



The Economics
of Ecosystems
and Biodiversity
on Bonaire

Recreational and cultural value of Bonaire's nature

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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

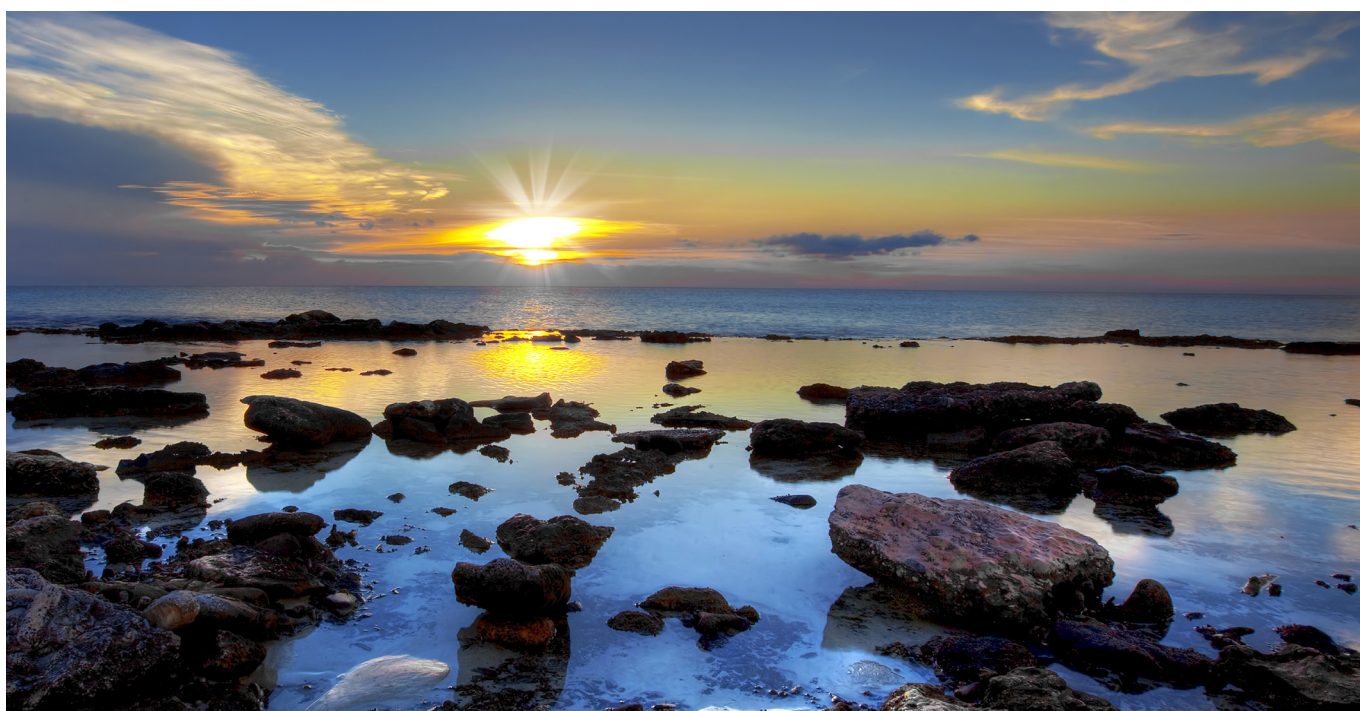
Bonaire inhabitants lived in balance with nature all their lives. However, many pressures including a fast economic development of the island lead to less resilient ecosystems causing the people of Bonaire to take more precaution than they are used to. Therefore it is very relevant to understand how important nature is for the people of Bonaire and their awareness of the vital role that healthy ecosystems play in supporting their own well-being.

The Approach

By studying the Willingness-To-Pay (WTP) for nature conservation by Bonaire residents, the identification of the importance of nature for the people on Bonaire is determined. Choice modelling is a way to estimate the value households' attribute to the protection of specific elements of nature on their island. Almost 400 households in Bonaire participated in this valuation survey. They were also asked qualitative questions regarding ecosystem threats, benefits, and preferred environmental management options.

Results & Recommendations

The WTP by all Bonaire households to improve the overall marine and terrestrial environment from poor level to a high level appears to be as much as \$3.9 million per year. Residents identified solid and liquid waste and coastal development as the threats facing nature on Bonaire. The research demonstrates that the most important step to take is raising awareness of citizens of Bonaire regarding pressures on the services of their ecosystems. Raising awareness automatically results in stronger support for additional environmental measures and more responsible behaviour by the local population.



The Challenge

In the current era of financial insecurity and environmental degradation it becomes clear that classical investments in a strong economy are not always contributing to a healthy environment. In reaction, a growing minority is working to demonstrate that the two are interlinked, and that in fact a healthy environment is critical to human as well as financial wellbeing, especially in the longer run. The challenge is to find methods to accurately measure and value these ecosystem services, such as public spaces, access to waters, fish and healthy ecosystems. 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 labelled 'a tragedy of the commons,' because overexploitation and degradation often occurs.

By assigning these systems a value, however, environmental economists highlight the willingness of individuals to pay for their protection, as well as mechanisms (e.g. user fees) to do so. One way to define its value is by figuring out communities' "Willingness-to-Pay" (WTP) to maintain their public spaces.

For example how much would a resident of Bonaire, as an individual, be willing to pay to preserve nature surrounding their home? How much would they be willing to pay to improve the coral reefs on their island, even if they don't go fishing or swimming near them?

Research demonstrates that nature contributes to the well-being of Bonairean people.



Country Overview.

Bonaire is a Caribbean island of approximately 288 km², with circa 16,000 permanent inhabitants. Bonaire is a 'special municipality' of the Netherlands. The entire coastline of the island is designated as a marine sanctuary in an effort to protect what are considered to be some of the most pristine coral reefs in the Caribbean. Tourism accounts for the majority of economic activity on the island and fishery hold significant economic and cultural influence. Much of Bonaire's economy and many of its residents rely on the quality of the island's ecosystems. Bonaire currently has two protected natural areas: the Bonaire National Marine Park (BNMP) set up in 1979 and the Washington Slagbaai National Park (WSNP) set up in 1969. The national marine protected areas include five Ramsar areas - Lac, Gotomeer, Pekelmeer, Slagbaai and Klein Bonaire.

Much of Bonaire's economy and many of its residents rely on the quality of the island's ecosystems

The Approach

'Ecosystem services' is a fairly new concept, and are defined as "the benefits that people obtain from ecosystems" (MEA, 2005).

The goal of this study is to design and estimate a comprehensive indicator (i.e. a monetary unit) for local residents' value of ecosystem services.

This study applied the Choice Modelling (CM) method in assessing Bonaire residents' WTP for the protection and conservation of their nature. A recent innovation in stated preference methods, CM asks respondents to select between a set of alternative scenarios possessing different attributes. By having a payment vehicle, like a tax, as one of these attributes, the values of each attribute can be indirectly derived. Respondents' choices between the scenarios reflect the trade-offs they are willing to make, and ultimately, the values they assign to the ecosystems. CM is

based on the theory that the characteristics of goods, rather than merely the goods themselves drive consumer behaviour. It also gives insight in trade-offs that individuals are willing to make.

CM indirectly measures the WTP for conservation of respondents through a controlled experiment as described above. This research created an choice model to reflect both marine and terrestrial ecosystems. The attributes chosen are based on interviews with a test panel and the most important ones were the quality of the coral reef and landscape, fish catch, free roaming goats or goats behind fences and the access to public beaches. These resulted in thirty-six choice sets, further divided into six versions of six choice sets.

Figure 1 illustrates one choice set used. Eight interviewers conducted surveys over a six weeks period covering almost 400 households, applying not only the CE, but addressing several qualitative aspects.

Results

The analysis shows that a yearly willingness to pay by all households on Bonaire to improve the overall natural environments state from poor to moderate is almost \$2,9 million and from poor to high as much as \$3,9 million. Several trends emerged, the most important being that 64% of respondents replied that they would be, at least in principle, willing to pay to protect certain ecosystem services. For households that did not express a positive WTP, the most common reasons were not being able to afford the fees, and a lack of confidence that any money collected for ecosystem protection would be wisely used.

The most popular ecosystem services in the marine environment were “swimming” “wading” and “relaxing”. 33% of households sampled reported engaging in recreational fishing, and some even reported relying on caught fish for food. The most popular land-based activities were “walking” “cycling” and “BBQ/camping.” Interestingly, the results demonstrate that native Bonairean residents have a positive WTP for putting goats behind fences to protect the nature of Bonaire. Figure 2 shows the attributes and their corresponding WTP. The highest WTP is related to improving reef quality, which likely reflects the understanding of the importance of a vibrant reef system for both tourism and recreational fishing.

Figure 2

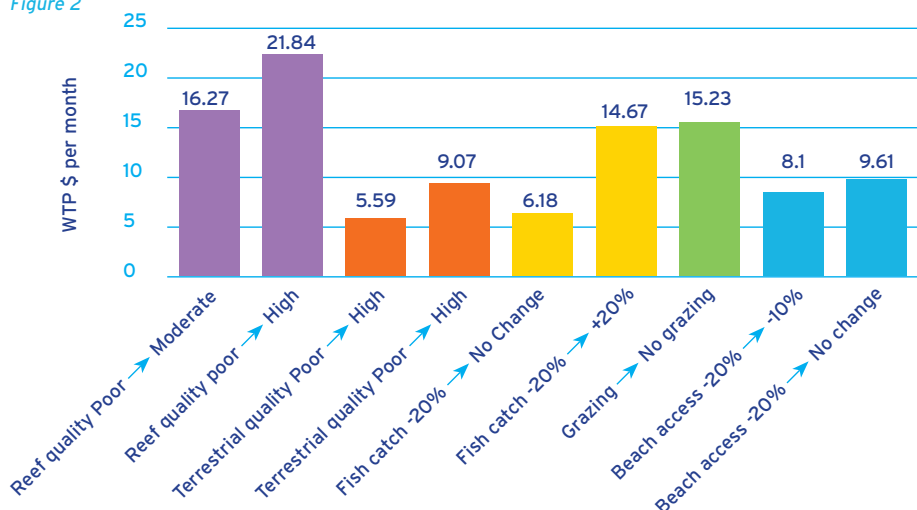
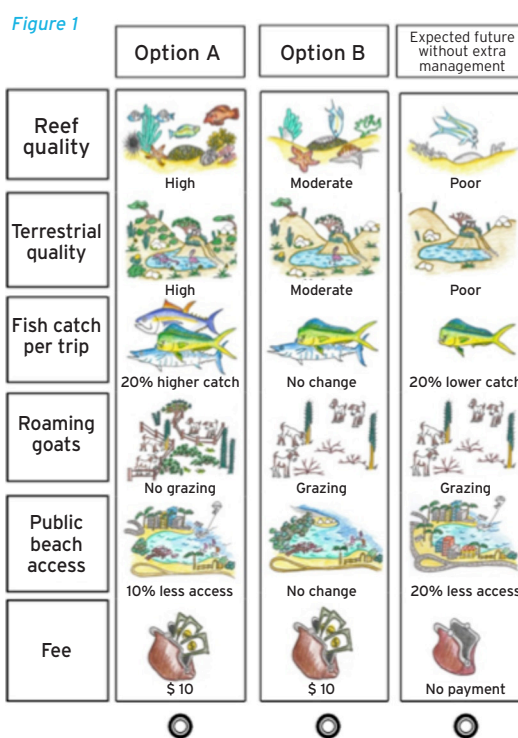


Figure 1: One of the choice sets used



Interestingly, while there is a fairly high WTP to remove grazing goats, this was not listed as a threat by the households surveyed. One explanation for this might be a lack of public information until the survey raised the issue.

The greatest perceived and identified threats to the marine environment were: 1) solid waste, 2) cruise ships, and 3) coastal development. Yet, while waste was noted as a top threat, participation rate for proper disposal of hazardous chemicals was low.

Figure 2: Average household WTP in USD per month per attribute



Top terrestrial threats were noted as 1) littering in the sea, 2) oil and contaminants, 3) clear-cutting woods. An environmental score was calculated by aggregating the total number of times that a respondent stated to have participated in one of the 11-listed environmental activities in one year. The average was 4, and highest for “not littering” and “purchasing environmentally friendly products.” The most popular of the given environmental management options were improving solid waste management, limited restrictions on development, and prohibition of sewage effluent, but not limitations on fishing.

Recommendations

The most relevant policy recommendation is the recognition that there is a general preference among Bonaire residents to move towards additional conservation of nature. This knowledge can be supportive to future nature conservation and natural development policy. Residents in general support both reef and terrestrial conservation. However, the limiting of fishing and fishing methods was not well received. For these issues it is important to engage in raising public awareness.

Regarding the surprising desire to curb free-grazing by goats, one issue to address is the lack of resources by kunukeros (farmers) to provide enough fodder for the animals. However, through public information engagement and stakeholder participations there will probably be much enthusiasm and understanding for changes in goat management and support for these kinds of initiatives.

A critical struggle is observed between tourism and environmental and cultural heritage conservation. Bonaireans take pride in the pristine reefs and fresh air, both of which are threatened by infrastructure development and rising numbers of tourists potentially leading to road congestions and a high demand amount of sewage.

Policymakers should keep this particular struggle in mind especially given Bonaire’s goal of sustainable tourism. That is, it is not so necessary to attempt to reduce the number of tourists, but instead to increase the tourists that visit Bonaire more than once, and become part of, and active in, the maintenance on Bonaire’s natural beauty. As for perceived terrestrial threats, waste management is a major issue in the eyes of residents. Littering of nature, dumping trash in the woods, littering beaches and other natural areas was seen as issues where improvements would be supported. Coastal development and private beach development are seen as important threats for Bonaire.

Pressure areas for development like Sorobon/Lac should be kept development-poor, as it is seen as one of the most important areas of beach recreation by residents.

Finally, Bonaire is far away from actually collecting the willingness-to-pay amounts identified among its residents. This absence of a payment mechanisms is mainly due to the current cultural norms and turbulent times, and the result of lack of interest in nature conservation. On the longer term, after extensive awareness raising and creation of local support, systems such as Payments of Ecosystems (PES) could also be introduced among local residents of Bonaire.

It is especially important to understand that accountability does not only lie with tourists but also with locals and that the environment needs management given the high level of influence we as humans have.

Further Information

For further information about valuing Ecosystem Services on the island of Bonaire, contact Esther Wolfs (esther@wkics.com) or Pieter van Beukering at IVM (pieter.van.beukering@vu.nl) and the webpage www.ivm.vu.nl/en/projects/Projects/economics/Bonaire

Coastal development is seen as an important threat for Bonaire

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Households of Bonaire are willing to contribute to improve the overall nature on their island

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