

The Tourism Value of Nature on St Eustatius

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This report was commissioned by: Ministry of Economic Affairs, Netherlands

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List of abbreviations

BES-islands	Bonaire, St. Eustatius and Saba
CE	Choice Experiment
CI	Confidence Interval
CM	Choice Modelling
CVM	Contingent Valuation Method
IVM	Institute for Environmental Studies Amsterdam
SIDS	Small Island Developing States
STENAPA	St. Eustatius Nature Parks
TEV	Total Economic Value
WTP	Willingness to pay
PS	Producer Surplus
CS	Consumer Surplus

Summary

This study aims to value the services provided by nature to tourists on St Eustatius. The natural landscape, the coastal waters, the tranquillity and rich historical heritage are highly appreciated by tourists that visit the island. For most Small Island Developing States (SIDS), such as St Eustatius tourism is one of the main sources of income. Healthy ecosystems are therefore crucial to the island. However, human development (including tourism) puts pressure on the same natural environment. In order to fully understand this paradoxical relationship, the economic value of the cultural and recreational ecosystem services to tourists and the economic contribution of nature to the tourism sector on St Eustatius are determined. Transparency about these values and the beneficiaries of ecosystem services can support the local and national government and other stakeholders in decision-making processes.

These values are retrieved using a choice modelling method. During six weeks, a total of 390 foreign visitors on Saba and St Eustatius have been interviewed. 190 of these respondents were interviewed on St Eustatius. With the use of a choice experiment, the willingness to pay (WTP) of tourists for the maintenance or improvement of nature and other island aspects is determined. The results also show the preferences of tourists concerning the different ecosystems and other island aspects. Characteristics, expenditures and perceptions about the natural environment of St Eustatius by visitors are retrieved through the complementary survey.

This study also reveals that next to nature-based activities, tourists highly appreciate island aspects such as the tranquillity, the friendly local people and admiring archaeological heritage. These aspects are part of the attractiveness of the island and should be taken into account when growth in the tourism sector is desired. The value of the natural environment for the tourism industry of St Eustatius is estimated to be almost 3 million USD per annum and tourists are willing to pay an annual 120,000 USD to increase the management of the archaeological heritage on the island.

1 Introduction

St Eustatius is a tropical island in the Dutch Caribbean with unique flora and fauna. Visitors from all over the world visit the island to experience the corals, fish and the lush vegetation on the slopes of its volcano, the Quill. Also, the rich historical heritage and the tranquillity on the island are characteristics that appeal to visitors of St Eustatius. St Eustatius can be characterized as a Small Island Development States (SIDS)¹. SIDS share specific characteristics limiting their socio-economic development due to remoteness and small capacity. In general, these islands rely a lot on their natural resources. The natural beauty of these islands attracts a lot of tourism, which functions as an important source of income.

The value of the services provided by ecosystems on these islands should not be taken for granted. SIDS have fragile natural environments due to a variety of reasons, the impact of human activities, including tourism, is relatively large. This does not only threaten nature itself, thereby also the main source of income for a small island that is reliant on the health of its natural wealth. Instead of taking the environment for granted, these socio-economic values of the ecosystem services should be determined and included in economic models and decision-making processes to make sure that 'all the goods and services provided by all affected ecosystems are taken into account when decisions are made about future developments on small islands' (Van Beukering, et al. 2007: 19).

Economic valuation of ecosystem services deals with this issue and aims to express the value of ecosystem services in monetary units, making it easy to communicate these values to stakeholders and include the values in decision support tools, such as cost-benefit analysis. With the economic valuation projects on St Eustatius, the national government and the local island governments will be provided with transparent information on which environmental management or development decisions can be based, as well as decisions for the allocation of funds regarding the protection of nature (Van Beukering et al. 2012; Min. van EZ, 2013).

The aim of this study is to value the ecosystem services that are relevant to tourists on St Eustatius. In this study a survey with a choice model (CM) is used to determine the economic value of nature for tourism. This method aims to establish the willingness to pay (WTP) of tourists for additional environmental management. The questionnaire also investigates the current tourist expenditures that can be attributed to the local ecosystems and delivers insight in the perception of tourists regarding the natural environment on St Eustatius.²

The report is structured as follows: Chapter 2 starts with the context of this study including a description of St Eustatius. Chapter 3 gives a description of the theoretical background of the method used in this study and it describes the research method, the design of the survey and the Choice Experiment (CE). In Chapter 4 the results of the survey and the CE are presented. The conclusions and the recommendations are discussed in chapter 5.

¹ <http://sustainabledevelopment.un.org/index.php?menu=1520>

² This study serves as input for the complementary study 'The total economic value of nature on St Eustatius'. Both studies are part of the project 'What is St Eustatius' Nature Worth?' and of 'TEEB Caribbean Netherlands'.

2 Context of this study

Need for valuation studies in Small Island Developing States (SIDS)

The term SIDS applies to a category of islands in the Caribbean, the Pacific and the Indian Ocean that share specific characteristics and face similar challenges (Van Beukering et al., 2007). These characteristics are their small size, a small population, their remoteness, a lack of natural resources, their vulnerability to natural disasters and an economy which depends on a narrow range of products and, therefore, highly dependent on international trade which makes them vulnerable to external shocks (Ghina, 2003). A more extensive list of characteristics can be found in Appendix D. These characteristics make the ecosystems on which the islands depend fragile and their economy very vulnerable (van Beukering et al., 2007). These characteristics also form constraints for these islands to pursue economic development. It is recognized that SIDS need special attention and support to be able to develop in a sustainable way (Ghina, 2003; Abeyratne, 1999). The most important environmental problems that SIDS face include for example climate change, sea level rise, pollution and tourism (Ghina, 2003).

SIDS and tourism

In previous times, many Caribbean islands used to depend economically on the export of primary agricultural products (Pantin, 1999). Nowadays, tourism has become one of the main sources of income for most of the SIDS, especially in the Caribbean (Thomas-Hope & Jardine-Comrie, 2007; Abeyratne, 1999). In fact tourism has also been one of the only sectors that experienced growth in the recent years on small islands (Scheyvens & Momson, 2008). The remoteness and the presence of an unique natural environment makes many SIDS attractive to foreign visitors (UNWTO, 2012). The natural environment can be seen as key importance to tourism (Sinclair, 1998). A study by the World Resource Institute calculated that coral reef degradation by human activity and climate change can lead to a loss of USD 100 to USD 300 million from tourism in the Caribbean region by 2015 (WRI, 2004).

The impact of tourism on the islands can be problematic and more damaging than on the mainland because of the mentioned characteristics of SIDS, including their fragile ecosystems the interrelatedness of their ecosystems and limited availability of land. Especially on these islands values have to be determined and included in decision-making for future development in combination with nature conservation (van Beukering et al., 2007). According to the World Tourism Organisation, tourism can be a sustainable source of income for small islands, especially compared to other practices like logging, mining or farming (UNWTO, 2012: 33). But the environment should not be taken for granted and local stakeholders should be aware of the impact of human activity on the natural environment. Sustainable development should safeguard that future generations can benefit from the services that nature provides as well.

2.1 Project framework and funding

Since October 10, 2010, Bonaire, St Eustatius and Saba (BES-Islands) have taken on the status of special municipalities within the Netherlands. This constitutional change means that these islands, including their unique nature, are now officially part of the Netherlands. They are referred to as the 'Caribbean Netherlands' but also known as

the BES-islands. This constitutional change gives the Netherlands, next to the islands themselves, responsibility concerning the conservation of nature on the BES-islands.

Table 1 gives an overview of the total area of nature parks in the Caribbean Netherlands (which is not to be confused with the total area of natural landscape) and species that officially became part of the Netherlands after October 10, 2010. The total area of nature parks on St Eustatius specifically and a brief description of the nature parks is shown in Figure 5 in Appendix C.

This is an economic valuation study to determine the value of ecosystems on St Eustatius for the local tourism sector. The study is part a the larger project called 'What is St Eustatius' nature worth?' 390 visitors are interviewed on Saba (200) and St Eustatius (190). This report mainly focuses on the results that are based on the respondents from St Eustatius, although some comparative insights between the two islands are given. A similar report is written on the results for Saba.

These studies are commissioned by the Ministry of Economic affairs and performed by the Institute for Environmental Studies of the VU University Amsterdam (IVM) in collaboration with the research company Wolfs Company. Aiming at valuing nature in the Caribbean Netherlands, a similar economic valuation study has been performed on Bonaire³ in 2012.

³ The projects 'What is Bonaire's nature worth?', 'What is Saba's nature worth?' and 'What is St Eustatius's nature worth?' are part of The Economics of Ecosystems and Biodiversity Netherlands study (TEEB NL) (PBL, 2010) and are commissioned by the Ministry of Economic Affairs.

Table 1 *Characteristics of nature in the Netherlands' mainland and the Caribbean Netherlands (van Beukering et al., 2012)*

Nature indicator	Netherlands Mainland	Caribbean Netherlands
Area of terrestrial nature parks	12,685 km ² (30% of total area)	49.4 km ² (15.7 % of total area)
Area of marine nature parks	2,330 km ² (4% of total area) ^{***}	75 km ² (0.3% of total area) with Sababank= 2,754 km ² (11% of total area)
Number of animal species*	27,000	2,831 ^{****}
Number of endemic animal species	14 ^{**}	85 ^{****} of which 25 in Caribbean Netherlands
Number of plant species*	3,900	1,259 ^{****}
Number of endemic plant species	0	7 ^{****}

Sources: Dutch Caribbean Nature Alliance (2012); Staatsbosbeheer (2012); WUR (2012).

* Note however not all species are known and new species are still being discovered.

** www.natuurinformatie.nl names 2 species of sponges and 10 ciliary worms and one mouse subspecies and a butterfly.

*** 3 protected areas in the North Sea are in the Exclusive Economic Zone; Vlake van Raan (17,521 ha), Voordelta (92,367 ha) and North Sea Coastal Zone (123,134 ha). Total area Dutch North Sea is 57,000 km².

**** Number of species in Dutch Caribbean (including Aruba, Curacao and St Maarten).

2.2 St Eustatius

Geography and demographics

St Eustatius is located in the Caribbean and is constituent of the Lesser Antilles, which is a group of volcanic islands in the Caribbean Sea. Together with Bonaire and Saba, the island belongs to the Caribbean Netherlands. Saba and St Eustatius belong to the northern part of the Caribbean Netherlands and are part of the Leeward Islands (DCNA, 2012).

St Eustatius covers an area of 21 square kilometres. Being part of the Netherlands, Dutch is the official language on the island. However, English is spoken by the majority of the population on the island. According to the last census St Eustatius inhabits roughly 4,000 people (CBS, 2013).

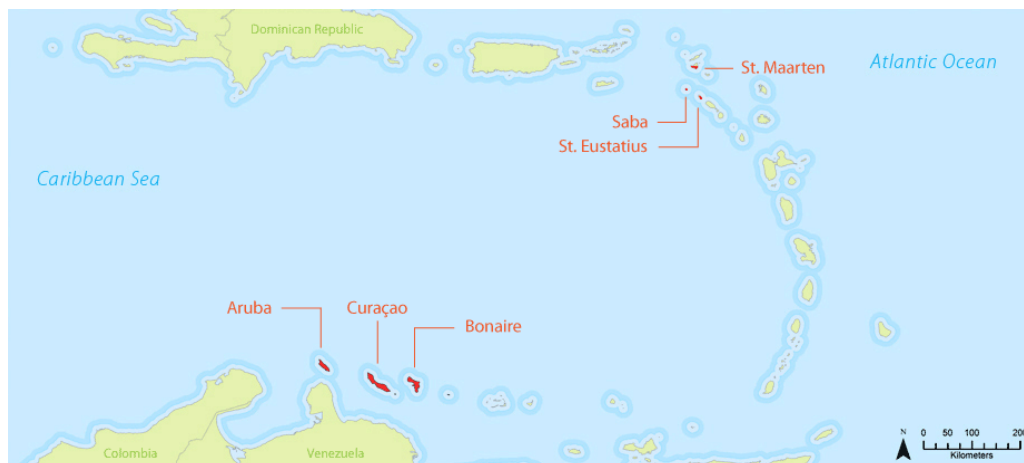


Figure 1 Geographical position of St Eustatius (DCNA, 2012).

Economy

Because of a lack of economic data the exact share of the different sectors as part of the Gross Domestic Product (GDP) of St Eustatius is unknown. ECORYS identified the employment in the different economic sectors in 2010, see figure 2. This research indicates that oil transshipment by NuStar and all its sub-contractors is the most important driver of the economy of St Eustatius. The tourism industry represents the second largest economic sector. In the Strategic Development Plan (2010) it becomes clear that there is a desire to develop the tourism industry in order to diversify economic activity. At the moment the local government is the biggest employer on the island, followed by Nustar, The tourism industry represents the third provider of jobs (ECORYS, 2010).

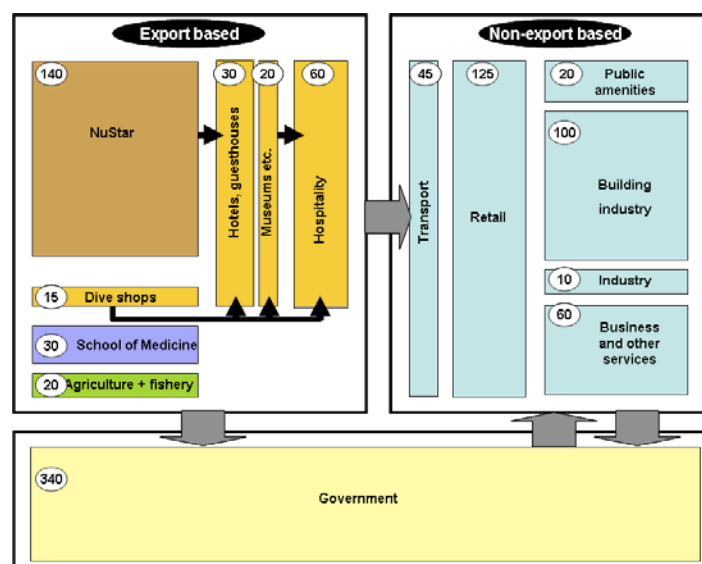


Figure 2 Sectoral employment on St Eustatius (ECORYS, 2010)

Tourism numbers

St Eustatius receives over 10,000 visitors per year, which includes both visitors that visit the island for leisure and for other reasons (e.g. work, visiting friends or family). The general figure of arrivals indicate a slight decrease in visitors to the island in the

last years, however, it is hard to say something about this development on actual increase or decrease in leisure tourism, since there is no data available on tourist arrivals except for the number of overall visitors. In general, the local stakeholders in the tourism sectors on St Eustatius indicated that they experienced a decline in tourists over the last years. The reason for this decline is not entirely clear, but is likely to be related to the worldwide economic crisis in this specific period.

Tourism development

The island government commissioned the Strategic Development Plan (2010) for the development of the entire economy of St Eustatius, which was performed by Bearingpoint Consultants, RBOI and ECORYS. The main goal of the Strategic Development Plan is to achieve economic growth, while diversifying the economy. According to the report, tourism is one of the sectors that can make this happen. The authors advocate that tourism is currently underdeveloped and that it has great economic potential. To increase tourism, extra tourist accommodations have to be developed, the infrastructure has to be improved and other facilities such as shops and restaurants are expected to follow if tourism increases. The number of jobs in the tourism sector should grow from 125 jobs now, to 300 in the future (Hoogenboezem-Lanslots et al., 2010).

Ecosystems and threats

St Eustatius is characterized by the clearly recognisable crater on the south end of the island called 'The Quill', which is covered by tropical rainforest (DCNA, 2012). Other parts of the island are much drier and lie at lower levels with different types of vegetation than the rain forest in the volcano. The crater and the area of Boven are protected as National Parks.

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 Marine Park includes sea grass beds and many coral patches including endangered black corals. Both the marine and terrestrial parks are managed by the St. Eustatius National Parks Foundation (STENAPA) (STENAPA, 2013).

Table 2 gives an overview of the different ecosystems of St Eustatius that are considered for valuation in this study. The ecosystem services that are provided to tourists and the possible threats to the ecosystems are also described. Threats include local influences, such as roaming livestock and erosion, regional influences, such as the lionfish invasion, and global issues such as climate change.

Table 2 Ecosystems, ecosystem services and threats to ecosystems on St Eustatius

Ecosystem	Ecosystem services	Threats to ecosystem
Marine ecosystems		
Coral	Recreational: diving, snorkelling, fishing, aesthetic appreciation	Water sports, overfishing, oil spill, anchoring, invasive species (e.g. lionfish), climate change, erosion, nitrification
Coastal area (harbour & beaches)	Recreational: beach visit, swimming, hiking, boating	Littering, oil spill, erosion
Terrestrial ecosystems		
Dry forest	Recreational: hiking, bird watching etc. Aesthetic, spiritual and artistic appreciation and inspiration	Roaming animals, construction activities, littering, invasive species (e.g. Coralita)
Rainforest	Recreational: hiking, bird watching etc. Aesthetic, spiritual and artistic appreciation and inspiration	Roaming animals, construction activities, littering, invasive species (e.g. Coralita)

2.3 Prior studies

There have been economic valuation studies performed before on St Eustatius and other Caribbean islands. In 1997, a socio-economic study of the Marine Park has been conducted (Buchan et al., 1997) and in 2010 the St Eustatius National Marine Park (STENAPA) determined the monetary value of the coral reefs (Bervoets, 2010), which calculated that tourism related income from coral reefs on St Eustatius is USD 9 million worth. The study of Buchan et al. (1997) concluded that the contribution of the Saba Marine Park to the tourism industry on Saba is USD 8.8 million.

These studies base their results on the total revenue that is generated by hotels, restaurants, dive shops and local fisherman. A novelty to earlier studies on St Eustatius is that, with this study, also estimates of the value of ecosystem services that are not traded in markets are included. By investigating the Willingness To Pay (WTP) of local residents and visitors for additional environmental management, the study also takes values of nature into account that are currently consumed for free. Furthermore, the study encompasses more than just information on the nature parks. It provides a rich source of information on preferences of tourists on a range of environmental aspects.

Although tourism is an important and growing source of income for the island, the dependence of the sector on the natural environment has never been quantified sufficiently. This study will provide a first step in providing information on the value of the natural environment for the tourism sector on St Eustatius and is embedded in a project that aims to value other goods and services provided by ecosystems on the island. In the end, the Total Economic Value (TEV) of nature can be determined.

3 Methodology

This chapter provides the theoretical and procedural background on research methods used in this study. The first paragraph starts with the description of the economic valuation theory and the application of this theory for small islands like St Eustatius. The next paragraphs deal with the choice modelling method used in this study, including the design of the survey, the choice experiment and the procedure for data collection.

3.1 Theoretical background

Environmental economics

The principles, on which environmental economics are based, form the theoretical fundament of this study. Environmental economics helps to identify and clarify the circumstances or causes for the degradation of the environment (Tietenberg & Lewis, 2010).

From an environmental economics point of view, natural resources are subject to market failure. Market failure is a situation where market prices do not reflect the full social costs and benefits associated with a good or service. This leads to an inefficient allocation of resources (TEEB, 2010). There are different sources of market failure. The market for natural resources fails because externalities exist and most services provided by ecosystems are public goods or quasi-public goods. The issue with public goods is that people do not feel responsible to pay for the good that they consume. This leads to overexploitation and degradation of the good or the supply of the natural resource resulting in a market failure (Tietenberg & Lewis, 2010).

The so-called ‘tragedy of the commons’ problem can occur when property rights for ecosystems services are not clearly defined. One of the consequences of ill-defined property rights is that people act only in their self-interest, overexploit and eventually deplete a natural resource. This is especially the case with open access resources that are finite (common-pool resources), like fish stocks or water in an aquifer. The recreational and cultural services provided by nature on St Eustatius are either quasi-public goods or public goods since they are all non-rivalry and dependent on whether there is a fee charged, non-excludable or excludable. For example, a dive fee is charged to divers that enter the marine park (quasi-public good).

Valuing ecosystem services

Nature provides many benefits to society that range from provisioning food to recreational experiences. The benefits that people obtain from ecosystems are called ecosystem goods and services. If ecosystems change, for example through overexploitation by humans due to a market failure, this will affect human wellbeing (TEEB, 2010). In order to deal with market failures and accomplish an efficient allocation of resources, it is necessary to know the full social costs of a decision or proposed action where natural resources are involved. Therefore, the values of the non-marketed ecosystem goods and services have to be determined in order to make well-informed decisions. The different sources of value that, combined, make up the total economic value (TEV) of an ecosystem are presented in **Error! Reference source not found..** The concept of TEV is ‘the sum of all marketed and non-marketed benefits associated with an ecosystem or environmental resource’ (van Beukering et al., 2007).

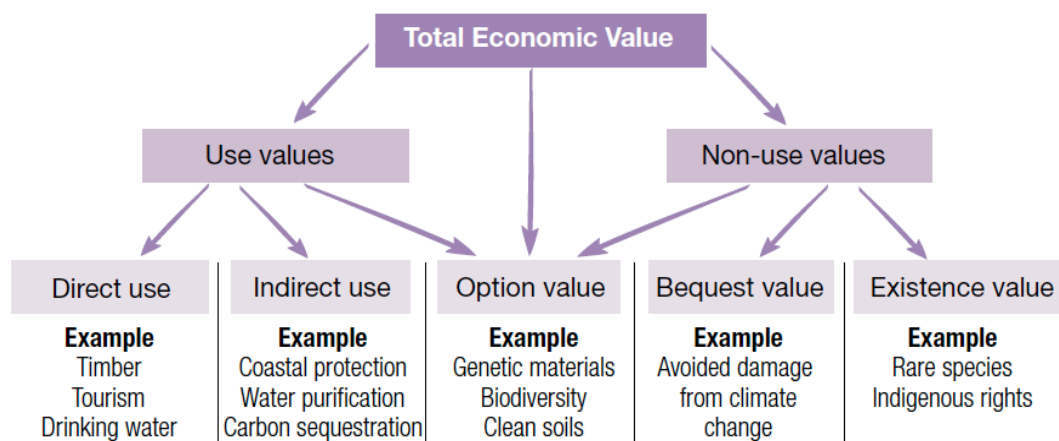


Figure 3 Total Economic Value (van Beukering et al., 2007).

Economic valuation techniques retrieve the various values and express them in a monetary unit. This makes it possible to compare the benefits of various goods (TEEB, 2010). 'Willingness to pay' (WTP) is a widely used measure to determine the value of ecosystem goods and services (van Beukering et al., 2007; Loomis, Kent, Strange, Fausch & Covich, 2000). Monetary valuation should be seen as a powerful instrument that can inform stakeholders and policymakers in a language everyone understands and everyone is used to (TEEB, 2010).

The focus of this study is on tourism and how tourists experience and value nature. Nature provides recreational services to tourists, like the opportunity to go hiking and diving, which is a direct use value, although resources are not extracted. Nature also provides cultural and aesthetic services, like beautiful views or inspiration for artistic expressions (not presented in **Error! Reference source not found.**). Some of the values are not traded (e.g. hiking is free) or can be valued higher than prices indicate. Therefore, a non-market valuation techniques are used in this study (van Beukering et al., 2007).

3.2 Research method

The method used for this study to determine the recreational and cultural value of nature to tourists is choice modelling. A choice experiment (CE) is used with a complementary questionnaire. In the survey additional questions are asked to retrieve different characteristics of the respondents. This information can be used to determine whether these characteristics influence the values retrieved by the CE and expenditures are used to calculate the consumer surplus (CS). The information as such, gathered through the survey, is also interesting to local stakeholders since it indicates what kind of tourist visit the island, what activities they engage in and how they appreciate what the islands has to offer. Moreover, it gives insight in how dependent their activities are of local ecosystems and how sensitive visitors are to local changes in these ecosystems.

Choice modelling (CM)

Choice modelling is a stated preference method where respondents are indirectly asked for their WTP to preserve or enhance an ecosystem service. The method was developed in the field of marketing and psychology in the 1980's. The difference with the more familiar contingent valuation method (CVM) is that CM could measure how

people value the different characteristics of a good instead of only the good itself (McCartney, 2011). CM was first applied in environmental evaluation in 1994 (Adamowicz, Louviere & Williams, 1994). CM is partly based on Lancaster's characteristic theory of value, which says that 'a good can be described as a bundle of attributes, or characteristics, and the levels that they take' (McCartney, 2011). It is also based on the random utility theory, which explains how people make choices to maximize their utility. This is derived from general utility theory which describes that a respondent will select the scenario from a set of alternatives that provides him or her with the highest expected utility (Pearce & Ozdemiroglu, 2002).

The difference between what people are willing to pay for a good or service and what they are actually paying, is defined as the consumer surplus (McCartney, 2011). This economic value, which is not revealed in market prices, displays the value of the consumer for the provisioning of certain good (Laurence, Ian & Kenyon, 2003).

In this study, the WTP of respondents is derived through using the CE. The method can be seen in contrast to the CVM, which is also a stated preference method, where respondents are directly asked to state their WTP for a change in the provisioning of an ecosystem service. The CE consists of six cards that are presented to the respondent (for an example of a choice card see Figure 27 in Appendix E). With each card, respondents are asked to choose for a hypothetical scenario from a set of alternatives. Each scenario exists of different attributes of which one is the 'payment vehicle'. The payment vehicle is a monetary unit that is attached to a scenario, which makes it possible to retrieve the WTP per attribute.

The CM method can be used to determine use- and non-use values and it can value different kind of ecosystem services (van Beukering et al., 2007).

By estimating the WTP for a change in the provisioning of a good or service, policy makers are supported in deciding on marginal changes in the provisioning of a good (Hanley, Wright & Adamowicz, 1998). Next to these WTP values, results from a CE make it possible to compare the relative importance of the different attributes that determine environmental quality (van Beukering et al., 2007; McCartney, 2011).

3.3 Choice experiment design

Selection of attributes

A similar design for the choice experiments on Saba and St Eustatius has been developed in order to compare results and increase the precision of the analysis. Five attributes for the CE were chosen after first consultation visits to St Eustatius and Saba by Wolfs Company, where stakeholders were invited to give their input for the design of the CE. A second consultation of the stakeholders took place during a seminar where the final design of the attributes with corresponding levels was discussed. The attributes were decided upon based on their relevance to tourists visiting one of the two islands and because of the relevance to local societal matters.

The attributes that are used in the CE are natural landscape, coastal waters, crowdedness, and archaeology. The fifth attribute is a financial contribution, which is the monetary unit that is attached to each scenario. This is called the payment vehicle.

The different levels of the attributes in the CE are represented by drawings. The use of the drawings is a conscious choice since CE is already quite complex and pictures can communicate a lot of information in an effective and efficient way (Mathews, Freeman

& Desvousges, 2006). An example of a choice card used on Saba and St Eustatius is presented in Figure 5.

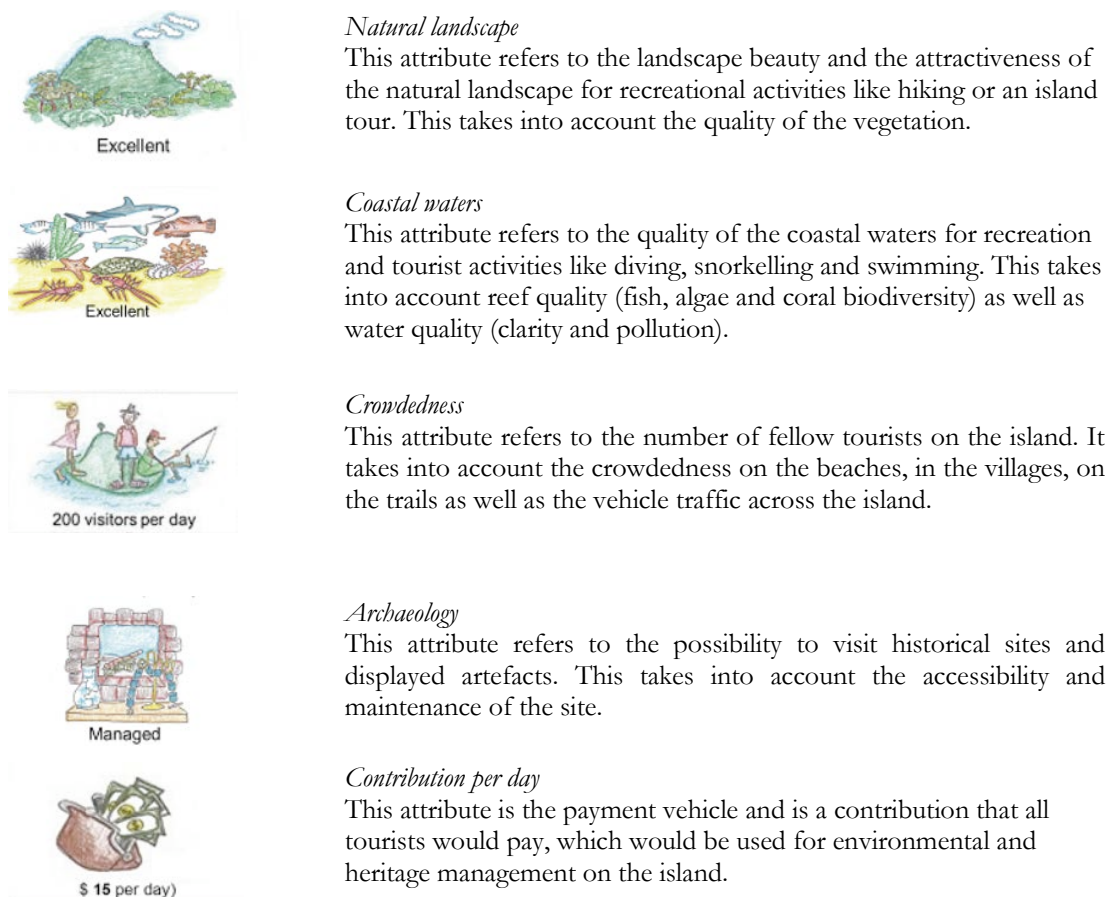


Figure 4 Attributes with explanation

Payment vehicle

The choice for the payment vehicle was based on the fact that tourists on Saba and St Eustatius already pay different taxes, entrance fees and dive fees to finance environmental management. To avoid any confusion or overlap it was decided to use additional contribution as payment vehicle. This also makes it clear that an additional payment is meant, making it an appropriate way to measure the consumer surplus (Schep et al. 2012).

Assignment of levels

Later on in the design process, when the attributes were defined, appropriate levels of the attributes and corresponding pictures had to be assigned. Especially for the pictures that represent the different levels, input was asked during a seminar for stakeholders on Saba and St Eustatius. This resulted for example in the addition of a shark to the 'excellent' level of the coastal waters attribute. According to the dive shop owners sharks are a big attraction to divers. The inputs from the stakeholders also led to a change in the levels of the attributes in the 'expected future scenario'. The levels for natural landscape and coastal waters were changed from 'poor' to 'moderate' since the stakeholders stated that 'poor' was not a realistic representation of the expected

future scenario. The different attributes with corresponding levels used in the experiment are presented in Table 3.

Table 3 Attributes with corresponding levels

Attribute	Level 1	Level 2	Level 3	Level 4	Level 5
Natural landscape	Poor	Moderate	Excellent		
Coastal waters	Poor	Moderate	Good	Excellent	
Crowdedness	100 visitors per day	200 visitors per day	400 visitors per day		
Archaeology	Unmanaged	Managed			
Contribution	\$0	\$2 per day	\$5 per day	\$15 per day	\$25 per day

Experimental design

Once the attributes and corresponding levels and drawings were defined, the statistical software Sawtooth is used to design the choice sets. The software calculates the optimal design of the CE. In total, 48 different choice cards were created. From these choice cards, 8 different choice sets were selected. One choice set consists of 6 choice cards. Three alternatives (scenarios) are shown on each choice card. The last of the three alternatives stays the same on each choice card and for this alternative no payment is involved. This opt-out alternative is named 'expected future without extra management' and the levels of the attributes in this alternative are realistic for Saba and St Eustatius, if there would be no environmental management from now on.

Every choice set contained an identical seventh card, which was an example card. This card was only used by the interviewer to explain the functioning of the CE and the respondent did not have to make any decision for this card yet. This example card was made to reduce an interviewer bias, which could occur if the interviewer would for example use the first real choice card to explain the CE.
















Version 1 - Card 2			
	Option A	Option B	Expected future without extra management
Natural landscape	 Excellent	 Poor	 Moderate
Coastal waters	 Poor	 Excellent	 Moderate
Crowdedness	 100 visitors per day	 400 visitors per day	 200 visitors per day
Archaeology	 Managed	 Unmanaged	 Unmanaged
Contribution	 \$ 2 per day	 \$ 15 per day	 \$ 0 per day

Figure 5 One of the choice cards used in the CE on Saba and St Eustatius. Respondents could choose between option A, option B or the 'Expected future without extra management'.

3.4 Survey design

Survey design

The CE is part of a survey where additional questions are asked to respondents. This is done to gather statistical information on the sample, for example to see if certain factors can partly explain the WTP estimates from the CE and to create insight in the perception of tourists on the natural environment of St Eustatius (McCartney, 2012; Lacle, 2012).

The first part of the survey contains questions on visitor characteristics like the purpose of the visit and for how long the respondent is staying on the island. Followed by questions on activities undertaken on the islands and the appreciation for these activities. The third part of the survey starts with questions on environmental awareness and is followed by the CE. After the CE, a question on perceived potential threats to the environment and statements specifically designed for the islands follows. The survey concludes with questions to gather demographical information of the respondents, including expenditures.

3.5 Procedure

Sample size

The surveys were conducted from April and May, 2013. A sample size of roughly 400 respondents is necessary to successfully conduct a statistical analysis of the CE. When preparing this study it was clear that this amount of respondents could not be reached on each of the two islands because of time constraints and the fact that during the period of data collection it was low tourism season on Saba and St Eustatius. Instead, it was decided to conduct 200 surveys on St Eustatius and 200 on Saba.

Sampling

Due to the scarcity of available tourists on Saba and St Eustatius, convenience sampling was used to reach the targeted number of respondents. Since the islands are so small and no database of respondents is available to take a sample from, convenience sampling seemed to be the most obvious sampling technique.

The survey period was six weeks. An interview team consisting of four local residents on Saba and six local residents on St Eustatius were recruited and trained to conduct surveys on both island. The interviewers earned a monetary compensation of ten dollars for every completed interview. Beforehand the interviewers attended a training session in order to get familiar with the survey and the CE and get more information on the overall aims of this study.

3.6 Possible biases and challenges

With the use of CM, several biases with respect to the actual WTP of respondents can occur. In case of certain biases, the CM method has some advantages over the CVM. Strategic bias can arise when a respondent provides a biased answer to influence the outcome since that might positively benefit him or her. A respondent might also give a biased answer just to seem socially responsible and involved, also known as 'yeah-saying'. The CM method reduces strategic bias behaviour because respondents are asked to evaluate different attributes at the same time and also to repeatedly make these trade-offs (van Beukering et al., 2007). The complexity of the CE makes it harder to behave strategically compared to some questions in the survey and the CVM.

There is still much debate on whether the hypothetical bias is a big problem with stated preference methods. The scenarios presented to respondents in a CE are hypothetical scenarios and the choices that respondents make in a CE might differ from choices made in real life situations. Some sources say that WTP estimates from CV and CM studies are much higher than actual payments, while other sources contradict this (Hanley, Mourato and Wright, 2001; Kahneman & Knetsch, 1992; Arrow et al., 1993; Tietenberg & Lewis, 2010). While this might raise questions about the validity of the results of the CE stated preference methods are currently the only available method to capture values that cannot be determined with revealed preference methods (McCartney, 2011: 17). Adding certainty scales after the choice questions can reduce the hypothetical bias (McCartney, 2011).

Since the CEs were conducted face-to-face, the chance of interviewer bias is present. The way an interviewer approaches a respondent and the way he or she poses the questions can influence the respondent's decisions. But conducting the survey face-to-face also has advantages since the interviewer can provide extra explanation when necessary (McCartney, 2011).

The complexity of a CE is one of the main ‘weaknesses’ of CM. There is a maximum amount of information that people can meaningfully handle while making decisions. Too much information and considering multiple attributes and multiple alternatives at a time can lead to cognitive burden (McCartney, 2011). A result of this cognitive complexity can be that respondents get tired after a few choice cards and start giving more random, irrational answers or more often chose the ‘without management’ option, thereby not necessarily making a conscious trade-off. To minimize the complexity aspect, the number of attributes, number of alternatives on a choice card and total amount of choice cards were limited in the survey.

4 Results

This chapter starts with a description of the visitor numbers on St Eustatius. Next, the survey results will be presented. First the general visitor characteristics are discussed. Subsequently, the experience of the island by respondents and the activities they participated in and their appreciation is described. This is followed by the environmental awareness and WTP preparedness of respondents. Next the perceived potential threats to the environment by respondents and statements about the island specifically and statements on return visits are presented. This chapter ends with an analysis of possible associations of variables with the WTP preparedness of respondents.

4.1 Visitor numbers

The number of visitors on St Eustatius is based on the strategic development report (2010) and the numbers from the immigration service. What should be noted here is that the tourism numbers of St Eustatius actually refer to arrival numbers, the number of ‘foreigners’ that arrive by airplane⁴. This includes everyone except local residents. These foreigners can have multiple purposes for visiting, not only leisure purposes. In our sample we also included visitors that are former residents or are visiting friends or family and people that visit the island for a combination of business or visiting friends and family and leisure. However, since there is no data available on this breakdown in total visitor numbers, it is hard to see whether our sample is representative in that case. In our sample 70 percent of the tourists arrived by airplane and especially on St Eustatius this is the most common way to travel to the island. Unfortunately, there is no data available on the proportion of day tourists and stay-over tourists on St Eustatius. There is data available from the immigration service on St Eustatius regarding the nationality of arriving air passengers, but this is not split into locals and foreigners, which makes it hard to compare this data to our sample with only foreign visitors. Figure 6 presents the trend in visitor arrivals over the last years. It is clear that the amount of visitors did not change very much, however the general tendency is a decline in visitor numbers, which was also confirmed by people that work in the tourism sector on the island.

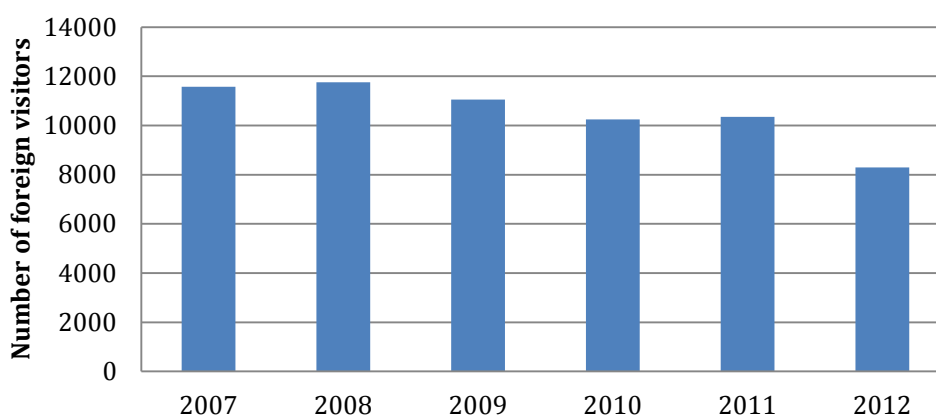


Figure 6 Total visitor arrivals in for St Eustatius (CHL, 2011; Hoogenboezem-Lanslots et al, 2010; immigration service).

⁴ It has to be noted that St Eustatius receives visitors that travel by yacht as well.

4.2 Representativeness

Due to the scarcity of statistics regarding the composition of visitor arrivals, it is hard to determine the representativeness of our survey. We compared the country of origin in our sample with statistics that were provided by the St Eustatius Tourism Development Foundation. However, these statistics are from before the institutional change in 2010, meaning that people from the other islands in the Dutch Caribbean were not regarded as foreigners. In the sample, visitors from other Dutch Caribbean islands are considered tourists, which explains the overrepresentation of respondents in the 'other' category in the sample. Note that the respondents from 'the Netherlands' category are not included in the 'Europe' category.

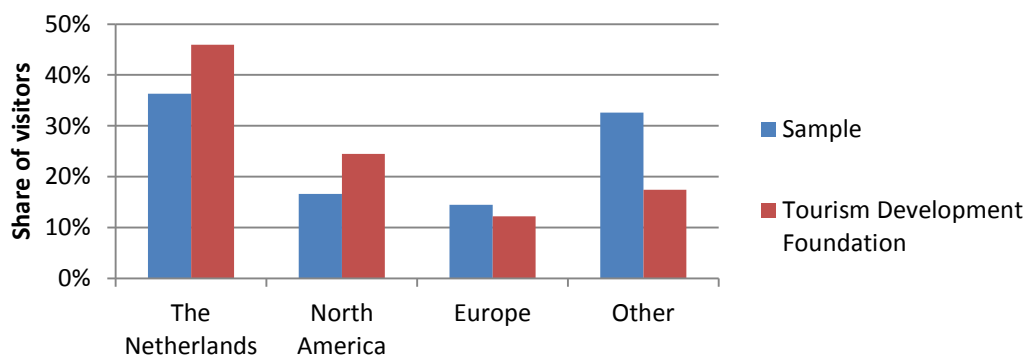


Figure 7 Comparison of country of origin of respondents on St Eustatius in the sample with total visitor numbers in 2009 (source: statistics St Eustatius Tourism Development Foundation).

Figure 5 gives an insight in whether the share of divers is representative in the sample. It is clear that the distribution in our sample is comparable with the number of divers on St Eustatius in 2010. The number of divers in the sample is made up of respondents that indicated that they had been diving and respondents that indicated that they are still planning to go diving during their visit on St Eustatius.

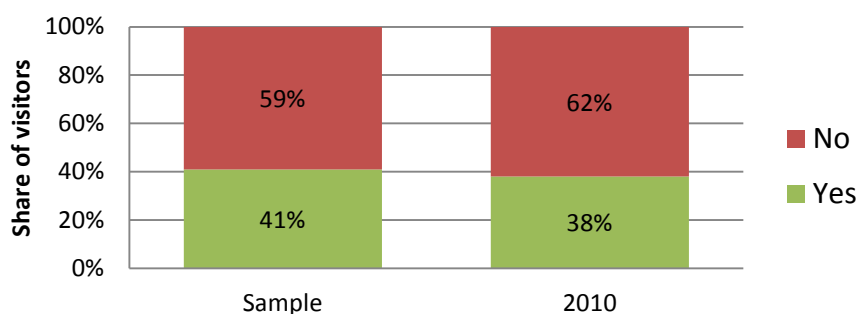


Figure 8 Proportion of divers in the sample and according to STENAPA (STENAPA, 2010)

4.3 Visitor characteristics

Figure 9 gives an overview of the purpose of the visit of respondents. Of the respondents in the sample, 18 percent is visiting friends or family, of which 42 percent is from the Caribbean region. People that combine a business visits or visiting friends or family with leisure activities, with other business purposes (53 percent of them are Dutch).

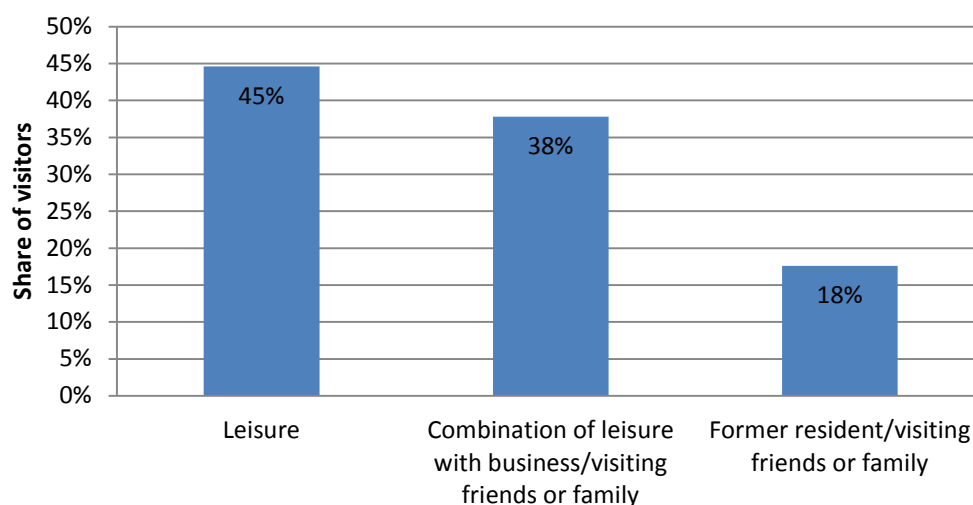


Figure 9 Purpose of visit of the respondents St Eustatius.

Looking at the amount of respondents in the different age categories in **Figure 10**, a few things stand out. There are not many respondents in the category of 66 years and older.

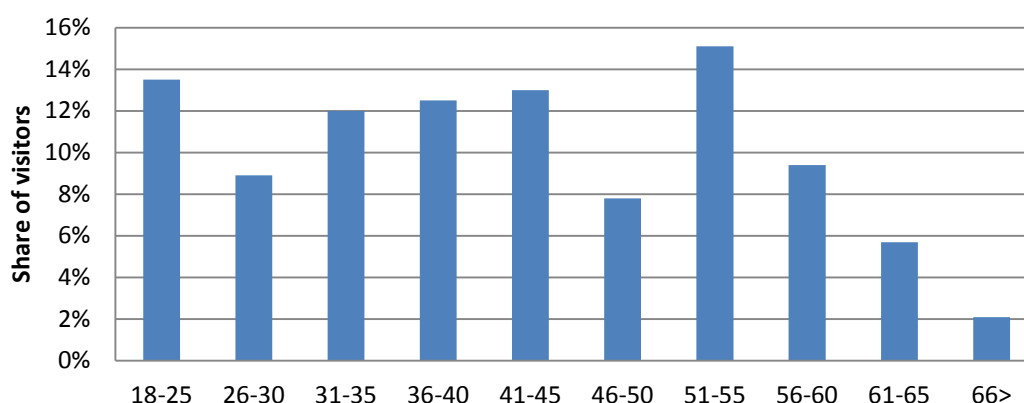


Figure 10 Division of respondents on St Eustatius per age category.

Figure 11 indicates that most respondents on St Eustatius travel with their partner or alone. This can be explained by the purpose of their visit. This is tested with crosstabulations and it demonstrated that most of the respondents on the island that have pure leisure puposes travel with their partner. Respondents that visit the island for a combination of leisure with business or visiting friends or family more often travel alone or in a group.

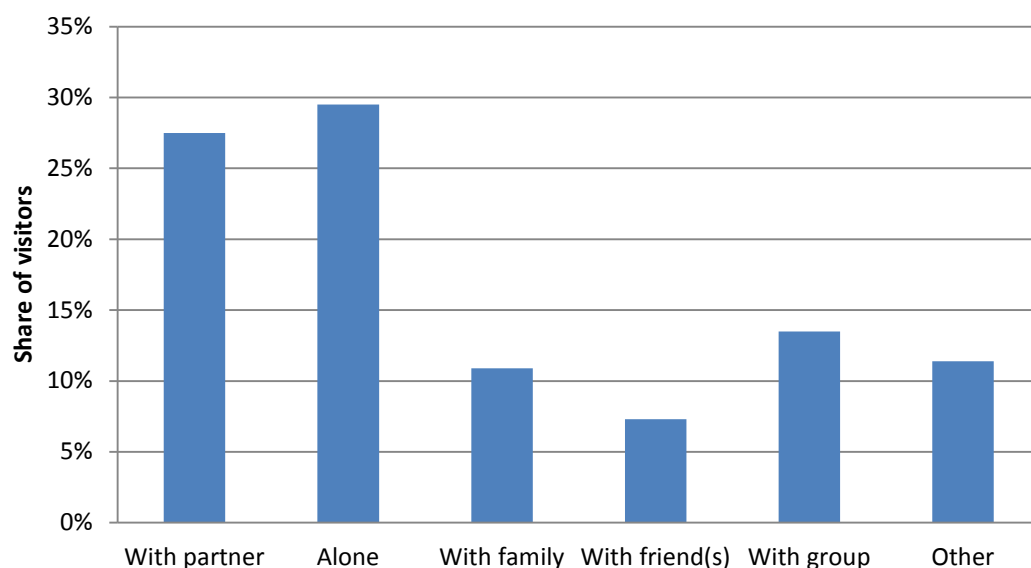


Figure 11 Travel composition of visitors on St Eustatius.

Figure 12 presents the income distribution of the respondents in the sample. Most of the respondents earn between 2,000 USD – 2,999 USD and 5,000 USD – 5,999 USD per month. There is a sudden drop in the category 1,500 USD – 1,999 USD, which can be explained by the fact that most respondents in the first category (0 USD – 1,499 USD) are students and most respondents that are employed earn 2,000 USD or more per month. More than 20 percent of the respondents refused to answer the question.

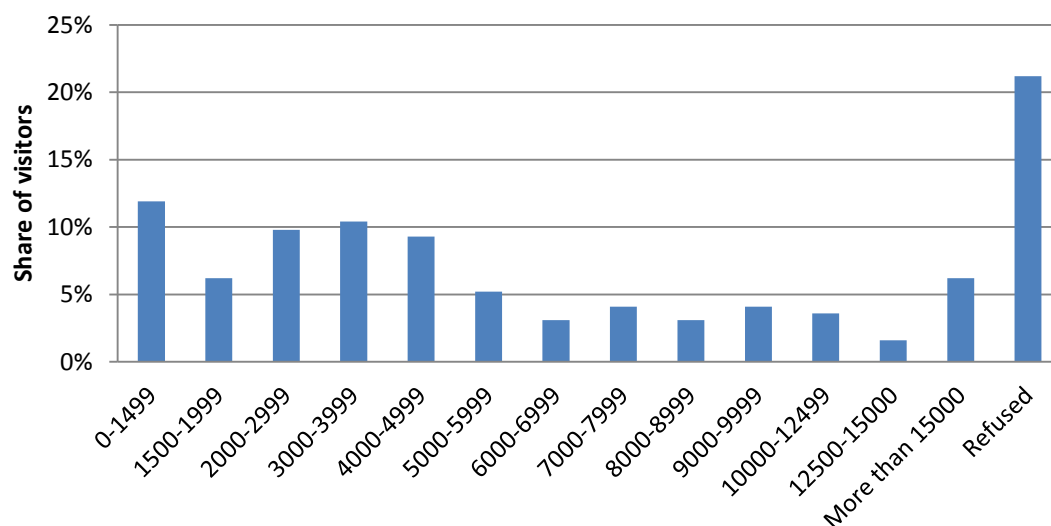


Figure 12 Monthly household income before taxes in US Dollars.

Most of the respondents in the sample are highly educated (HBO, Bachelors, University or Masters Degree), as presented in Figure 13. The trip to and the stay on the island are both quite expensive, which can explain that mainly tourists with a higher income and also a higher education visit the island.

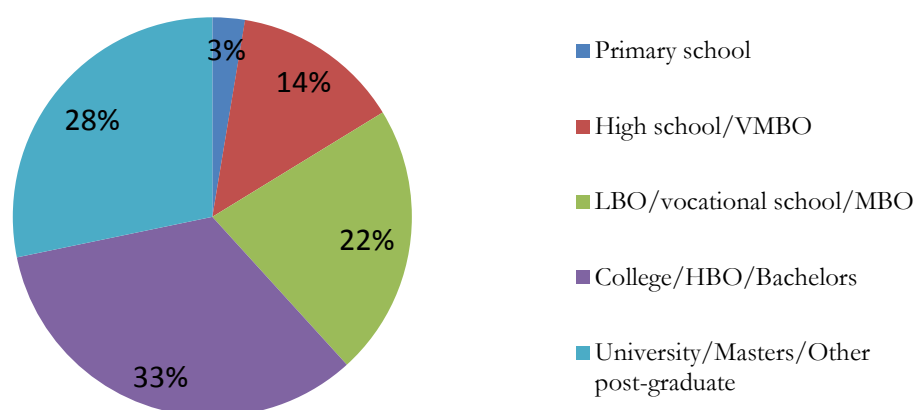


Figure 13 Highest completed level of education of respondents on St Eustatius

Figure 14 indicates how many days the average stay-over tourist spends on the island. The average stay of over 12 days is relatively long compared to the sample on Saba. This can be explained by longer stays of categories other than leisure tourists. Leisure tourists stay on average only 7.4 days on St Eustatius. 29 respondents on St Eustatius that stay for longer than 20 days on the island, some even for 40 or 60 days. These respondents are mostly visiting St Eustatius for a combination of business or visiting friends or family and leisure.

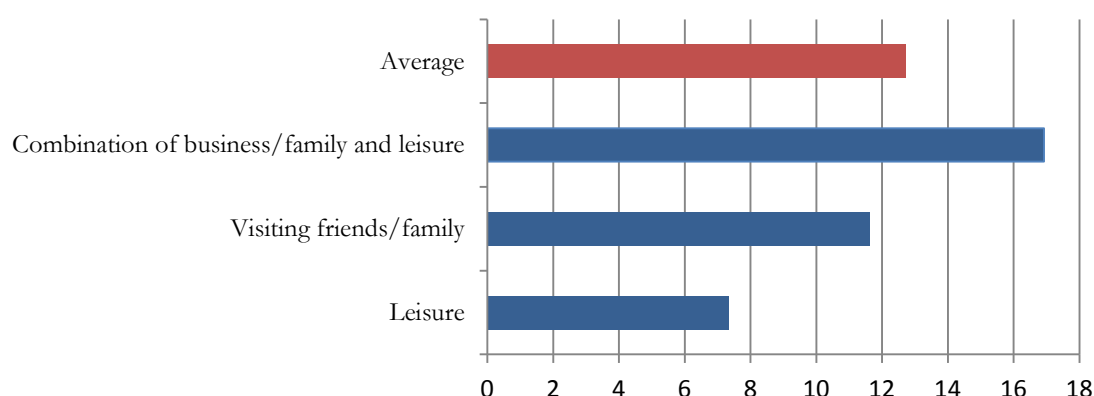


Figure 14 Average number of days that stay-over tourist stay on St Eustatius.

Almost half of the respondents on Saba and St Eustatius visited other islands as well during their trip. The top 3 of most other islands visited by the respondents on Saba are:

1. Anquilla (20%)
2. St Barths (18%)
3. St Eustatius (18%)

And the top 3 of other visited islands in the region on the same trip of respondents on St Eustatius is:

1. St Barths (37%)
2. St Kitts (33%)
3. Saba (30%)

St Maarten was not included in the top 3 of both islands. Reason for this is that it is hard to determine whether respondents stayed on St Maarten or were just using the island for transit. However, almost everybody did visit St Maarten. The results indicate that about half of the respondents visit Saba and St Eustatius as part of a more extensive journey that includes other islands as well. While both Saba and St Eustatius market themselves as individual holiday destinations that compete with other islands in the region, these results indicate that there might be a basis for cooperation based on a complementarity of the different islands.

4.4 Experience and activities

This section discusses the survey questions on how respondents experienced the island, whether they participated in activities and how they appreciated these activities.

Figure 15 presents the ranking of the different island aspects by the respondents. The top three most enjoyed island aspects consist of tranquility, natural landscape and friendly local people. Archaeological heritage and type of visitors are ranked lowest. Natural landscape is most often included in the ranking, followed by the tranquillity on the island.

Respondents were asked to make a top-4 ranking of the island aspects that were presented to them in the survey, with 1 being the most enjoyed aspect. The ranking was converted into a score between 1 and 4. If a respondent ranked an aspect number 1, it was changed into 4 points, rank 2 got 3 points, rank 3 got 2 points and rank 4 got 1 point. The total amount of points per aspect was divided by the total number of respondents. The result is a good reflection of how often an island aspect was included in the top-4 ranking. Diving is for example not often included in the top-4 ranking. However, if it was included in the ranking, it was almost always ranked number one.

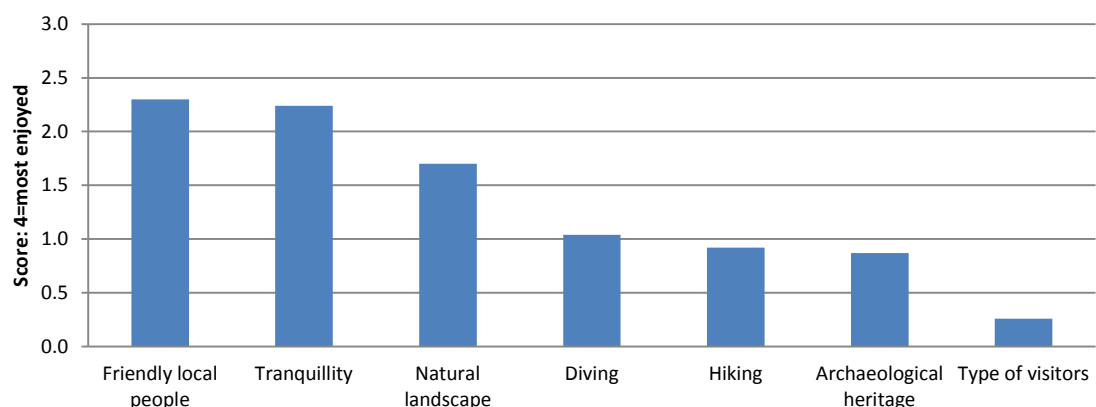


Figure 15 Ranking of the most important island aspects of St Eustatius according to respondents.

Following this ranking, respondents were asked whether they participated in water and land-based activities. And if they participated, how they appreciated these activities on the island. The results are split in water-based and land-based activities.

Water-based activities

As mentioned earlier, many tourists visit St Eustatius to go diving, but also to participate in other water-based activities. **Figure 16** demonstrates that swimming and

visiting the beach are very popular activities among tourists on St Eustatius. When only leisure tourists are included, the percentages change slightly: a little under 40% of the leisure tourists participate in diving. Other important water-based activities are beach visits and swimming. Fishing and boating are practiced to a minor extent.

In general, most activities are highly appreciated (a score between 4 and 5). Diving received the highest appreciation followed by swimming and yacht/boat charters.. The appreciation for deep-sea fishing is low. This can be due to the rough waters surrounding the island during the period that the surveys were conducted.

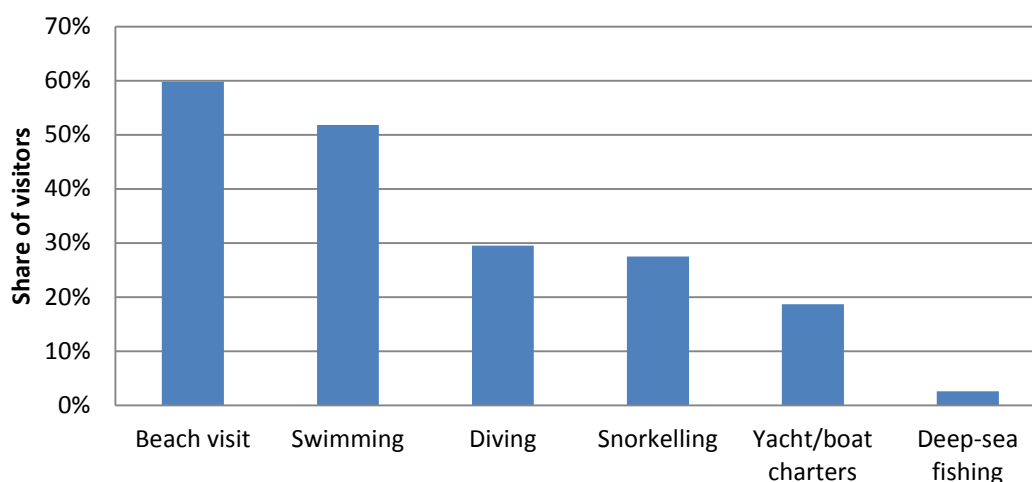


Figure 16 Participation in water-based activities on St Eustatius.

Land-based activities

Figure 17 presents the participation in land-based activities. Visiting historical sites and an island tour by car are clearly the most popular activities. Interesting is the comparison of the percentage of hikers with the sample on Saba, where 70 percent of the respondents has hiked. This indicates that there could be room for development of hike tourism, given the availability of a lot of interesting trails in National Parks of St Eustatius.

Hiking is rated as most enjoyable land based activity by the respondents, followed by visiting the historical sites on St Eustatius. Most land-based activities are highly appreciated. Shopping is not seen as very enjoyable on the island, which is expected given the small availability of shopping opportunities.

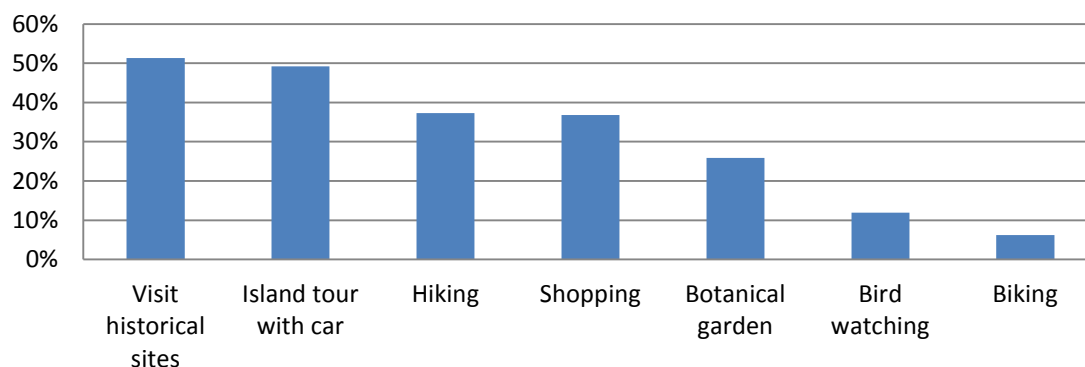


Figure 17 Participation in land-based activities on St Eustatius.

4.5 Perceived potential threats

As Figure presents, the top 3 most important perceived potential threats by tourists is: oil spills, solid waste and coral bleaching. Interesting is the low awareness about the impact of free roaming animals. Especially if this is compared to the perceived threats in the local household survey that has been conducted at the same time for this project (Fenkl et al., 2014).

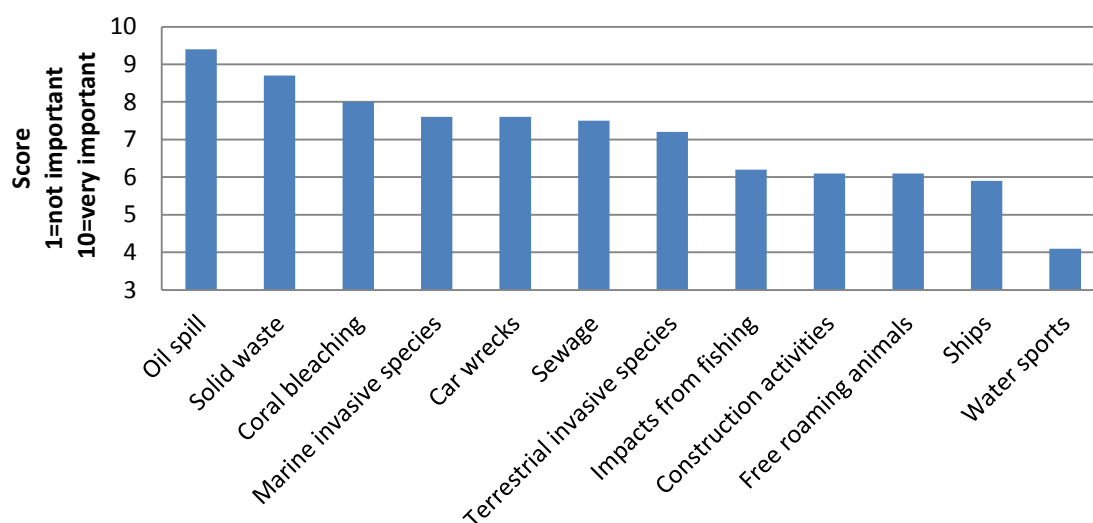


Figure 18 Perceived potential threats to the marine and terrestrial environment as perceived by the respondents on St Eustatius.

4.6 Statements

In cooperation with stakeholders, a couple of context specific statements were prepared on environmental management subjects. The statements are displayed in **Figure 19**. The most noteworthy results are that almost all the respondents agree that St Eustatius is a safe holiday destination and that archaeological heritage should be promoted more. Most of the respondents disagree with the statement that litter on St Eustatius is spoiling their holiday. So, although visitors do perceive litter as an important threat to the environment, it is not important for the enjoyment of their

stay. The respondents seemed not so sure about whether the environment on St Eustatius is well protected, as respondents do not agree or disagree very strongly. This might also be the reason for the fact that people are not particularly keen on obliged entrance fee's for the marine and terrestrial parks, although many people are in principle willing to pay. Most respondents are in favor of fencing roaming livestock on St Eustatius. This contradicts with the results in the previous section on potential threats. Most respondents on St Eustatius do not consider free roaming livestock as a threat to the terrestrial environment. This might indicate that people are experiencing roaming animals more as a disturbance than a threat to the natural environment.

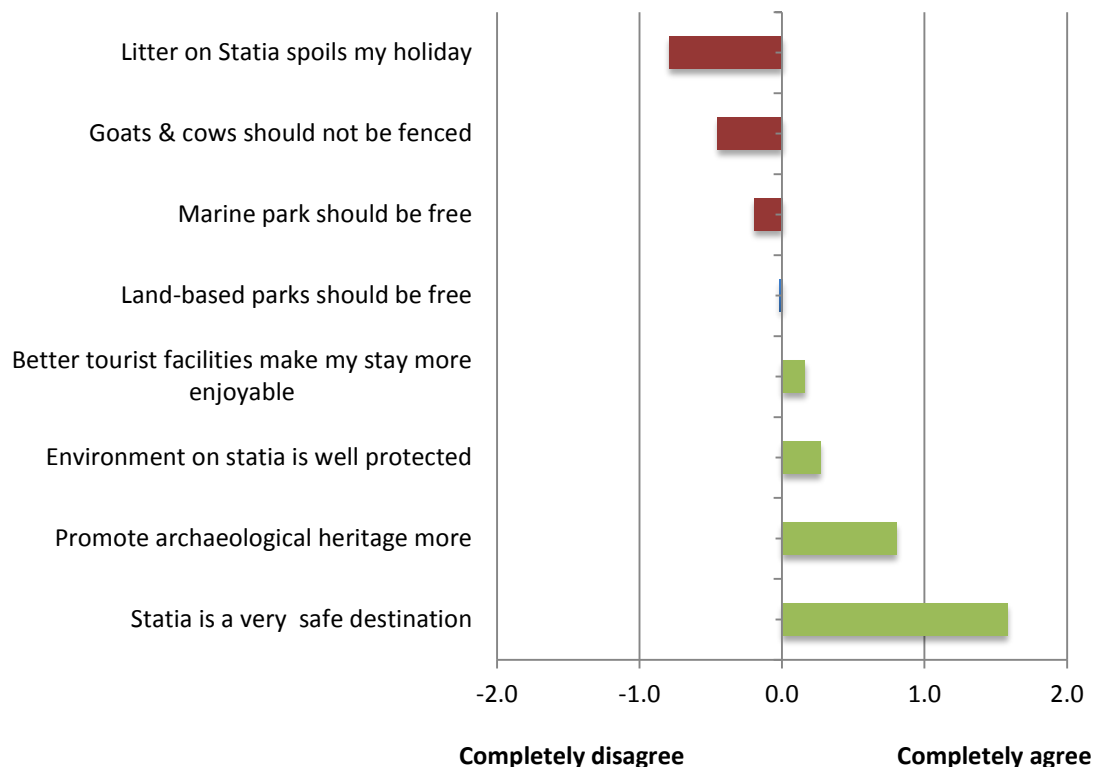


Figure 19 Statements for St Eustatius

Return visit statements

Returning visitors are important for the tourism industry. They provide stability in tourist numbers and often function as ambassadors of destinations such as St Eustatius. Attracting new visitors requires investments in marketing, while returning visitors already know about the island. The rate of returning visitors is also an indicator that gives an idea about whether visitors appreciate the island as a holiday destination. A higher return rate, furthermore, makes it more likely that visitors will recommend the island as a holiday destination to family and friends. 34 percent of the visitors on St Eustatius have visited the island before.

Does a potential change in characteristics of the island affect the decision of respondents to return? The answers to the next statements demonstrate whether respondents will return if certain environmental or cultural assets change. Focus is on the leisure tourists, since business visitors and people that visit friends or family are not influenced as by changes in the characteristics of the island.

According to the results presented in Figure 20 Suppose you were planning to return to St Eustatius for another vacation, would you still return if 1) the island were more crowded than it currently is (i.e. 50% more buildings and people)? 2) the marine environment were in a worse state than it currently is? (i.e. 50% less healthy) 63 percent of the leisure tourists want to come back to St Eustatius. This percentage is not affected by an increased amount of people and buildings on the island. However, a worse state of the marine environment will have a significant influence on the return rate of the current visitors. The hypothetical scenario in which the 'health' of the marine environment decreases with 50 percent, lowers the share of visitors that want to return to 40 percent.

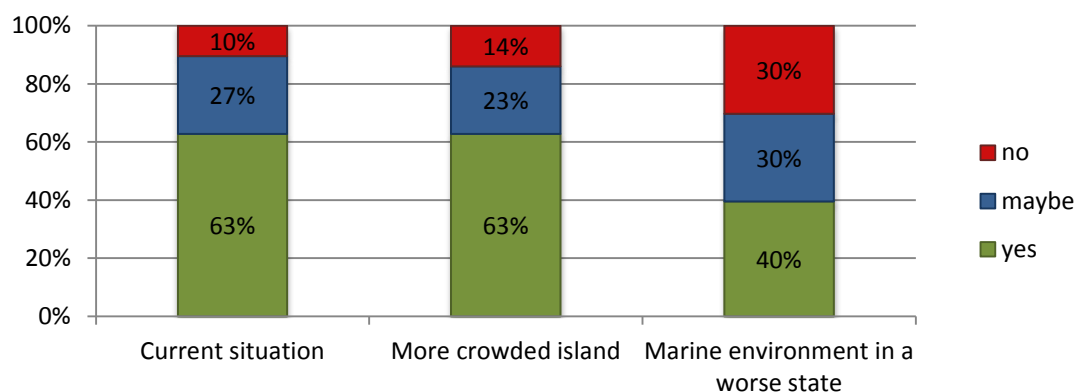


Figure 20 Suppose you were planning to return to St Eustatius for another vacation, would you still return if 1) the island were more crowded than it currently is (i.e. 50% more buildings and people)? 2) the marine environment were in a worse state than it currently is? (i.e. 50% less healthy).

When respondents are confronted with a more open question about their main reason not to return, additional motives come up. Figure 21 reveals that almost a quarter of the respondents indicated 'not enough to do' as main reason to not return. 'Corals or the natural landscape are becoming less beautiful' is not chosen very often as the main reason to not return, which indicates that the state of the environment did not disappoint the respondents.

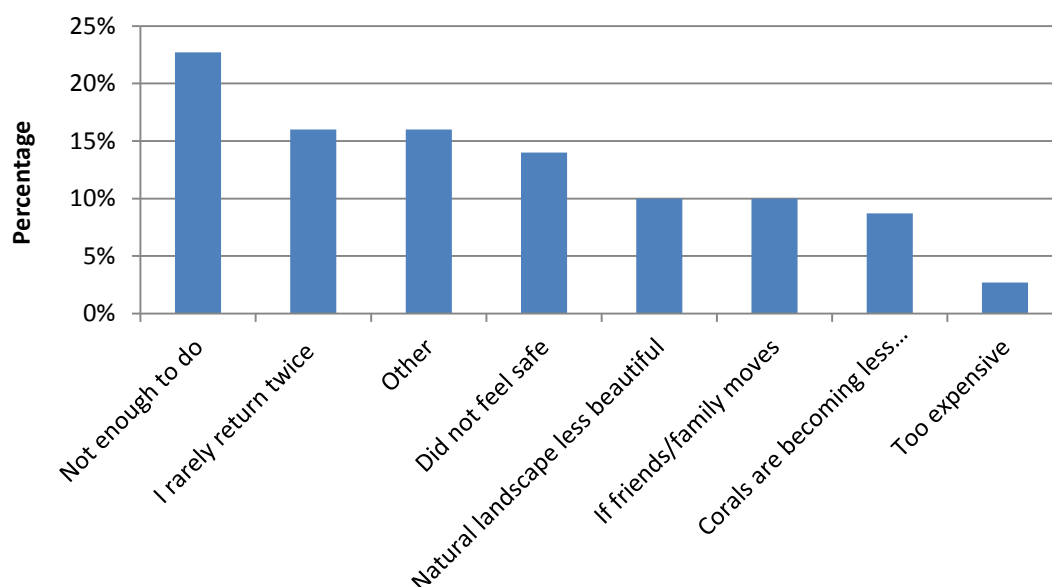


Figure 21 The main reason for respondents to not return to St Eustatius

4.7 Who is 'in principle' willing to pay for conservation?

An important question in the light of this study, the economic valuation of ecosystem services, is whether respondents are in principle willing to pay (WTP) a contribution to improve the environment of St Eustatius. Around 60 percent of the respondents is willing to pay to improve the environment on St Eustatius.

Many respondents indicated that they don't know who should manage the collected funds. The majority of those who speak out indicate that they would prefer STENAPA to manage the collected funds, as displayed in **Figure 22**.

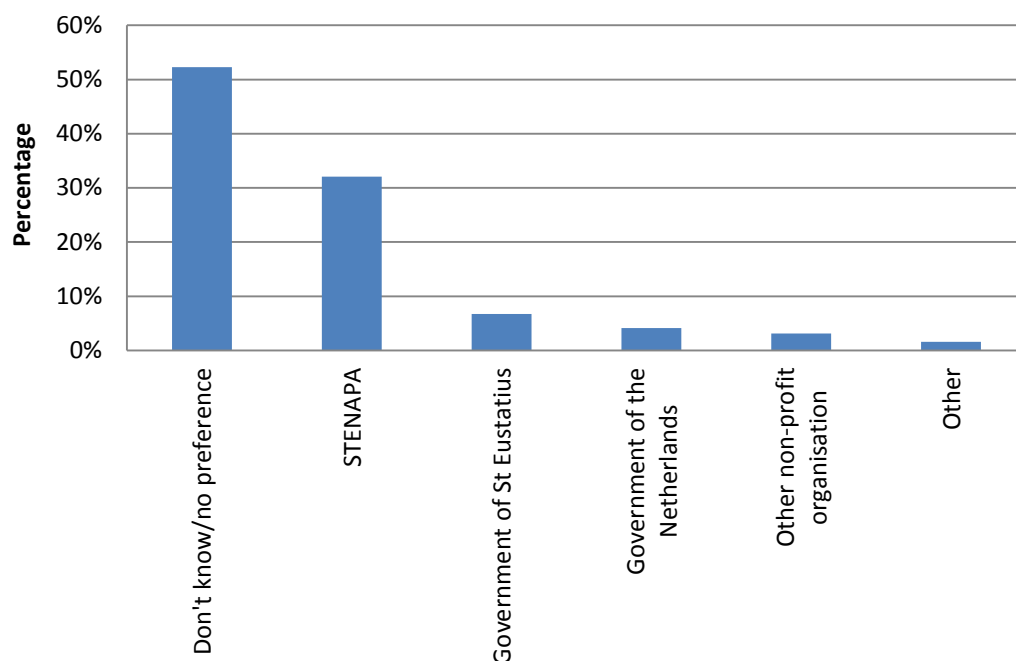


Figure 22 Organizations that should manage the collected funds according to the respondents.

The main reason of respondents for not having a WTP for environmental improvements is not very clear. The majority response to the question that should inform why a respondent is not willing to pay is 'don't know' (49 percent). The top two main reasons that indicate a reason are 'conservation is the responsibility of the island' and 'I cannot afford it'. Reasons given in this category range from 'mismanagement of funds' to 'lack of information on environmental issues on St Eustatius' to 'I'm already paying enough taxes'.

To check which of the variables might influence the WTP preparedness of respondents, crosstabulations in SPSS are used to check for an association between WTP and another variable from the survey. Pearson's Chi square test is used to see if the association is significant and the Phi and Cramer's V test is used to measure the strenght of the association. These tests are specifically useful for variables on a nominal or ordinal measurement level and for tables of 2x2 (De Vocht, 2009). The two most important associations are investigated further.

The association between 'self perceived environmental awareness' and the 'WTP in principle' is quite straightforward, of these two variables it is clear that the more someone is environmentally aware, the more often the respondent is willing to pay for nature improvement (**Figure 23**).

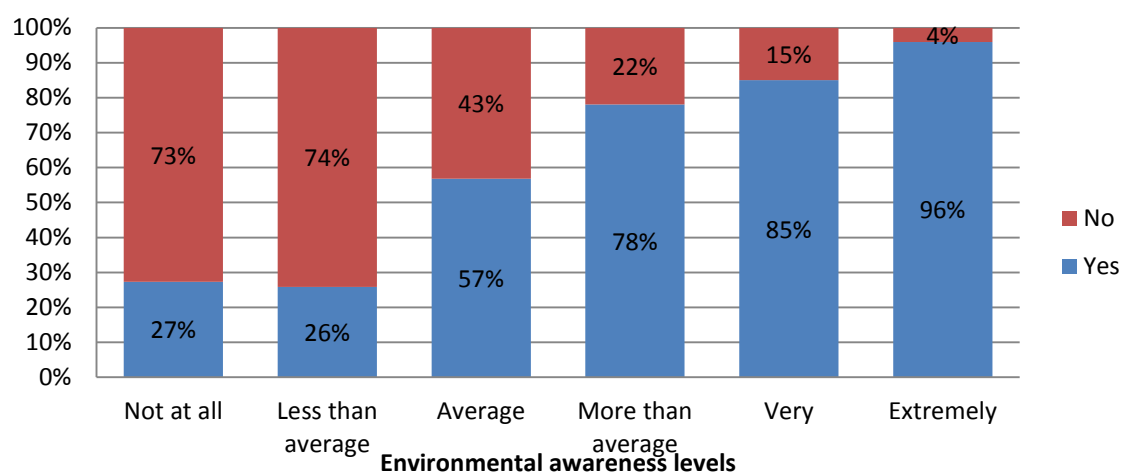


Figure 23 Relation between 'self-perceived environmental awareness' and the 'WTP in principle'.

The other association with a high association is country of origin and WTP. In **Figure 24** this association is examined. It indicates that especially respondents from Europe, the Netherlands and the USA are more often willing to pay for nature improvements than respondents from other countries.

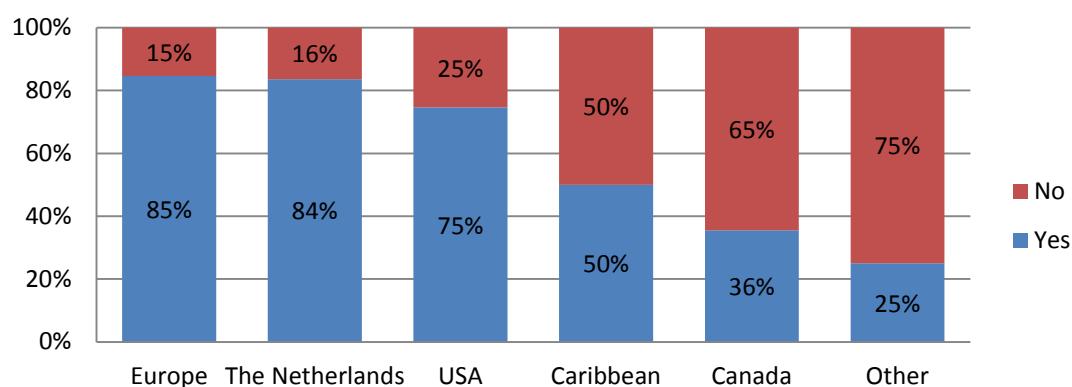


Figure 24 Respondents that are in principle willing to pay for nature conservation.

4.8 Choice experiment results

A multi-nomial regression model on the attributes is used to calculate the WTP per attribute of the CE. Initial analysis of the sample demonstrates that all attributes for the sub-sample of St Eustatius are significant, except for crowdedness. The initial analysis of the CE for the entire sample of Saba and St Eustatius is presented in Appendix A. The results of the initial analysis using the multi-nomial regression model are suspected to suffer from a hypothetical bias, which causes WTP estimates that are unrealistically high. Therefore, an extended methodology is used to calculate WTP estimates. This methodology is based on the coefficients in combination with average WTP. See appendix A for further explanation.

Results of the analysis are presented in **Table 4**. The WTP estimates reflect how much an average respondent is willing to pay per day of his stay to go from the lowest level of the attribute (the omitted level), to the other levels of the attributes.

The first row in **Table 4** presents the results for the alternative specific constant (ASC), which is the scenario that stayed the same on each choice card and was named ‘the expected future without extra management’. The WTP estimate associated with the ASC is the amount of money that respondents are willing to pay to avoid this scenario and to choose between one of the two other scenarios on the choice card. The fact that this value is positive implicates that tourists on St Eustatius have a positive WTP for nature management that is not explained by any of the attributes.

Table 4 Absolute WTP per attribute based on the average WTP for nature conservation including all attributes.

	Coefficient MNL Model	Relative WTP	Absolute WTP per person per day
ASC	0.6070	21%	\$1.50
Natural landscape: excellent	0.9270	32%	\$2.29
Coastal waters: excellent	1.4060	49%	\$3.47
Crowdedness: 400 visitors per day	-0.4270	-15%	\$-1.05
Archaeology: managed	0.3760	13%	\$0.93
Total	2.8890	100%	\$7.12

As shown in Table 5, for the natural landscape attribute, respondents are willing to pay 2.29 USD per day to go from poor to the excellent level. The WTP for moderate natural landscape is calculated by using the relative WTP between the different attribute levels. It is calculated that respondents are willing to pay on average 1.53 USD to move from ‘poor’ to ‘moderate’ landscape. The estimates demonstrate that there is a decreasing marginal utility for natural landscape quality. Or, in other words, people are willing to pay less to move from ‘moderate’ to ‘excellent’ compared to what people are willing to pay to move from ‘poor’ to ‘moderate’.

Table 5 WTP estimates for different levels of the natural landscape attribute.

	Coefficient	Absolute WTP
Natural landscape: moderate	0.621	\$1.53
Natural landscape: excellent	0.927	\$2.29

Table 6 presents the WTP for the attribute of coastal water quality. The WTP for the attribute coastal waters is calculated similar to the WTP for the natural landscape attribute. The coastal water attribute is overall the attribute for which the respondents are willing to pay the highest amount of money to conserve. Again, a decreasing marginal utility is derived for the coastal waters quality. Especially moving from the level ‘good’ to the level ‘excellent’ is rather similar.

Table 6 WTP Estimates for different levels of the coastal waters attribute.

	Coefficient	Absolute WTP
Coastal waters: moderate	0.8	\$1.97
Coastal waters: good	1.301	\$3.21
Coastal waters: excellent	1.406	\$3.47

The fact that the moderate crowdedness attribute is not significant (Table 7), tells us that the respondents have no specific preference for 100 visitors per day or 200 visitors a day, they seem indifferent between low crowdedness and moderate crowdedness. The WTP estimate for a high level of crowdedness (400 visitors per day) is negative, which should be interpreted as a WTP to avoid this level of crowdedness. So respondents are willing to pay 1.05 USD per day to avoid an increase in crowdedness from 100 visitors to 400 visitors per day.

Table 7 WTP estimates for the different levels of the crowdedness attribute.

	Coefficient	Absolute WTP
Crowdedness: 200 visitors per day	0.004	-
Crowdedness: 400 visitors per day	-0.427	\$ -1.05

The archaeology attribute only has two levels: unmanaged and managed. The WTP to go from unmanaged to managed is positive. So, respondents are in favour of managing archaeology and are willing to pay 0.93 USD per day to improve the quality of the archaeological heritage on St Eustatius.

Main reason to opt-out

Figure 25 presents the main reasons of respondents to choose the expected future scenario (where no contribution is paid) or to refuse the CE. Respondents mainly indicated that the costs are too high or that they are against an additional contribution. A quarter of the respondents indicated that the 'expected future scenario' represented the best alternative in the sense that the combination of the levels of the attributes in this scenario was well balanced, better than in the other two scenarios on the choice card.

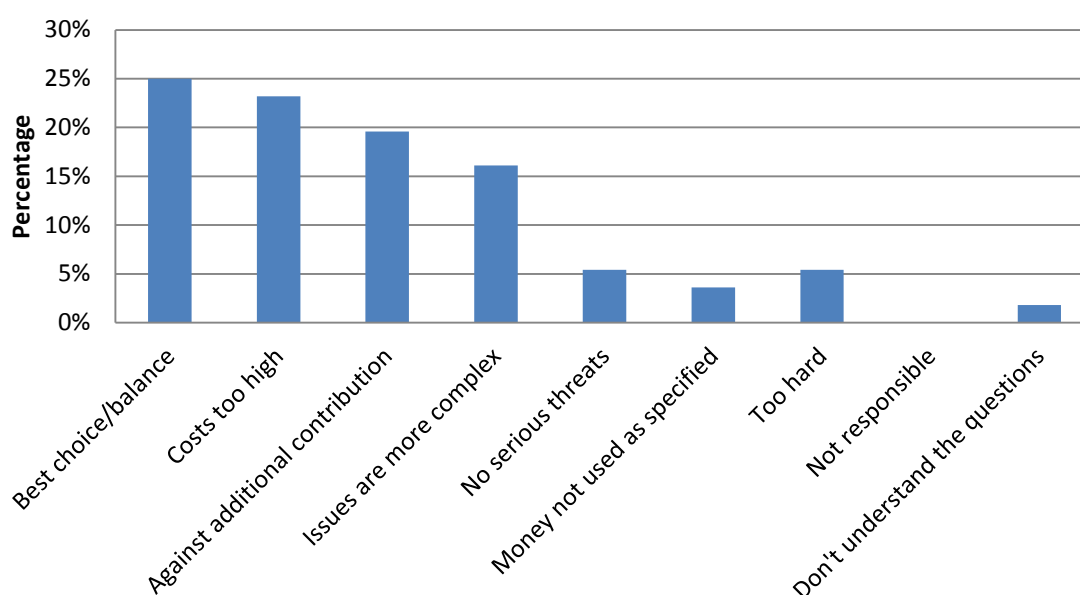


Figure 25 Main reason to choose the 'expected future scenario' or to refuse the CE.

4.9 Total tourism value

The total tourism value of nature on St Eustatius is made up of the producer surplus and the consumer surplus. The producer surplus is calculated by using the net factor income method and the producer surplus is calculated by using the WTP estimates from the CE.

Producer surplus

The producer surplus in this study is based on the direct and indirect benefits from local ecosystems for the tourism sector. With the net factor income method, the producer surplus is calculated by determining the revenues made in the tourism sector, reduced by the costs to the producer for offering the goods to tourists (van Beukering *et al.*, 2007).

To calculate the revenues made in the tourism sector, the expenditures that tourists filled in, in the survey per activity or good are calculated. One-fourth of the respondents indicated that they booked a travel package. However, since only the total package costs are known and not the breakdown of the cost for the different categories, it is impossible to include these expenditures into the calculation of the average expenditure per category. Therefore, the producer surplus calculated in this study will be an underestimate. What was included in the packages is presented in Appendix F. In Appendix G, the mean daily expenditures for day and stay-over tourists can be found. This difference in expenditures is not used for the calculation of the producer surplus, because the actual share of day tourists is not known.

Not all the expenditures and goods are directly dependent on local ecosystems and since we are valuing nature, the share of dependence on the local ecosystem is determined per activity. Later on, the expenditures are adjusted based on this calculation. First, all the expenditures are divided into direct and indirect values.

Direct values

The direct activities depend directly on local ecosystems and can therefore, directly be related to the natural environment. The expenditure categories where this applies are diving, snorkelling, yacht/boat rental and island tours. These expenditures are directly dependent on the quality of the local ecosystem and are direct values. If the local ecosystem degrades, revenues made from these activities are directly affected. Not all these activities depend on the ecosystems for the full 100%. Diving and snorkelling do, but yacht/boat rental and island tours do to a certain extent, because a less healthy ecosystem will still provide some of the values that a healthy ecosystem will (**Table 8**).

Indirect values

Indirect values refer to revenues from good and activities that do not directly depend on local ecosystems but do so in an indirect way (e.g. hotels and restaurants). Local ecosystems are not needed to provide these goods but if ecosystems degrade, fewer will visit the island and hotels and restaurants will be affected. In order to calculate the benefits that ecosystems provide to these indirectly dependent suppliers of goods and activities, the information from **Table 8** is used. In this case, the factor for ecosystem dependence is used to calculate per island how dependent the average tourist is on the local ecosystems. This is done by calculating the average ecosystem-dependence per tourist, after which the average ecosystem-dependence for the entire group of visitors is calculated.

Table 8 Ecosystem dependence per activity on St Eustatius.

Water-based activities	Factor for local ecosystem dependence (FED)	Land-based activities	Factor for local ecosystem dependence (FED)
Diving	1	Hiking	0.75
Snorkeling	1	Biking	0.25
Swimming	0.5	Bird watching	1
Beach visit	0.5	Island tour with car	0.5
Yacht/boat charters	0.25	Visit historical sites	0
Deep sea fishing	0.5	Visit botanical garden (St Eustatius)	0.5
		Shopping	0

FED level Motivation for FED levels

- 0** These activities are not dependent on any of the local ecosystems.
- 0.25** These activities are for a small part dependent on local ecosystems, but degradation of the local ecosystem would not affect the experience of these activities very much.
- 0.50** These activities are for 50% dependent on local ecosystem. For example a beach visit for relaxation where the sand and the water is enjoyed. The presence of the sand and opportunity to swim is dependent on the local ecosystem but relaxation is also part of the experience, which can also take place on other locations.
- 0.75** These activities have a very high level of interaction with the natural environment and the experience of the activity is almost fully dependent on the local ecosystem. Degradation of the local ecosystem would have a great affect on the experience of the activity.
- 1** These activities are for 100% dependent on the local ecosystem, for example: diving and snorkeling are totally dependent on the local coral ecosystem, without a healthy coral ecosystem the activity will not take place.

Ecosystem dependence of the producer surplus

Unfortunately there is no data available on the cost of producing goods and services in the tourism sector on the island. Due to this lack of data it is assumed that the average expenditures per good account for 25 percent of the added value of the good (Schep *et al*, 2012). The next step is to get from the average expenditures per day to the net ecosystem benefit.

The following two steps are performed to calculate the net factor ecosystem benefit per good or activity:

Step 1: Added value (%) * Average expenditure per day = Added value

Step 2: Added value * Local ecosystem dependence = Net factor ecosystem dependence

Table 9 Calculation of net factor ecosystem benefit for tourists on St Eustatius.

Direct values	Added value (%)	Local ecosystem dependence	Average expenditure per day	St. Deviation expenditures	Added value	Net factor ecosystem benefit
Diving	25%	100%	\$8.04	21.41	\$2.01	\$2.01
Snorkelling	25%	100%	\$0.26	3.60	\$0.07	\$0.07
Island tours	25%	50%	\$0.51	3.85	\$0.13	\$0.065
Boat rental	25%	25%	\$12.96	81.53	\$3.24	\$0.81
Trail/Marine park tag	25%	100%	\$0.71	2.96	\$0.18	\$0.18
Indirect values						
Harbour fees	25%	60%	\$0.54	3.78	\$0.14	\$0.08
Airport fee	25%	60%	\$4.28	-	\$1.07	\$0.64
Food & beverages	25%	60%	\$29.31	52.11	\$7.33	\$4.40
Shopping	25%	60%	\$9.70	16.86	\$2.43	\$1.46
Local transport	25%	60%	\$0.89	3.75	\$0.22	\$0.13
Accommodation	25%	60%	\$34.13	99.96	\$8.53	\$5.12
Car/scooter rental	25%	60%	\$3.91	12.82	\$3.20	\$1.92
Donations	100%	60%	\$0.26	1.72	\$0.26	\$0.16
Total p.p./p.d.			\$105.50		\$28.81	\$17.05
Total per year (times 10,250 visitors; times 12.7 days per stay)			\$13,733,500		\$3,750,300	\$2,219,500

Consumer surplus

The consumer surplus is determined with WTP estimates from the CE. The WTP estimates indicate what respondents are willing to pay for a change in the levels of the attributes. This sometimes means an improvement and sometimes maintaining the current state. The WTP estimates reflect the value that people assign to the attributes or the utility that they gain per attribute, also if they did not directly 'use' the attributes in the sense of paying for an environmental related activity.

Table 10 demonstrates the total WTP per attribute level for landscape and coastal water excellence, these are based on the WTP estimates from the CE and the visitor numbers 2010. The total WTP for the conservation of the natural environmental is calculated by adding up the total WTP for natural landscape and the total WTP for coastal waters, as displayed in **Table 10**. Based on the excellent attribute levels of the natural landscape and coastal water quality, the total WTP for additional management of the natural environment on St Eustatius is estimated to be almost 750,000 USD. The WTP to manage the archeological heritage of the island more compared to what is happening now, is 120,000 USD.

Table 10 Total annual WTP for nature conservation on St Eustatius.

Total WTP	
Natural landscape excellent	\$298,000
Coastal waters excellent	\$451,000
Total annual WTP for nature conservation	\$749,000

* Based on 10,250 visitors per year on St Eustatius

Total tourism value

The producer and consumer surpluses can be added together to calculate the total tourism value for St Eustatius. The value represents the welfare created in the tourism industry that is attributable to the natural environment.

Table 11 Total tourism value that is attributable to the Natural environment of St Eustatius.

Total WTP	
Producer surplus attributable to natural environment	\$2,219,500
Total annual WTP for nature conservation (producer surplus)	\$749,000
Total tourism value	\$2,968,500

5 Conclusions and recommendations

The aim of this study is to *determine the value of nature to tourists on St Eustatius*. This is done by determining how much revenue is earned by the tourism sector is attributable to local ecosystems services and by calculating the WTP of tourists for additional environmental management. A choice experiment (CE) and complementary questionnaire has been used to answer this research question.

From the results of the CE it is clear that there is a positive preference for additional natural environmental management and the management of the archaeological heritage of St Eustatius among tourists. This demonstrates that most of the respondents on St Eustatius would like to see archaeological heritage be more actively managed on the island than it currently is.

Diving is the highest appreciated water-based activity. About 41 percent of the respondents on St Eustatius participated in diving. On land, tourists on St Eustatius can most often be found doing island tours and visiting historical sites. Hiking is also one of the more important activities practiced by tourists on the island. The most appreciated island aspects are its friendly local people, the natural landscape and tranquillity. The total value of the natural environment for tourism on St Eustatius (part of the producer surplus in the tourism industry that is attributable to the natural environment plus WTP for environmental management) is calculated to be 3 million USD per year. The high WTP values from the CE for an increase in quality for both coastal waters, natural landscape and the management of archaeological heritage demonstrate that increasing fees for diving or installing fees for hiking or visiting of historical sites is unlikely to affect the number of tourists that visit the island..

Respondents from St Eustatius are most sensitive to changes in the quality of the marine environment. In the current situation, 60 percent of the visitors want to return to St Eustatius. This percentage decreases to respectively 40 percent if the quality of the marine environment degrades. Crowdedness is generally not seen as an important factor to change the willingness to return to St Eustatius. This indicates that the natural capital of St Eustatius is of great importance to the tourism sector and therefore to the economy of the island. The positive attitude of the current visitors towards an increase in the number of tourists demonstrates that development of the tourism industry is very well possible. However, limiting the impact on the natural environment and increasing conservation are proven to be fundamental to the development of the tourism industry on St Eustatius.

Acknowledgements

This study would not have been possible without the support of numerous people and organizations on St Eustatius. It was great to start our visit with a discussion with the Executive Council, government officials of the St Eustatius government and employees of STENAPA. We would like to express our gratitude to commissioner Tarr and the Executive Council for their hospitality and the time mister Tarr took to share his vision.

Moreover, we like to thank all the people who attended the workshop on valuing the natural environment of St Eustatius and others who gave us valuable information on St Eustatius; especially Roberto Hensen (LVV), Jessica Berkel, Claire Blair, Hannah Madden and Steve Piontek from STENAPA, Maldwyn Timber and Siem Dijkshoorn from Planning & Project Bureau of St Eustatius, investment officer Darlene Berkel, Erik Boman (LVV, STENAPA), Terrence Keogh (NuStar) Johan Stapel (CNSI) Charles Lindo, Maya Leon-Pandt from the the St Eustatius Tourism Development Foundation and many others, we thank you for your expert opinion and the data you provided. Your contribution was crucial for the success of this study.

Furthermore, we have had the privilege to work with a great interview team, consisting of Heleen Visser, Cherida Creebsburg, Fraukje Vonk, Brenda Nous, Perla Duinkerck, Rafaela Busby, Maruska Simmons, Solandy Sanchez Bianca Schmidt, Felicia Schmidt and Mariana Schmidt.

IMARES was of great assistance and provided us with local data and model suggestions to further improve this research. Thank you Ingrid van Beek, Bert Brinkman, Martin de Graaf and Erik Meesters for your expertise and discussions.

We would also like to express our gratitude towards Ruth Rivers Woodley from the Rijksdienst Caribisch Nederland (RCN). Thank you Ruth, for your warm welcome and the facilitating services. The Lions Club for providing their facilities for the workshop. We would like to thank Gay Soetekouw, Ruud Stelten and the other people from S.E.C.A.R. for their accommodating services and their knowledge of the historical heritage of St Eustatius.

Special thanks go to Marjolijn Staarink for the laborious task of editing the layout of the report.

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Annex A Initial Choice Experiment results for Saba and St Eustatius

The results of a multi-nomial logit regression model on the main effects (attributes) are presented in Table 11. The effects are all dummy coded except for the payment vehicle attribute, which is coded as a continuous variable. The estimated coefficients on the attributes are all statistically significant at the 1% level except for the estimated coefficient on the dummy variable indicating moderate crowdedness (indicating no statistically significant difference in preferences between low and moderate crowdedness).

The estimated coefficients are used to calculate mean household willingness to pay (WTP) for each change implied by the attribute levels. The WTP amounts should be interpreted as the average WTP to move from the omitted category attribute level (the lowest category in each case) to the attribute level listed in the table. For example, mean household WTP to move from a situation with poor quality natural landscape (the omitted category) to a situation with moderate quality natural landscape is estimated to be 48 USD per day.

The Krinsky and Robb (1986) procedure is used to estimate 95 percent confidence intervals (CI) for each WTP estimate. This indicates the range within which we can be 95 percent certain that mean WTP falls, given the variation in responses observed in the data. For example, we can be 95 percent certain that mean annual household WTP to move from a situation with poor quality natural landscape to a situation with moderate quality natural landscape falls within the range 27 USD – 60 USD per day.

The alternative specific constant (ASC) estimated in the model represents the preference of respondents to avoid the 'expected future without extra management' scenario and opt for one of the alternative management scenarios. This preference is over and above the differences between scenarios that are represented by the attributes, i.e. there is apparently a positive and statistically significant preference for additional environmental management on the part of tourists to Saba and St Eustatius.

A further analysis of the choice data was conducted to identify whether there are any significant differences in preferences between different groups within the sample of visitors. In other words, we try to identify whether some visitors have higher or lower WTP for changes in environmental/management attributes. This analysis was implemented by introducing interaction terms into the estimated multi-nomial logit regression between the payment vehicle (fee) attribute and a set of variables describing visitor characteristics.

The visitor characteristics that were tested are: income, education, age, gender, place of origin, mode of transport to reach Saba and St Eustatius (ferry, aeroplane or yacht), whether the respondent was on a package holiday, purpose of the visit (whether for leisure or not), whether travelling with children, intention to return to Saba and St Eustatius, level of environmental awareness, whether willing to pay for improved environmental management in principle, level of certainty when choosing between options in the CE, and the choice process used when making choices in the CE. We also included an interaction term between the fee attribute and a variable indicating whether the respondent was visiting Saba or St Eustatius in order to identify whether WTP differs between visitors to each island. From this set of interaction variables, only those for place of origin, purpose of trip, package holiday, gender, and island proved

to be statistically significant (i.e., the other indicators of differences between visitors did not reveal any differences in WTP for improved management).

The implications of the statistically significant interaction effects in terms of differences in WTP from the sample average are calculated and presented in Table 11. Place of origin appears to have a large influence on stated WTP for environmental management. Respondents from the USA and Canada have substantially lower WTP. By implication, the omitted category of visitors (those from European countries other than the Netherlands) have relatively high WTP.

The purpose of the visit also has an important bearing on the WTP of respondents. Those that are visiting Saba and St. Eustatius for leisure are willing to pay considerably more than other types of visitors. Visitors that are on package tours, however, are found to have significantly lower WTP than the sample average. WTP by package tourists is 41 percent lower than average, possibly reflecting their expectation that the cost of their package should also include fees for environmental management.

Table 11 Multi-nomial logit regression results, willingness to pay with 95% confidence intervals.

	Coefficient	SE	P	WTP	Lower CI	Upper CI
ASC	0.732	0.104	0.000	38.16	26.50	60.20
Natural landscape: moderate	0.955	0.081	0.000	47.98	34.01	77.71
Natural landscape: excellent	1.257	0.089	0.000	63.70	46.25	101.31
Coastal waters: moderate	0.968	0.110	0.000	49.91	34.65	79.96
Coastal waters: good	1.606	0.108	0.000	79.83	58.38	126.13
Coastal waters: excellent	1.591	0.113	0.000	79.32	58.88	123.09
Crowdedness: 200 visitors per day	0.009	0.073	0.900		-	-
Crowdedness: 400 visitors per day	-0.559	0.079	0.000	-29.84	-50.11	-19.66
Archaeology: managed	0.389	0.058	0.000	18.45	12.05	29.88
Contribution: US\$ per day	-0.022	0.004	0.000	-	-	-
N	2174					
R ² Pseudo	0.0717					

The most striking result that we obtain from the analysis with interaction effects is that visitors to Saba are found to have considerably higher WTP (over four times higher) than those on St Eustatius. In order to examine the differences in preferences between respondents on each island further, we estimate separate models using the subsamples from each island. The results are presented in Table 12. We find that the estimated coefficient on the fee attribute in the Saba model is not statistically significant, and therefore the calculated WTP amounts need to be treated with extreme

caution. It appears that respondents in the Saba subsample did not take sufficient account of the fee attribute when making their choices. This has large implications for the calculated WTP amounts since respondents are effectively stating a very low preference for money and high preference for the environmental attributes. The estimated coefficient on the fee attribute in the St Eustatius model is statistically significant and larger than in the estimated model using the full sample combined (as expected given that the Saba respondents that ignore the fee attribute are excluded). The computed WTP amounts for the St Eustatius model are therefore substantially lower (approximately half the WTP amounts derived from the full sample model).

It is notable that the relative preferences for the environmental attributes are robust in the two subsamples, i.e. for both islands improvements in coastal water quality are considered to be of greatest importance, followed by natural landscape, and finally crowdedness with moderate crowdedness not considered to be a problem on both islands.

Table 12 Multi-nomial logit regression results and willingness to pay for sub-samples for Saba and St Eustatius.

	Saba				St Eustatius			
	Coefficient	SE	P	WTP	Coefficient	SE	P	WTP
ASC	0.996	0.151	0.000	261.41	0.607	0.153	0.000	16.11
Natural landscape: moderate	1.312	0.120	0.000	344.28	0.621	0.115	0.000	16.48
Natural landscape: excellent	1.576	0.129	0.000	413.53	0.927	0.129	0.000	24.60
Coastal waters: moderate	1.169	0.158	0.000	306.75	0.800	0.159	0.000	21.22
Coastal waters: good	1.857	0.156	0.000	487.38	1.301	0.157	0.000	34.52
Coastal waters: excellent	1.687	0.162	0.000	442.89	1.406	0.163	0.000	37.32
Crowdedness: 200 visitors per day	0.074	0.103	0.475		0.004	0.108	0.974	
Crowdedness: 400 visitors per day	-0.781	0.114	0.000	-204.91	-0.427	0.115	0.000	-11.33
Archaeology: managed	0.370	0.083	0.000	97.15	0.376	0.085	0.000	9.97
Contribution: US\$ per day	-0.004	0.005	0.470		-0.038	0.006	0.000	
N	1147				1027			
R ² Pseudo	0.119				0.036			

Additional analysis to derive absolute WTP

Due to the expected hypothetical bias in the choice experiment, the following analysis has been performed to finalize the results. The coefficients calculated for each attribute with the multi-nomial model are still valid, which means that the relative WTP for different attributes in the CE is deployed. To estimate the total WTP for nature conservation the payment vehicle has been used. Therefore, the average WTP is calculated based on the different levels of the payment vehicle that were chosen by the respondents. This average is assumed to represent the maximum WTP for nature conservation per respondent. Based on the relative WTP for the scenario that includes the highest attribute levels, the average WTP is divided among the different attributes of the choice experiment. Because the relative WTP for different attribute levels is still valid, the absolute WTP for the highest level of each attribute is then determined.

Results of the analysis are presented in **Table 14**. The WTP estimates reflect how much an average respondent is willing to pay per day of his stay to go from the lowest level of the attribute (the omitted level), to the other levels of the attributes.

Table 14 Absolute WTP per attribute based on the average WTP for nature conservation including all attributes.

	Coefficient MNL Model	Relative WTP	Absolute WTP Per person per day
ASC	0.6070	21%	\$1.50
Natural landscape: excellent	0.9270	32%	\$2.29
Coastal waters: excellent	1.4060	49%	\$3.47
Crowdedness: 400 visitors per day	-0.4270	-15%	\$-1.05
Archaeology: managed	0.3760	13%	\$0.93
Total	2.8890	100%	\$7.12

Annex B Questionnaire Tourist survey St Eustatius

TO BE FILLED BY THE INTERVIEWER:		Weather: (circle one(s) that apply) <i>Sunny, overcast, rainy</i>
Interviewer name:		
Date (m/d/y):	Time:	Location:
Questionnaire #		

ST EUSTATIUS TOURISM SURVEY

0 Introduction

Good morning/afternoon/evening, my name is _____. I am working for the VU University in the Netherlands. We are researching how tourists value St Eustatius's environment. For this we would like to ask a few questions about your motivation to visit St Eustatius and your activities while being on the island. Would you like to participate? It will only take about **20** minutes and it is completely confidential. Note that there are no wrong answers to the questions - we only want your honest opinion.

0.1 Are you 18 years or older?

1. Yes	CONTINUE QUESTIONNAIRE	<input type="checkbox"/>
2. No	THANK PERSON AND TERMINATE INTERVIEW	<input type="checkbox"/>

0.2 Where do you live?

1. Here on St Eustatius: THANK AND TERMINATE •	<input type="checkbox"/>
2. USA: specify state: _____	<input type="checkbox"/>
3. Canada: specify province/territory: _____	<input type="checkbox"/>
4. Dutch Caribbean, specify island _____	<input type="checkbox"/>
4. Other Caribbean, specify territory/country _____	<input type="checkbox"/>
6. The Netherlands mainland	<input type="checkbox"/>
5. Europe, specify country _____	<input type="checkbox"/>
7. Other, specify country _____	<input type="checkbox"/>

0.3 What is the **purpose** of your visit?

1. Former residents/ visiting friends or family	<input type="checkbox"/>
2. Leisure	<input type="checkbox"/>
3. Combination of leisure with either business or visiting friends/family (only if you spend one day or more on leisure activities)	<input type="checkbox"/>
4. Business – THANK AND TERMINATE •	<input type="checkbox"/>

Part 1: Your visit to St Eustatius

1.1 How many **days** are you staying on St Eustatius? days

1.2 In which **accommodation** are you staying on St Eustatius?

1. The Old Gin House	<input type="checkbox"/>	5 Kings Well Resort	<input type="checkbox"/>
2. St Eustatius Lodge	<input type="checkbox"/>	6 Friends or family	<input type="checkbox"/>
3. Country Inn	<input type="checkbox"/>	7 Other, specify:	<input type="checkbox"/>
4. Golden Era Hotel	<input type="checkbox"/>		

1.3 Was your most recent **visit to St Eustatius** by boat, by airplane or did you arrive by yacht?

1. Boat	<input type="checkbox"/>	2. Airplane	<input type="checkbox"/>	3. Yacht	<input type="checkbox"/>
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1.4 How many **times** have you visited St Eustatius (*including current visit*)?

1 time	<input type="checkbox"/>	5 times	<input type="checkbox"/>
2 times	<input type="checkbox"/>	6 times	<input type="checkbox"/>
3 times	<input type="checkbox"/>	More than 6 times	<input type="checkbox"/>
4 times	<input type="checkbox"/>		

1.5 Have you visited, or are you planning to visit any of the following islands in the **region** during your holiday?

1. St Maarten	<input type="checkbox"/>	6. St Kitts	<input type="checkbox"/>
2. St Barths (St Barthelemy)	<input type="checkbox"/>	7. Anguilla	<input type="checkbox"/>
3. Nevis	<input type="checkbox"/>	8. Other, specify	<input type="checkbox"/>
4. Antigua	<input type="checkbox"/>	9. None	<input type="checkbox"/>
5. Saba	<input type="checkbox"/>		

Part 2: Your experience on St Eustatius

2.1 Indicate the Top-4 aspects that you **enjoyed most** on the island so far (*1 is most enjoyed, and rank up to 4 aspects*)

1. Tranquillity		5. Archaeological heritage	
2. Hiking		6. Natural landscape	
3. Diving		7. Friendly local people	
4. Type of visitors		8. Other, specify	

2.2 Which **water-based activities** have you participated in on St Eustatius? Please indicate how much you enjoyed them. You do not need to answer if you didn't participate in an activity (*1 = not enjoyable; 5 = very enjoyable*).

	Not enjoyable ↔ Very enjoyable					Did not do this	Still planning to do this
1 Diving	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
2 Snorkelling	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
3 Swimming	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
4 Beach visit	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
5 Yacht/boat charters	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
6 Deep-sea fishing	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
7 Other, specify:	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>

2.3 Roughly how many **dives** have you had in your **lifetime**?

1. 0	<input type="checkbox"/>	4. 26 - 50 times	<input type="checkbox"/>
2. 1 - 10 times	<input type="checkbox"/>	5. 51 - 100 times	<input type="checkbox"/>
3. 11 - 25 times	<input type="checkbox"/>	6. > 100 times	<input type="checkbox"/>

SKIP 2.4 IF RESPONDENT DID NOT DIVE OR SNORKEL **2.4** Indicate how many dives and snorkelling trips you did during your stay on **St Eustatius**

1. # _____ dives	2. # _____ snorkelling trips
------------------	------------------------------

2.5 Which **land-based activities** have you participated in on St Eustatius? Please indicate how much you enjoyed them. You do not need to answer if you didn't participate in an activity (*1 = not enjoyable; 5 = very enjoyable*).

	Not enjoyable ↔ Very enjoyable					Did not do this	Still planning to do this
1 Hiking	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
2 Biking	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
3 Bird watching	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
4 Island tour with car	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
5 Visit historical sites	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
6 Visit botanical garden	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
7 Shopping	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
8 Other, specify:	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>

[SKIP 2.6 IF RESPONDENT DID NOT HIKE]

2.6 Indicate on the map on which trail(s) you have **hiked** or are planning to **hike** during your stay on St Eustatius [SHOW MAP]

1. Quill Trail	<input type="checkbox"/>	5. Mazinga trail	<input type="checkbox"/>
2. Around the Mountain trail	<input type="checkbox"/>	6. Botanical Garden & Bird trail	<input type="checkbox"/>

3. Crater trail	<input type="checkbox"/>	7. Couchar Mountain trail	<input type="checkbox"/>
4. Panorama Point trail	<input type="checkbox"/>	8. Boven National Park	<input type="checkbox"/>

2.7 Indicate how many times you visited the following **beaches** during your stay on St Eustatius

1. Lower Town Beach _____ times	3. Other beaches, specify number of times & location: _____ times
2. Zeelandia Beach _____ times	

Part 3: Environmental Awareness & choice questions

3.1 To what extent do you consider yourself **environmentally aware**?

1. Not at all	<input type="checkbox"/>	4. More than average	<input type="checkbox"/>
2. Less than average	<input type="checkbox"/>	5. Very	<input type="checkbox"/>
3. Average	<input type="checkbox"/>	6. Extremely	<input type="checkbox"/>

SMALL TROPICAL ISLANDS FACE SEVERE ENVIRONMENTAL PRESSURES CAUSED BY, AMONGST OTHER THINGS, CONSTRUCTION ACTIVITIES, FREE ROAMING ANIMALS AND THE EFFECTS OF CLIMATE CHANGE. THIS GOES FOR ST EUSTATIUS AS WELL.

3.2 Are you in principle **willing to pay** an additional contribution to improve the environment of St Eustatius?

1. Yes [next question]	<input type="checkbox"/>	2. No [skip next question]	<input type="checkbox"/>
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3.3 Would you have a preference for one of the following **organizations** to manage the collected funds?

1. STENAPA	<input type="checkbox"/>	4. Other non-profit organization (e.g. WWF)	<input type="checkbox"/>
2. The Government of St Eustatius	<input type="checkbox"/>	5. Other, specify:	<input type="checkbox"/>
3. The Government of the Netherlands	<input type="checkbox"/>	6. Don't know / no preference	<input type="checkbox"/>

3.4 What is the main reason you **would not be willing to pay** to improve the environment of St Eustatius (check one)?

1. No need for management of nature	<input type="checkbox"/>	5. I cannot afford it	<input type="checkbox"/>
2. Conservation is responsibility of St Eustatius	<input type="checkbox"/>	6. <input type="checkbox"/> Other: ...	<input type="checkbox"/>
3. My activities have no impact on nature	<input type="checkbox"/>		
4. This program would not be effective	<input type="checkbox"/>	7. Don't know/refused	<input type="checkbox"/>

SHOW THE EXAMPLE CHOICE CARD HERE, AND READ THE FOLLOWING TEXT

The following questions ask you to make a choice between three scenarios for the future state of the environment and atmosphere on St Eustatius. The scenarios are described in terms of the following aspects:

1. Quality of the Marine environment for recreation and tourist activities (diving, snorkelling, swimming). This takes into account reef quality (fish, algae and coral biodiversity) as well as water quality (clarity, pollution etc.).
2. Quality of the natural landscape refers to the landscape beauty and the attractiveness for recreational activities (hiking, beach visit etc.). This takes into account the vegetation quality.
3. Archaeology refers to the possibility to visit historical sites and displayed artefacts. This takes into account the management and maintenance of the site, accessibility etc.
4. Crowdedness in terms of the number of fellow tourists on the island. It takes into account the crowdedness on the beaches, dive sites, the vehicle traffic across the island etc.
5. The contribution per day is a contribution that all tourists would pay, which would be used for environmental and historical management on the island. This contribution would act as a package deal and would enable tourists to have access to every beach and national park.

You will be asked to make a choice **six times**. In each question, the options on offer will be different. Try to imagine in which situation you would prefer to be, taking into account the payment, and then choose that option. [SHOW ON THE EXAMPLE CHOICE CARD THAT THE ITEMS FOR ONE SCENARIO BELONG TOGETHER AND INDICATE THAT HE /SHE SHOULD CHOOSE ONE OF THE THREE SCENARIOS]. Be aware that none of the choices has a clear-cut best scenario and that you will need to make trade-offs between the different aspects. There are no wrong answers - we are only interested in your opinion!

Please look at the 3 options shown in the example card. To make a choice between the 3 options you should look at all of the items that shape the option (quality of marine environment, archaeology management, management fee, etc.).

- In **Option A** the quality of the natural landscape is excellent, the quality of the Marine environment is Excellent, the island has hundred visitors per day and archaeology is unmanaged, and you pay USD 25 per person per day.
- In **Option B** the quality of the natural landscape is moderate, the quality of the Marine environment is good, the island has 200 visitors per day, archaeology is managed and you pay USD 15 per person per day.
- In the **third option**, the "Expected future without extra management" option, means the threats to the environment are not dealt with and so the situation has deteriorated compared with today. The quality of the natural landscape is moderate, the quality of the Marine environment is moderate, the island has 200 visitors per day, archaeology is not managed, but there is no need to pay an additional contribution. This option will remain the same in all 6 choice questions that you will be asked.

Options A and B are different in each question. Please note that none of the options will be perfect from your point of view and that some decisions may be difficult. Every card represents a new choice and has nothing to do with the previous choice.

[FOR THE FIRST CHOICE CARD TRY NOT TO HELP THE RESPONDENT TOO MUCH, UNLESS HE REALLY DOESN'T UNDERSTAND. JUST BRIEFLY POINT OUT THE DIFFERENCES BETWEEN THE OPTIONS IF NECESSARY BUT TRY TO GIVE A BALANCED PRESENTATION. DO NOT LET YOUR VALUES AND PREFERENCES INFLUENCE THE RESPONDENT'S CHOICE!! AFTER ALL CHOICES ARE MADE, ASK

THE RESPONDENT THE FOLLOW UP QUESTIONS. IF THE RESPONDENT REFUSES TO MAKE A CHOICE, TRY TO FIND OUT WHY.]

Record the respondent's answers to each choice question in the table below.

3.5 FILL CHOICE SET NUMBER HERE	1.	2.	3.	4.
	Option A	Option B	Option C	Refused
3.6 Choice card 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.7 Choice card 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.8 Choice card 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.9 Choice card 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.10 Choice card 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.11 Choice card 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.12 Indicate on a scale of 1 to 10 how **certain** you are about your choices in the choice experiment: 1 means “not certain at all” and 10 “fully certain”.

Uncertain	↔								Certain
1	2	3	4	5	6	7	8	9	10

3.13 If you chose ‘Without management’ in each card or refused to choose, explain **why**:

1. The costs were too high	<input type="checkbox"/>
2. I am against additional contribution , no matter what it is used for	<input type="checkbox"/>
3. I think that the money will not be used as specified	<input type="checkbox"/>
4. I am not responsible for the damage to the environment	<input type="checkbox"/>
5. There are no serious threats to the environment of St Eustatius	<input type="checkbox"/>
6. The issues are more complex than these questions suggest	<input type="checkbox"/>
7. I couldn't understand the questions	<input type="checkbox"/>
8. It was too hard to make choices	<input type="checkbox"/>
9. Other , specify	<input type="checkbox"/>

3.14 How did you make your **choices**? Did you:

1. Consider all aspects simultaneously	<input type="checkbox"/>	4. Use your intuition	<input type="checkbox"/>
2. Consider a few aspects	<input type="checkbox"/>	5. Make a random choice	<input type="checkbox"/>
3. Only consider one aspect	<input type="checkbox"/>	6. Don't know	<input type="checkbox"/>

3.15 In making your choices, how important were the following **items** to you?

	Not important \longleftrightarrow Very important				
	1	2	3	4	5
1. Marine environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Natural landscape	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Crowdedness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Archaeology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Management fee	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.2 Please indicate the extent to which you agree with the following **statements**

(1 =

completely disagree; 5 = completely agree)

	Fully disagree \longleftrightarrow Fully agree				
	1	2	3	4	5
1. St Eustatius is a very safe holiday destination	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Better facilities (e.g. shops, roads) would have made my vacation on St Eustatius much more enjoyable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Litter on St Eustatius is spoiling my holiday	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. The environment on St Eustatius is well protected	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Goats and cows should NOT be fenced	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Visiting marine parks on St Eustatius should be for free	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Visiting land-based parks on St Eustatius should be for free	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. St Eustatius should promote their archaeological heritage more than it does now	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.3 Will you **return** to St Eustatius for another vacation?

1. Yes, definitely	<input type="checkbox"/>	4. No, probably not	<input type="checkbox"/>
2. Yes, most probably	<input type="checkbox"/>	5. No, definitely not	<input type="checkbox"/>
3. Not sure	<input type="checkbox"/>	6. Don't know	<input type="checkbox"/>

4.4 If there would be a **reason not to return** to St Eustatius, what would the main reason be?

1. Corals are becoming less beautiful	<input type="checkbox"/>	4. Did not feel safe	<input type="checkbox"/>
2. Natural landscape becoming less beautiful	<input type="checkbox"/>	5. I rarely return to a vacation destination twice	<input type="checkbox"/>
3. Not enough to do	<input type="checkbox"/>	6. Other, specify:	<input type="checkbox"/>

4.5 Suppose you were planning to return to St Eustatius for another vacation, would you still return if the **marine environment** were in a worse state than it currently is? (*i.e. 50% less healthy*)

1. Yes, the quality of the marine environment does not affect my decision	<input type="checkbox"/>
2. Maybe, I am sensitive to the quality of marine environment but do not know how much	<input type="checkbox"/>
3. No, without a healthy marine environment I would not visit St Eustatius	<input type="checkbox"/>

4.6 Suppose you were planning to return to St Eustatius for another vacation, would you still return if the island were **more crowded** than it currently is (*i.e. 50% more buildings and people*)?

1. Yes, crowdedness of the island does not affect my decision	<input type="checkbox"/>
2. Maybe, I am sensitive to crowdedness but do not know how much	<input type="checkbox"/>
3. No, without the current tranquillity and space I would not visit St Eustatius	<input type="checkbox"/>

Part 5: Personal and household information

Finally, I would like to ask you some questions about your expenditures and your personal situation. Please note that this information is strictly used for scientific purposes only.

5.1 In what kind of **group** did you come to St Eustatius?

1. Alone	<input type="checkbox"/>	4. With family member(s), specify # ...	<input type="checkbox"/>
2. With my partner	<input type="checkbox"/>	5. With an organised group, specify # ...	<input type="checkbox"/>
3. With a friend, specify # ...	<input type="checkbox"/>	6. Other, specify...	<input type="checkbox"/>

5.2 Who do you **share** all your expenses with on St Eustatius (*including yourself*)?

1. # _____ Adults	2. # _____ Children
-------------------	---------------------

5.3 What kind of **travel arrangement** did you book?

1. Travel package	<input type="checkbox"/>	2. Individually arranged	<input type="checkbox"/>
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CONTINUE WITH 5.6 IF RESPONDENT DID NOT BOOK TRAVEL PACKAGE

5.4 What was **included** in the package?

1. Flight from home to St Maarten	<input type="checkbox"/>	6. Dinner	<input type="checkbox"/>
2. Flight from St Maarten to St Eustatius	<input type="checkbox"/>	7. Car	<input type="checkbox"/>
3. Accommodation	<input type="checkbox"/>	8. Diving/Snorkelling	<input type="checkbox"/>
4. Breakfast	<input type="checkbox"/>	9. Other activities (tours, etc.)	<input type="checkbox"/>
5. Lunch	<input type="checkbox"/>	10. Other, specify	<input type="checkbox"/>

5.5 How much did you approximately pay in total for this **package** (Fill for most convenient unit: per person or per group indicated in question 5.1)?

1. US\$ _____ per person	or	2. US\$ _____ per group
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5.6 Please indicate the expenditures (**excluding package costs**) on the following items. The amounts should be given as expenditures **per person** during your stay on St Eustatius (*a rough estimation is sufficient and choose your preferred column for each item*).

	a. US\$ per person per day	b. US\$ per person per stay
1. Accommodation		
2. Car or scooter rental		
3. Local transportation (taxis)		
4. Tours on the island		
5. Trail tag/marine park tag		
6. Diving		
7. Snorkelling		
8. Boat / yacht rental		
9. Harbor fees		
10. Food and beverages (in restaurants)		
11. Shopping (including groceries)		
12. Donations		
13. Other, specify		

5.7 What is your **gender**?

1. Female	<input type="checkbox"/>	2. Male	<input type="checkbox"/>
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5.8 What is your **age**?

1. 18 - 25	<input type="checkbox"/>	6. 46 - 50	<input type="checkbox"/>
2. 26 - 30	<input type="checkbox"/>	7. 51 - 55	<input type="checkbox"/>
3. 31 - 35	<input type="checkbox"/>	8. 56 - 60	<input type="checkbox"/>
4. 36 - 40	<input type="checkbox"/>	9. 61 - 65	<input type="checkbox"/>
5. 41 - 45	<input type="checkbox"/>	10. 66 years and older	<input type="checkbox"/>

5.9 How many **children** do you have? *children*

5.10 What is the highest level of **education** you have completed?

1. None	<input type="checkbox"/>	5. MBO	<input type="checkbox"/>
2. Primary school	<input type="checkbox"/>	6. College/HBO/ Bachelors	<input type="checkbox"/>
3. High school / VMBO	<input type="checkbox"/>	7. University/Masters degree / other post-graduate	<input type="checkbox"/>
4. LBO, vocational school	<input type="checkbox"/>	8. Don't know/refused	<input type="checkbox"/>

5.11 Which **employment** category applies to you?

1. Student	<input type="checkbox"/>	4. Unemployed/seeking work	<input type="checkbox"/>
2. Employed	<input type="checkbox"/>	5. Retired	<input type="checkbox"/>
3. Self-employed / Entrepreneur	<input type="checkbox"/>	6. Not in the work force	<input type="checkbox"/>

5.12 What is your monthly total **Household Income before taxes in US\$?**

1. \$0 to \$1,499	<input type="checkbox"/>	6. \$5,000 to \$5,999	<input type="checkbox"/>	11. \$10,000 to \$12,499	<input type="checkbox"/>
2. \$1,500 to \$1,999	<input type="checkbox"/>	7. \$6,000 to \$6,999	<input type="checkbox"/>	12. \$12,500 to \$15,000	<input type="checkbox"/>
3. \$2,000 to \$2,999	<input type="checkbox"/>	8. \$7,000 to \$7,999	<input type="checkbox"/>	13. More than \$15,000	<input type="checkbox"/>
4. \$3,000 to \$3,999	<input type="checkbox"/>	9. \$8,000 to \$8,999	<input type="checkbox"/>	14. Prefer not to answer	<input type="checkbox"/>
5. \$4,000 to \$4,999	<input type="checkbox"/>	10. \$9,000 to \$9,999	<input type="checkbox"/>		

Annex C Nature parks and management bodies



Saba		Saba National Marine Park	The Saba National Marine Park was established in 1987. It surrounds the island stretching from the high-water mark to a depth of 60m and includes coral pinnacles, the seabed and overlying waters. It covers 820 hectares.
		Saba's Hiking Trail system and Muriel Thissel Nature Park	Saba's terrestrial park is comprised of 35 Ha of land donated to the SCF by the Thissell family in 1999. This area is locally referred to as the sulphur mine. Other protected areas include the portion of Mt. Scenery above 550m (no dwellings can be constructed) and the 14 trails (public easements on private property).
St Eustatius		Statia National Marine Park	The St. Eustatius National Marine Park includes the waters around the island from the high water mark to the 30m depth contour. It was designated in 1996 and is approximately 4,700 hectares including two actively managed no fishing zones.
		Quill and Boven National Park	Comprises a dormant volcano, the Quill, and Boven, an area of hills on the northern tip of St. Eustatius. The trails to, in and around the Quill have been open since 2000. It was established in 1997 and covers 540 hectares including lush secondary rain forest and almost all of the 482 wild plant species found on the island.
		Botanical Gardens	The Botanical Gardens cover an area of 5.3 hectares

Figure 5 Nature parks on Saba and St Eustatius with corresponding management bodies (STENAPA, 2009).

Annex D List of SIDS characteristics

Box 2. Characteristics of SIDS leading to their vulnerability.

- Geographical isolation
- Small physical size
- Ecological uniqueness and fragility
- Rapid human population growth and high densities
- Limited natural resources
- High dependence on marine resources
- Sensitivity and exposure to extremely damaging natural disasters
- Susceptibility to climate change and sea-level rise
- Small domestic market and high dependence of exports
- Limited terrestrial natural resource endowments and high import content
- Small economies with limited diversification possibilities
- Inability to influence international prices
- Peripherality (related to remoteness and isolation): high per unit transport costs, marginalisation, uncertainties of supply, need to keep large quantities of stocks)
- Trade vulnerability: High dependence on trade taxes, vulnerability of domestic industries, dependence on trade preferences, inability to utilise the TRIPS agreement (Agreement on trade-related aspects of intellectual property rights), dispute settlement mechanism or accession
- Limited ability to exploit economies of scale
- Limitations on domestic competition
- Difficulties in absorbing FDI (foreign direct investment)
- Limited investment opportunities, including in communication services
- Problems of public administration
- Dependence on external finance
- Remittances

(List compiled from various sources: Kaly et al. (2002), UWICED (2002), Barbados Program of Action (1994), Witter et al. (2002))

Figure 26 List with characteristics of SIDS (China, 2003: 144)

Annex E Example Choice Card used in tourist survey
















Version 1 - Example card			
	Option A	Option B	Expected future without extra management
Natural landscape	 Excellent	 Moderate	 Moderate
Coastal waters	 Excellent	 Good	 Moderate
Crowdedness	 100 visitors per day	 200 visitors per day	 200 visitors per day
Archaeology	 Managed	 Managed	 Unmanaged
Contribution	 \$25 per day	 \$ 15 per day)	 \$ 0 per day

Figure 27 Example card used in the tourism CE on Saba and St Eustatius.

Annex F Travel packages

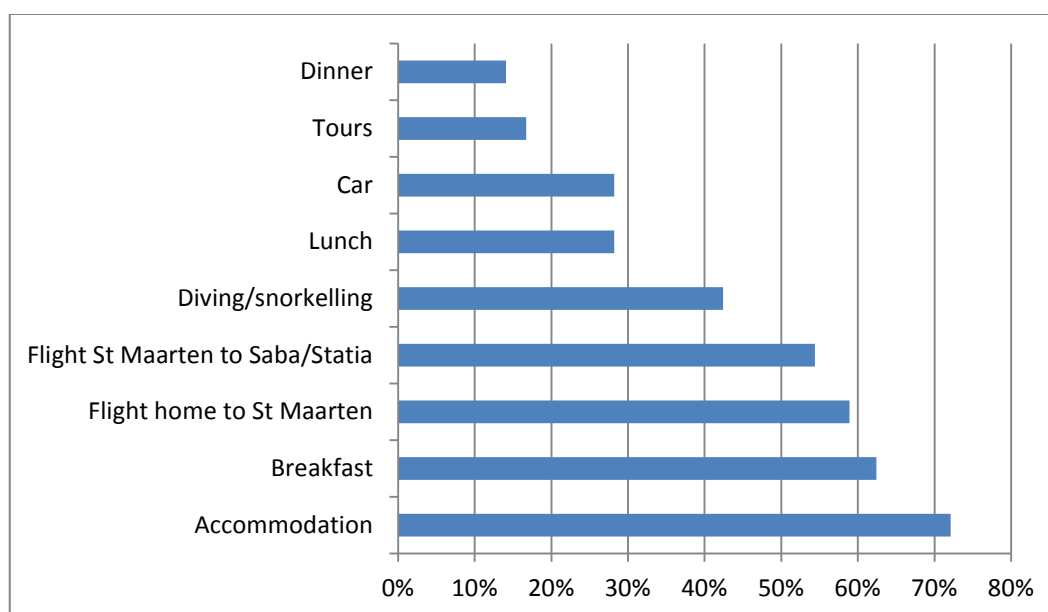


Figure 28 From the respondents that bought a package, the percentages are presented per item that was included in the package of the respondents.

25 percent of the respondents bought a travel package and 78.7 percent (74 respondents) of these respondents that bought a package, filled in how much the package had cost. The mean package cost is 1,439.61 USD, but the standard deviation is very high, namely 1,325.60 USD.

Annex G Mean daily expenditures day and stay-over tourists

Table 15 Mean daily expenditures of day tourists and stay-over tourists.

	Mean daily expenditures	N	St. deviation
Day tourists	\$54.46	65	75.56
Stay-over tourists	\$146.73	326	183.11

Table 16 Mean expenditures per category of day tourists and stay-over tourists.

Day tourists		Stay-over tourists	
	Average expenditure per day		Average expenditure per day
Diving	\$3.92	Diving	\$13.36
Snorkeling	\$0	Snorkeling	\$4.12
Island tours	\$1.62	Island tours	\$1.40
Boat rental	\$15.62 (ferry)	Boat rental	\$6.61
Harbour fees	\$0.89	Harbour fees	\$0.39
Food & beverages	\$17.43	Food & beverages	\$35.88
Shopping	\$10.31	Shopping	\$14.61
Local transport	\$4.22	Local transport	\$5.32
Accommodation	\$0	Accommodation	\$59.50
Car/scooter rental	\$0	Car/scooter rental	\$3.89
Donations	\$0.46	Donations	\$1.38
Total p.p./p.d	\$54.46	Total p.p./p.d.	\$146.73