



The Economics
of Ecosystems
and Biodiversity
on St Eustatius

What is St Eustatius' Nature Worth?



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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 reefs and the forests on the hillsides of Boven and the Quill are critical to the society of St Eustatius. The St Eustatius Strategic Development Plan also acknowledges the importance of natural attractions for the expansion of the tourism sector. In the last decades, various local and global developments have resulted in serious threats to these fragile ecosystems, thereby jeopardizing the foundations of the island's economy. It is crucial to understand how nature contributes to the economy and wellbeing to make well-founded decisions that affect the natural environment on 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 St Eustatius and their overall importance to 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 natural environment.

The Approach

By assigning economic values to the main ecosystem services of St Eustatius, this research 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. The study addresses the most relevant ecosystems and ecosystem services for St Eustatius and 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 estimated the willingness of individuals to pay for the protection of nature of St Eustatius. Furthermore, scenario analysis was conducted to inform decision-makers about the most effective strategies to protect the ecosystems of the island in order to improve the economy and wellbeing of its residents.

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The Results

The total economic value (TEV) of the ecosystem services provided by the marine and terrestrial ecosystems of St Eustatius is calculated to be \$25 million per year. After extensively analyzing different development scenarios for the value of future ecosystem services, it becomes very clear: Despite the ample opportunities to develop the tourism industry, increasing the tourism sector beyond its capacity are likely to cause pressures which the local ecosystems cannot endure. This potential degradation of the natural environment will prevent future tourists from coming to St Eustatius. In other words, tourism can destroy the very environmental attractions that visitors come to experience on St Eustatius. Furthermore, increased support for nature conservation proofs to be a profitable investment. With the current pressure on ecosystem services on St Eustatius, the TEV of its natural environment, will decrease from \$25 million today to around \$18 million in 30 years. The project is well documented and provides several extensive online reports and three easily accessible policy briefs to communicate the results of the study.

What is St Eustatius' Nature Worth?

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Country Overview

St Eustatius is a Caribbean island in the Lesser Antilles with an area of approximately 21 km² and approximately 4,000 permanent inhabitants. Since 2010, St Eustatius is part of the Netherlands as a public entity. Although transshipment by NuStar is the island’s main source of income, tourism accounts for a large part of economic activity on the island. The tourism sector and the wellbeing of many of the residents of St Eustatius rely on the quality of the island’s ecosystems. The coastal waters are officially a Marine Protected Area in an effort to conserve what are considered to be among the well-preserved marine ecosystems in the Caribbean. The St Eustatius National Marine Park was created in 1996 and covers the coastal waters around the island from the high water line until the depth of 30 meter. The Marine Park includes two marine reserves in which fishing and anchoring is prohibited. The terrestrial national parks go by the names of Quill and Boven. All parks are managed by the St Eustatius National Parks Foundation (STENAPA).

Nature on St Eustatius provides cultural and recreational services to the residents, such as relaxing on the beach, hiking in the national parks, diving in the coastal waters. In general, nature can be considered to be important for the wellbeing of the population of the island.

The Challenge

In the current era of financial insecurity and environmental degradation and a slow shift from fossil to sustainable energy sources, it becomes clear that conventional investments in the economy do not always contribute to a healthy environment. In response, a growing community is working 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 natural environment of a country, it is necessary to determine all benefits that are derived from ecosystems and their importance to society. The challenge is to find methods to accurately measure and value these ecosystem services.

Most ecosystems are either public or quasi-public goods: there are no specific property rights assigned and/or people cannot be excluded from using them. Such situations are often referred to as ‘a tragedy of the commons,’ because they lead to overexploitation and degradation of natural resources.

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, payment schemes, property rights etc.) the optimal supply of ecosystem services can be restored.

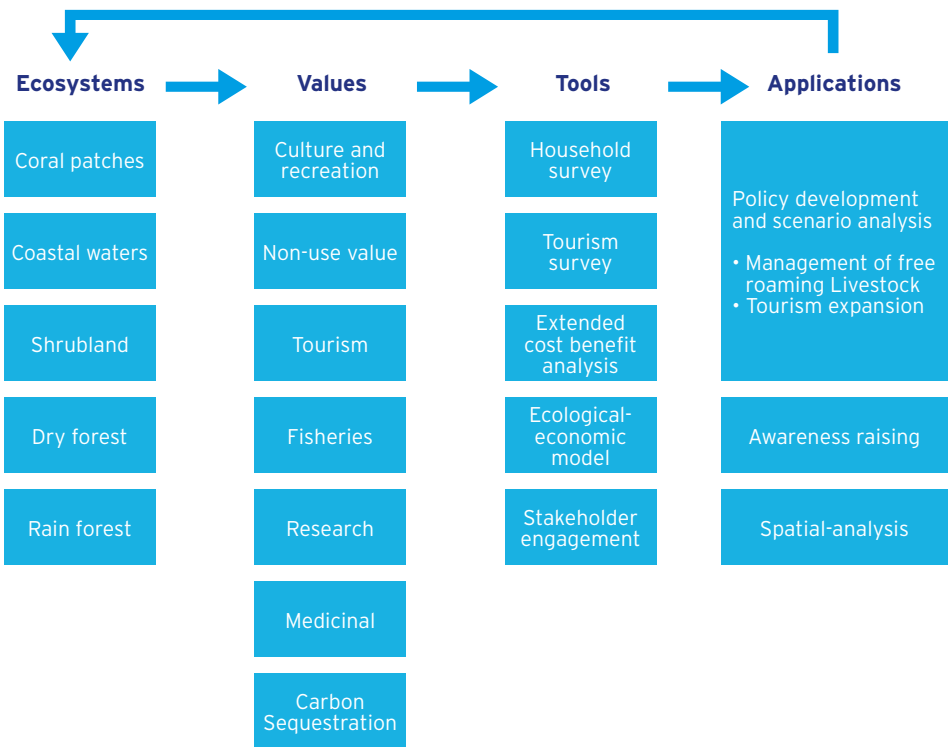
The Approach

The unique environment and biodiversity of St Eustatius are part of the Netherlands. The coastal waters contain coral reefs and sea grass beds. On land, the island is characterized by dry forest on the hillsides of Boven and the Quill, while the crater of the volcano hides a small patch of ancient rainforest. The biggest economic sector is represented by the oil transshipment by NuStar, tourism is still considered to be the second income source of St Eustatius. The tourism sector, as well as the wellbeing of residents relies on the benefits of the island’s natural resources. However, many pressures have led to environmental degradation and a loss of the ecosystem services of which the people of St Eustatius take benefit. Therefore, it is crucial to understand how nature contributes the economy and human wellbeing on the island.

This research project draws attention to the economic benefits of ecosystems and biodiversity and highlights the costs of biodiversity loss and ecosystem degradation. Insight into the value of ecosystems and biodiversity can support decision makers to make wise and inclusive decisions for long-term sustainable economic development. 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 St Eustatius has been undertaken by Wolfs Company and the VU University Amsterdam. The study addresses all relevant ecosystems and ecosystem services for St Eustatius and applies a range of economic valuation and evaluation tools. The overall project framework with an overview of assessed ecosystem services and developed tools and application is presented in Figure 1.

Figure 1:
Overall project
framework

Figure 1

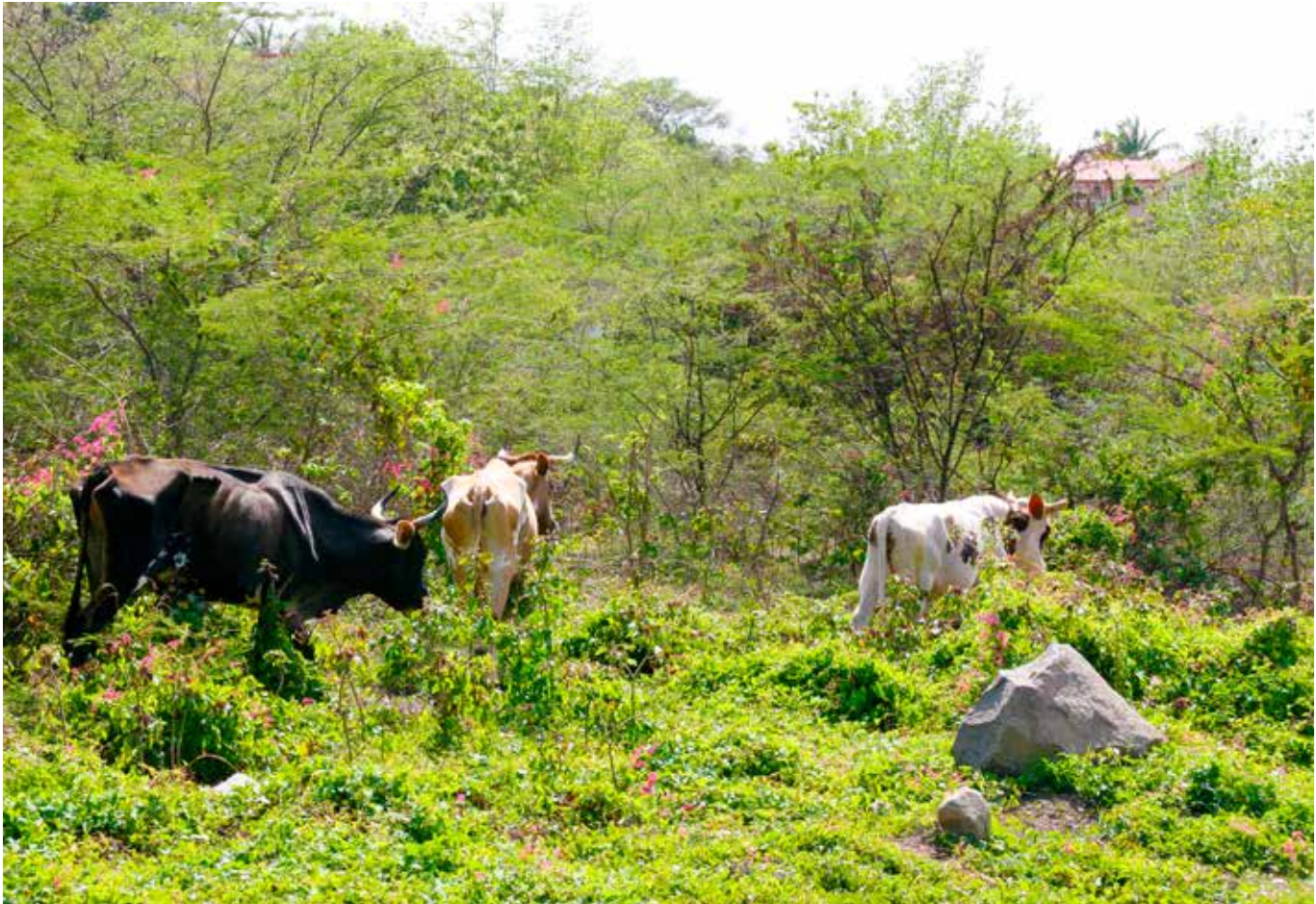


Results

This extensive study has resulted in complete socio-economic valuation of the natural resources of St Eustatius. The main outcome of the study is the Total Economic Value (TEV) of the island’s nature. This TEV and its underlying components are used to build a strategy for effective conservation measures and sustainable development. The TEV is the sum of the ecosystem services provided by the marine and terrestrial ecosystems of St Eustatius. In total, 8 different services have been valued in monetary terms. Because the bio-prospect value (the potential value for the pharmaceutical industry) is calculated to be of negligible significance, it is not discussed in this policy brief. The most relevant services that were assessed are summarized in the following Sections. Moreover, the results have been translated into easily accessible policy briefs.

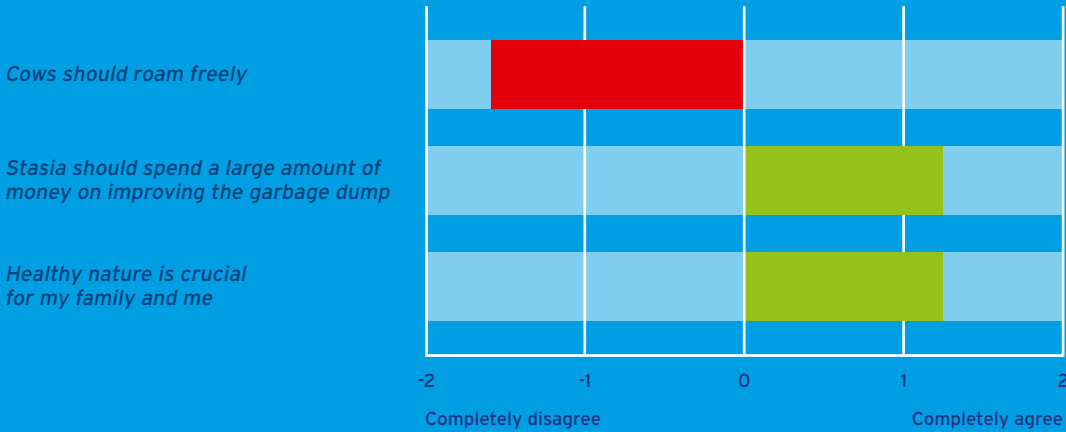
Local cultural and recreational values

The importance of the natural environment to the residents of St Eustatius has been assessed through a public survey. A total of 400 households on St Eustatius participated in this household 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 St Eustatius to improve the overall marine and terrestrial environment is estimated at \$200,000 per year. Residents identified oil spills, solid waste and car wrecks as the main threats facing nature on the island. Interesting is the WTP for the management of roaming livestock on the island. This implies that active livestock management is supported by a vast majority of the population. A crucial next step is raising awareness among the residents of St Eustatius about the vital role of nature on the island. Results indicate that this will result in stronger support for additional environmental measures.



Residents’ perception of the environment

Participants in the residential survey responded to several statements regarding the natural environment of St Eustatius. The results show that environmental threats are perceived as important by the people from St Eustatius and that a healthy natural environment is important to their wellbeing.



Tourism value

Ecosystems of St Eustatius support touristic activities that depend on the quality of the natural environment, such as diving and hiking. Although the tourism sector is the second-most important economic sector of St Eustatius, the economic value of the contribution of nature to its tourism industry has never been quantified. To determine the tourism value of local ecosystems a survey of tourists visiting St Eustatius has been conducted, recording visitors’ expenditures as well as their Willingness-To-Pay (WTP) for protection of the natural environment on St Eustatius. The expenditures by tourists are found to be around \$14 million annually.

The estimated value of the natural environment for tourism is around \$3 million. Of this value, \$0.8 million represents the WTP of tourists for additional management. The high WTP of tourists for additional nature protection in St Eustatius suggests that the current user fees for visitors can be increased without having an effect on the number of tourists visiting the island. Interesting is the large discrepancy between the amount of hikers and the amount of sold trail tags, which indicates that there is room for improvement of the payment for nature conservation mechanisms as well.

Tourists are willing to pay more in order to contribute to the conservation of St Eustatius' nature.



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

On average, between the 1 and 2 fishing boats go out per day. The main fishing technique is trap fishing to target lobster and reef fish; Although the department of agriculture and fisheries recently installed a Fish Attracting Device (FAD), trawling for pelagic species is practiced on a minor level. The total value of the fisheries on St Eustatius is estimated at around \$140,000 million USD per year. A monitoring program is currently in place to assess the fish stocks around St Eustatius.

Research value

Nature in St Eustatius provides important services for research purposes. The marine and terrestrial environments are subject to a group of academics conducting and publishing innovative research based on these unique and easily accessible ecosystems. The development of the Caribbean Netherlands Science Institute (CNSI) on St Eustatius exemplifies this. The sub-study made an inventory of the ecosystem related research expenditures, estimating the annual value at around \$695,000. 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

The aim of this sub-study is to economically value the benefits of species and ecosystem functions that are relevant for medicinal purposes. A large fraction of the population in St Eustatius is found to regularly collect and use local herbs and other medicinal plants for medical treatment. 77% of the local respondents stated to regularly use local plants for medicinal purposes or cooking. Especially the curacao sage is popular: the plant is popular by 90% of the medicinal plant users. Aloe, sour sop, bitter root and lemon grass are also commonly used. The annual medicinal and pharmaceutical value of the terrestrial ecosystems was estimated at \$107,000.

Carbon sequestration

The ecosystem service of climate regulation deals with greenhouse gas emissions and how ecosystems can mitigate such effects. This sub-study aims to value the climate regulation potential of St Eustatius, where the coral reefs and vegetation are assessed for their ability to sequester carbon. This desk study has made a rough attempt to estimate the carbon sequestration value of the main ecosystems of St Eustatius. Based on actual carbon market prices this value was estimated at \$118,000 per year.

Figure 2:
Total economic vs
total financial value

Conclusions &
Recommendations

The analysis of the wide range of ecosystem services provided by the natural environment of St Eustatius 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 St Eustatius. 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 St Eustatius 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 TEV of the natural environment of St Eustatius is estimated to be \$25 million annually. The last available GDP figure of \$55 million (2004) indicates that St Eustatius depends significantly on its natural environment. Although the TEV of nature on St Eustatius is very large, this aggregated value is

composed of numerous latent 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 St Eustatius). Of the TEV of \$25 million, only \$3.7 million is truly traceable to financial streams that are dependent on the local ecosystems, see Figure 2. The majority of 53% of this financial value is provided by the tourism sector.

Value maps

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

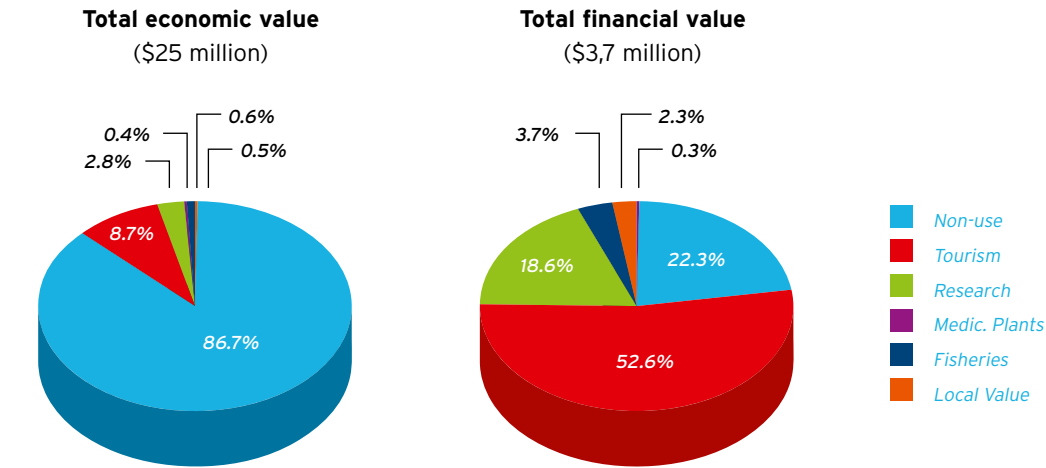


Figure 2

Figure 3

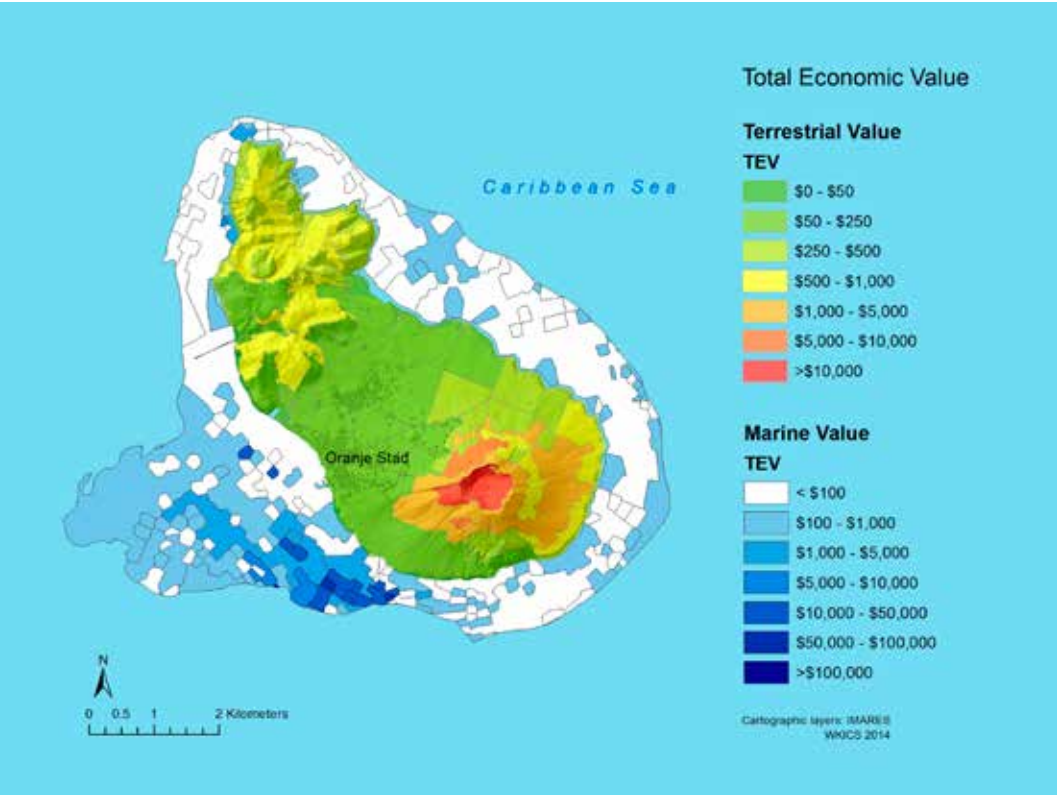


Figure 3:
Total Economic Value
(TEV) map

Scenario Analysis

This study applied 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 and are comparable to parts of the scenarios in the strategic development plan: 1) a baseline scenario; 2) management of roaming livestock combined with agricultural development; and 3) tourism expansion. The extensive analysis of the ecosystem services and the different scenarios demonstrates that improved management of the environmental threats fostering the value of ecosystems is a very lucrative investment. In the scenario analysis this is shown through a Cost Benefit Analysis (CBA) of managing roaming livestock. Such an intervention will decrease pressure on the terrestrial and marine environment and provides the opportunity for development of the agricultural sector.

The analysis of the tourism scenario shows that excessive tourism expansion increases the value of tourism to the island in the short run. Visitors do not seem to be influenced substantially by the potential presence of more tourists. However, tourists visit the island for its unique terrestrial and marine environment. The results show that without these natural assets, St Eustatius will cease to be the attractive destination that it currently is and these tourists will not return to the island. Modest development combined with increased investments in natural capital will payoff in the long run.

Further Information

For further information about valuing Ecosystem Services on the island of St Eustatius, contact Esther Wolfs at esther@wkics.com or Pieter van Beukering at IVM pieter.van.beukering@vu.nl and the webpage www.wolfscompany.com

Tourists are attracted by St Eustatius' unique natural environment

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