated at \$7.5 million. Of this value, \$1.6 million represents the WTP of tourists for additional nature management. The high WTP of tourists for additional environmental protection in Saba suggests that the current user fees for visitors to Saba could be

### The majority of Saba's visitors are willing to pay for additional nature conservation efforts

78% of the visitors on Saba is in principle willing to pay for additional nature conservation efforts. The results also indicate a preference by tourists to appoint the Saba Conservation Foundation for the management of the collected funds. This implies that the current modest levels of environmental fees for tourists can be increased to finance urgently needed nature conservation on Saba.





increased without having a negative effect on the number of tourists visiting the island. This finding is especially relevant for the terrestrial environment, for which no entrance fee system is currently in place. Although voluntary donations are asked for the maintenance of hiking trails on the island, no obligatory fee system is in place.

#### **Value of nature in the Caribbean Netherlands for citizens in the Netherlands**

How do citizens of the Dutch mainland value the ecosystems in the Caribbean Netherlands, even if many will never visit these beautiful islands? This and other questions are addressed in an extensive case study. Over 800 face-to-face interviews were conducted with people in the Netherlands, and an additional 500 respondents filled out an online questionnaire. The most notable result is that Dutch mainland citizens have a positive WTP for protecting nature on both sides of the ocean. Yet the WTP has diminished since 2012 and was estimated for 2013 at EURO 3.10 per month per household. However, the management of nature in other Dutch Caribbean islands is also included in this WTP (Sint Maarten, Aruba and Curacao). The aggregated annual WTP for nature protection in the three islands of the Caribbean Netherlands by all Dutch

households is estimated at \$63 million. Compared to the other values in the research, the non-use value of Dutch citizens is relatively large. Although this value is a genuine economic value, this ecosystem service is predominantly a non-financial value. The actual payment that is derived from Dutch mainland taxpayers is significantly lower. Although our study indicates there is ample support for greater financing from the Dutch households for nature management in the Caribbean Netherlands, the actual amounts are hypothetical and should be interpreted with care.

#### **Fishing value**

With nine small fishing vessels, the fisheries deliver a substantial contribution to the economy of Saba. Fishermen fish primarily for commercial purposes on the Saba Bank. The main fishing technique is trap fishing to target lobster and red fish; trolling, long and hand lining for pelagic species is practiced on a negligible level. Most of the red fish and lobster catch is exported for consumption on St Maarten. The total annual value of the fisheries on Saba is estimated to be around \$1.3 million. In order to assess fish stocks on the Saba Bank, a monitoring program is currently in place.







### Research value

Nature in Saba provides important services for research purposes. The marine and terrestrial environments of Saba are subject to a group of academics conducting and publishing innovative research based on these unique and easily accessible ecosystems. Researchers from all over the world are attracted to the unique ecosystems that Saba has to offer. This study made an inventory of the ecosystem related research expenditures, estimating the annual value at around \$435.000. This value will probably increase due to the availability of research budgets through the Netherlands Organisation for Scientific Research (NWO) for research in the Caribbean in the near future.

### Medical and pharmaceutical value

Especially the terrestrial ecosystems on Saba provide ample species and ecosystem functions that are relevant for medicinal purposes. A large fraction of the population in Saba is found to regularly collect and use local herbs and other medicinal plants for medical treatment. 40% of the local respondents stated to regularly use local plants for medicinal purposes or cooking. Most commonly used plants are lemongrass, soursop, bush and sprain bush. The plants are generally used for colds and the flu. The annual medicinal and pharmaceutical value of nature on Saba was estimated at almost \$60.000.

### Carbon sequestration

The ecosystem service of climate regulation deals with how ecosystems can on Saba can store greenhouse gasses. This sub-component of the study aims to value the climate regulation potential of Saba, where the coral reefs and forests are assessed for their ability to sequester carbon. Based on actual carbon market prices this value was estimated at \$115.000 per year.

Figure 2:  
Total economic vs  
total financial value

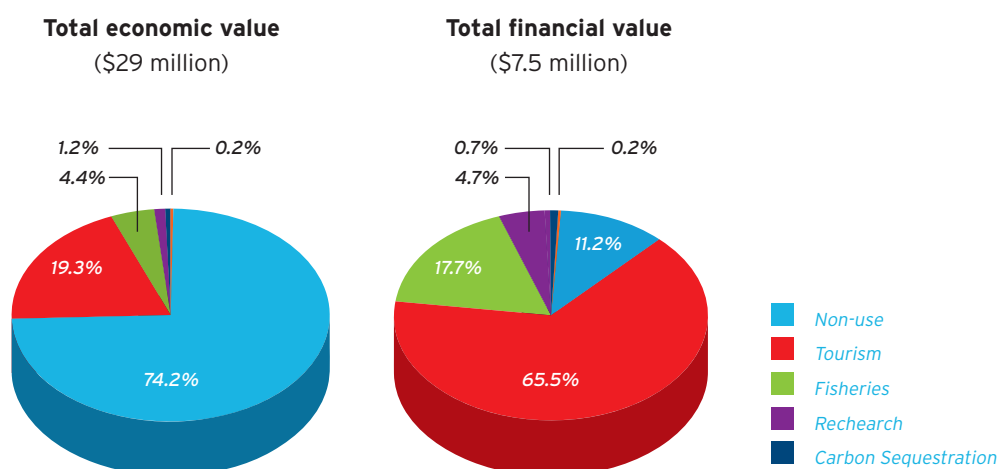


Figure 2

## Conclusions & Recommendations

The analysis of the wide range of ecosystem services provided by the natural environment of Saba generates many opportunities for decision makers to improve economic and environmental policies on the island. To deliver information to decision makers the first step is to calculate the Total Economic Value (TEV) and to grasp the role of nature in the economy of Saba. Next, an analysis of alternative future scenarios provides an objective means of understanding which interventions in the economy and environment generate the highest yield. Such an integral approach is intended to ensure the betterment of the environment of Saba to warrant sustainable economic development.

### Total Economic Value versus the Total Financial Value

By summing up the worth of the range of valued ecosystem services, the annual TEV of the natural environment of Saba is

estimated to be \$29 million. This is close to \$12.500 per capita. Compared to other island-based studies, this shows that the economy of Saba has a high dependence on its natural environment. Although the TEV of nature on Saba is very large, this aggregated value is composed of numerous hidden welfare-related values that are not necessarily translated into actual monetary flows. For example, the value by Dutch mainland citizens is a genuine economic value, yet at the same time, this ecosystem service is predominantly a non-financial value (i.e. its value is not fully transferred in money terms to the financial economy of Saba). As shown in Figure 2, a little less than one-third of one-third of the TEV of \$29 million (i.e. \$7.3 million) is truly traceable to financial streams that are dependent on the local ecosystems,. This means that almost \$3.700 per capita of this financial value is attributable to ecosystems on Saba. The majority (i.e. almost 70%) of this financial value is provided by the tourism sector.





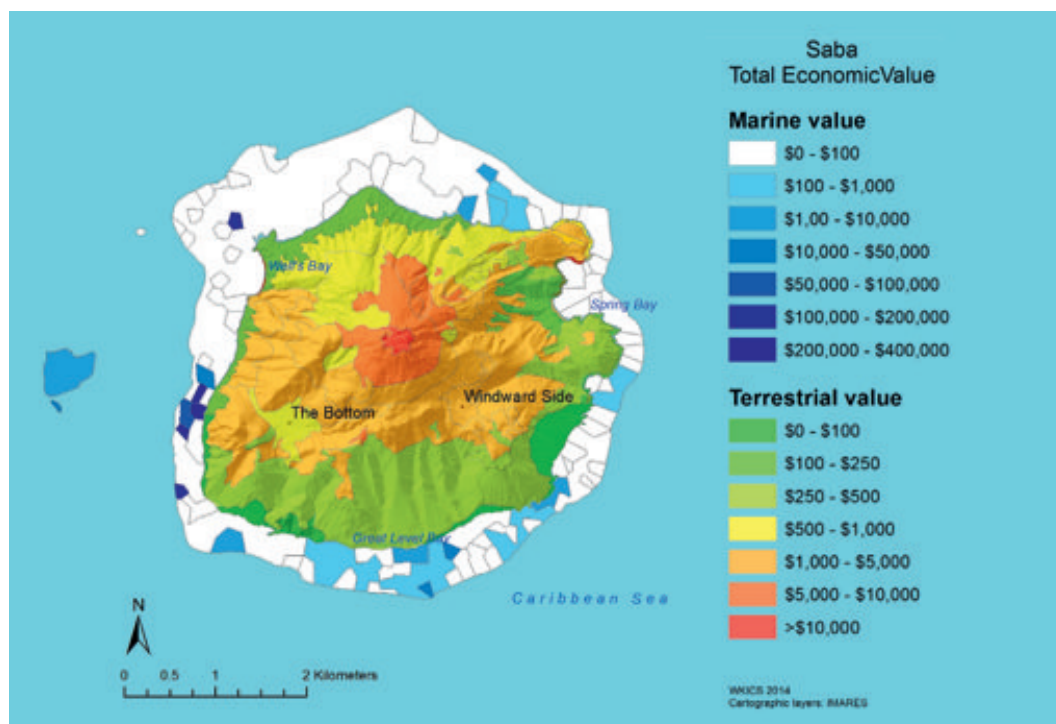


Figure 3:  
Total Economic Value  
(TEV) map

### Value maps

Using spatial analysis techniques, the TEV of Saba's ecosystems has been attributed to different (parts of) ecosystems. Value maps are created for the most important ecosystems. Together, these maps are combined to form the TEV map of Saba (Figure 3). The maps give insight in the value of the different ecosystem services for the different locations on Saba. Areas with high ecosystems values are indicated on the TEV maps which provide an important input for spatial planning on the island. Combined with a spatial analysis of threats to ecosystems an assessment can be made to prioritize conservation efforts.

### Scenario Analysis

This study made use of a dynamic model to simulate the current situation on the island and to give insight in the effect of possible future scenarios or management options. Three scenarios were developed in close cooperation with local experts and stakeholders: 1) A baseline scenario in which business continues as usual; 2) management of roaming goats and agricultural development; and 3) tourism expansion. Out of the extensive

analysis of the ecosystem services and the different scenarios it becomes apparent that management of threats in order to maintain or even increase the value of ecosystems is a very worthwhile investment. In the scenario analysis this is shown through a cost benefit analysis of managing roaming livestock. The analysis of the tourism scenario shows that excessive tourism expansion increases the value of tourism to the island in the short run. However, tourists visit the island for its tranquility and unspoiled natural landscape and marine environment. Without these assets, Saba will cease to be the attractive destination that it currently is and these tourists will not return to the island. Careful development combined with increased investments in natural capital will pay off in the long run.

### Further Information

For further information about valuing Ecosystem Services on the island of Saba, contact Esther Wolfs at [esther@wkics.com](mailto:esther@wkics.com) or Pieter van Beukering at IVM [pieter.van.beukering@vu.nl](mailto:pieter.van.beukering@vu.nl) and the webpage [www.wolfscpany.com](http://www.wolfscpany.com)

# Natural capital is of great value for tourism expansion on Saba

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