

**The local recreational and cultural value of
nature on Saba**

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List of abbreviations

CE	Choice experiment
CI	Confidence interval
CM	Choice modelling
CVM	Contingent valuation method
IVM	Institute for Environmental Studies Amsterdam
SCF	Saba Conservation Foundation
SIDS	Small Island developing states
TEV	Total economic value
WTP	Willingness to pay

Summary

This thesis is part of the project ‘What is Saba’s nature worth?’ a collaboration between the IVM, VU University Amsterdam and Wolfs Company. The aim of this study is to value the nature of Saba, a small Dutch Caribbean island. This small island faces a number of threats, which can harm the environment. Saba is home to unique ecosystems and its inhabitants have a strong link with their natural environment. The scope of this research is to determine the recreational and cultural value of this natural environment on the island to its residents with the use of economic valuation methods. Saban inhabitants were interviewed, during a household survey, on how much they are willing to pay for nature management on their island. The willingness to pay was determined by a choice experiment conducted as part of the household survey. With the choice experiment, the annual willingness to pay (WTP) per household for additional environmental management can be determined. The analysis shows that more than half of the respondents on Saba are prepared to pay for nature management on the island. The total WTP per year of all Saban residents for additional environmental management is 143,201 USD. This WTP is attributable to the different aspects that are considered in the experiment: the coastal waters, the natural landscape on the island, the Saba Bank and the management of free-roaming goats on the island. All aspects are valued positively by Saban households. The research furthermore creates insight in the perception of Saban residents on the natural environment on their island.

1 Introduction

1.1 Aim of this study

Worldwide a concern about the degradation and destruction of the environment, its ecosystems and biodiversity is growing. Ecosystems and biodiversity provide a wide range of useful products and services that enhance human welfare. Degradation of these services would significantly affect human wellbeing (Pagiola *et al.*, 2004). The services and/or products of which humans benefit are called *ecosystem services* (Millennium Ecosystem Assessment, 2005). These ecosystem services are the link between people and the natural environment surrounding them (Goldman, 2010). Societies have developed in close interaction with surrounding nature, which has influenced the culture of humanity. Cultures, religion, enjoyment and recreation have always had a direct relationship with the surrounding nature and its conditions. Loss of cultural valued ecosystems can lead to social disruptions. Many cultural and amenity services are not only direct and indirect of importance to humans, they also represent a significant economic resource, e.g. nature- and culture-based tourism (Hassan *et al.*, 2005).

A strong relationship between humans and nature is seen on (small) islands. This study was conducted on a small Dutch Caribbean Island named Saba (Figure 1). This rocky island is small and can be classified as very similar to the so called 'Small Island Developing States' (SIDS) (van Beukering *et al.*, 2007). SIDS are impacted by various threats to the environment on a higher level compared to a mainland area. In other words, there is strong link between social and ecological resilience, especially in communities that depend on the services or resources for their livelihood (Adger, 2002). Pressures caused by human activity and natural events influence this resilience and the recovery of nature (van Beukering *et al.*, 2007).



Figure 1 Map of Saba (13 km²)

Saban nature contains unique biodiversity including some endemic species, e.g. the Saban Anole and the Saba Least Gecko. An alien specie can cause a lot of damage on the terrestrial and marine environment of an isolated small island such as Saba. The resilience of a small island ecosystem is not that strong in comparison to a bigger island or a mainland ecosystem. The threat is bigger as a result of Saba's isolation. The island is influenced by the strong interaction between ecosystems and pressures influencing an ecosystem can indirectly affect the other interconnected ecosystems

(van Beukering *et al.*, 2007). The tourism industry on Saba is largely focused on recreational activities in nature; diving, snorkelling and hiking. Saban fisheries highly depend on the fish stocks in the Saba Bank area. Therefore threats to the natural environment of Saba can have economic and social impacts; it can lead to a loss of jobs and income aside from the degradation of a unique ecosystem.

Since the 10th of October 2010 Saba became a special municipality of the Netherlands. This new status affects local legislation, policies and regulations surrounding the environment. Therefore, it is crucial to understand how important the link is between Saban nature, Saban economy and thereby human wellbeing (Daily *et al.*, 2009). Putting a financial value on environmental and/or social impacts increases the chance that these effects can be taken into account by (Saban and Dutch) decision makers (de Groot *et al.*, 2010). This could result in better decisions related to the use of natural capital (Daily *et al.*, 2009).

To express the importance of the natural capital of Saba, the value of its ecosystem services should be determined. Valuation of ecosystem services can be used to illustrate the importance of services to the daily lives of Saban people and the Saban economy (Goldman, 2010). This study aims to determine the economic value of Saba's nature. As mentioned, the nature of Saba is very unique. And its natural capital provides opportunities for recreational activities by hiking or just enjoying the landscape. People also identify themselves with their surrounding environment; the resulting culture of the population is hereby largely influenced (de Groot *et al.*, 2002). Nevertheless, most humans are not totally aware of these local cultural and recreational values provided by the Saban ecosystems. To investigate the value inhabitants of Saba attach to these services, this study will try to answer the question:

What is the recreational and cultural value of the marine and terrestrial ecosystems of Saba to its inhabitants?

This study is part of the project 'What is Saba's nature worth?' This project is a collaboration between the Institute for Environmental Studies (IVM) from the VU University Amsterdam and research agency Wolfs Company from Bonaire. The project is commissioned by the Dutch Ministry of Economic Affairs and the research is a contribution to 'The Economics of Ecosystems and Biodiversity Netherlands' (TEEB Netherlands) study.

The aim of the project is to get an insight in the socio-economic importance of ecosystem services on Saba. Saba faces several environmental pressures, erosion and pollution among others. Threats to Saban ecosystems can influence the Saban economy in a negative manner. Gaining knowledge about possible impacts on a social and economic level is essential in order to make well-founded decisions for nature management and the economy. The aim of the project 'What is Saba's nature worth?' is to address the most relevant ecosystems and including services to determine the Total Economic Value (TEV) of Saba's nature.

Scope

The focus of this study is on the local recreational and cultural value of Saban citizens. Saba is called 'The Unspoiled Queen' by the locals which implicitly shows how proud Sabans are of their island. This pride is also reflected in the lyrics of the national anthem of Saba¹.

¹ Information provided by Saba Tourism

To contribute the more intangible recreational and cultural value to the TEV of Saba's ecosystems, a Choice Experiment in combination with a survey was performed. In total, in order to determine the Willingness To Pay (WTP) for additional nature management, 301 inhabitants were interviewed for this study (van Beukering *et al.*, 2007). The WTP of the interviewed Sabans provide a monetary value of the recreational and cultural services. Besides the WTP, the interviews will also help to gain insight in recreational and cultural participation of locals. Saba's ecosystems, its corresponding services and threats are presented in Table 1 (Meesters *et al.*, 2010). In this table both terrestrial and marine ecosystems services are included (TEEB, 2005, MEA 2005).

Table 1 In this table the recreational and cultural services per ecosystem and their corresponding threats on Saba are presented

Ecosystem	Services	Threats
Marine ecosystems		
Coral	Recreational (e.g. diving & snorkelling) Cultural (e.g. heritage-value)	Overfishing, Anchoring, Water sports, Oil spill, Marine litter, Invasive species (e.g. Lionfish), Climate change, Eutrophication, Run-off, Hurricane
Saba Bank	Recreational (e.g. fishing) Cultural (e.g. scientific discovery)	Overfishing, Anchoring, Water sports, Oil spill, Marine litter, Invasive species (e.g. Lionfish), Climate change, Eutrophication, Hurricane, Pollution
Coastal area (harbour & beaches)	Recreational (e.g. visit beach) Cultural (e.g. cultural activities)	Littering, Oil spill, Erosion, Pollution
Terrestrial ecosystems		
Elfin forest/cloud forest	Recreational (e.g. hiking, enjoying scenery) Cultural (e.g. cultural landscape, medicinal plants)	Littering, Pollution, Roaming animals (goats, Guinea Pigs), Invasive species (e.g. <i>Coralita</i>), Construction activities
Rain forest	Recreational (e.g. hiking, bird watching) Cultural (e.g. cultural landscape, medicinal plants)	Littering, Pollution, Roaming animals (goats, Guinea Pigs), Invasive species (e.g. <i>Coralita</i>), Construction activities
Dry Forest	Recreational (e.g. walking, enjoying scenery, bird watching) Cultural (e.g. cultural landscape)	Littering, Pollution, Roaming animals (goats, Guinea Pigs), Invasive species (e.g. <i>Coralita</i>), Construction activities

1.2 Background Saba

Saba is a small Caribbean island located in the Leeward region (Figure 2). Saba has a surface of 13 km². The Saba population consist of 1991 inhabitants (Jan, 2013 CBS), which also includes between 400 to 500 medical students. The island is a special municipality of the Netherlands since 2010. Before 2010 it was part of the former country 'Netherlands Antilles' or 'Dutch Antilles' together with the islands St. Maarten, St. Eustatius, Bonaire, Curaçao and Aruba before 1986 (NOS, 2009). Dutch is the official language but English is the daily spoken language. Columbus first discovered the island in the 1493 but it took until 1635 before the first people settled on the island. Saba as a colony changed many times from motherland and the current mixed population is a result of this. Since 1816 the island is part of the Kingdom of the Netherlands (SabaTourism, SabaGuide). Together with St. Eustatius and St. Maarten it was categorized in the group of the 'Windward Islands' until 1983.

The island consists mainly of a non-active volcano which is called 'Mount Scenery'. At 877 metres this volcano is the highest point in the Netherlands. Due to its volcanic structure the island has rocky steep shores and has only two beaches; Cove Bay (constructed) and Well's Bay (seasonal). The temperature is between 27 °C and 32 °C all year round. The rainforest and the low hanging clouds around the top of Mount Scenery make the climate very moist. Because of the climate characteristics Saba is a green island with a rare 'Elfin forest' on top of Mount Scenery. The vegetation on the island varies from Elfin forest to Woodland and dry vegetation near the shores (SabaTourism). The population of Saba is a mix of nationalities (Dutch, English, Irish, Scottish and African) as results of the history. This population is mainly divided amongst four small villages: Hell's gate (or Zions Hill), Windward side, St. Johns and the Bottom (the capital). The harbour called 'Fort Bay' helps to gain access to the island together with the smallest commercial airport in the world; Juancho E. Yrausquin Airport. The only road on the island is called 'The Road' and was built in 1958. The houses on Saba are unique in the Caribbean area and are now nominated for the UNESCO World Heritage Site (SabaTourism).



Figure 2 Location of Saba in the Caribbean region

Another part of the island is the Saba Bank; which is an atoll² located approximately 3 till 5 km southwest of Saba (Meesters *et al.*, 2010). This is one of the largest atolls in the world with its 2000 km² surface and contains rare and unique species; turtles,

² An atoll is a ring-shaped coral reef including a coral rim that encircles a lagoon partially or completely

sharks, lobsters, whales and coral. The Saba Bank is part of the Saba Marine Park and therefore a protected area, e.g. anchoring is not allowed. Because of Saba's special municipality the Bank has become an 'Exclusive Economic Zone' of the Netherlands, whereby the Kingdom is responsible for the total area and its exploitations including the protection of the Saba Marine Park. The Saba Bank is important for the fisheries sector of the island. The other main income streams of Saba are generated by tourism and the medical school (established in 1986). The nature management body on Saba is the Saba Conservation Foundation (SCF), a non-governmental organisation that is a member of the Dutch Caribbean Nature Alliance (DCNA). This foundation was established in 1987 and is responsible for the management of the Saban National Parks; Saba National Land Park and Saba National Marine Park. Additionally the hiking trails on the island are under supervision of the SCF (SabaPark).



Figure 3 Logo of SCF

2 Methodology

2.1 Theoretical background

The ecosystem services are based on environmental economics. This study refers to ecosystem services as formulated in 2005 by the Millennium Ecosystem Assessment (MEA, 2005): '*Ecosystem services are the benefits people obtain from ecosystems. An ecosystem can be formulated as: 'a dynamic complex of plant, animal and micro-organism communities and their non living environment interacting as a functional unit'*'. Services can be tangible and intangible benefits humankind gains from ecosystems. The MEA posits that there is an interaction between people and ecosystems and changes to the latter influence human wellbeing. The formulation by MEA was derived from other formulations designed by two other researchers, Constanza *et al.* (1997) and Daily (1997); both referring to 'services' or 'semi-public goods'(MEA, 2003).

Many ecosystem services are 'public goods'; meaning they are either non-rival and/or non-excludable to consumers (Lead *et al.*, 2009). As a result, these goods do not have a market price and use-levels are difficult to regulate (TEEB, 2010) with no clear property rights, leading to overuse by people. An ecosystem with 'public goods' can collapse, which is known as the theory 'the tragedy of the commons' (Milinski *et al.*, 2002). In this study the recreational and cultural services can be described 'public goods' or 'quasi public goods'. For example people on the island can make use of the hiking trails without paying for it (non-excludable and non-rival). Public goods are considered as market failures and environmental economists are using welfare economics to identify these failures and recommend policies and decision makers to correct these. The efficient use of services provided by the environment is beneficial for the economy (Perman *et al.*, 2003). In order to find this efficiency the 'values' of these goods and services have to be determined. The theory of environmental valuation techniques rests upon the consumer behaviour theory. In this theory preferences by humans can be represented by utility functions. Utility is a measure in which the relative contentment by a person of a good or service is expressed. This environmental economic approach is an anthropogenic view on ecosystem services. The TEV scheme (Figure 4) retrieved by van Beukering *et al.*, 2007 is recognizes two main categories of values: *use and non-use values*.

'Use values' are mostly tangible services, and can be subdivided in 'direct' and 'indirect'. The first category, 'direct use values' refer to services that people can use directly. Thus, people benefit from this service in a direct manner. As an example timber fits in this category, as well as fresh water for drinking. Services as 'coastal protection' or 'carbon sequestration' are indirect use values; humankind is benefiting from these services but not in a direct way. 'Non-use values' are most of the time 'intangible' to humans and in general people are less aware of them. Non-use values can be divided into two groupings; bequest and existence values. Bequest value represents services experienced only by future generations, e.g. avoided damage from climate change. Existence value refers to the intrinsic right of species. The last value category is the option value; which can be classified in use- as well as in non-use values. This refers to services that can become important in the near future, e.g. medicinal purposes of plants.

The contribution of this study to the TEV framework in Figure 4 communicates to the sections direct use and non-use values. Recreational and cultural services are found in direct use values and in non-use values. The preference for an environmental good is

measured by the WTP of the respondent. The economic value is then measured by the summation of all respondents' WTP (Pearce *et al.*, 1993; Kahneman & Knetsch, 1992).

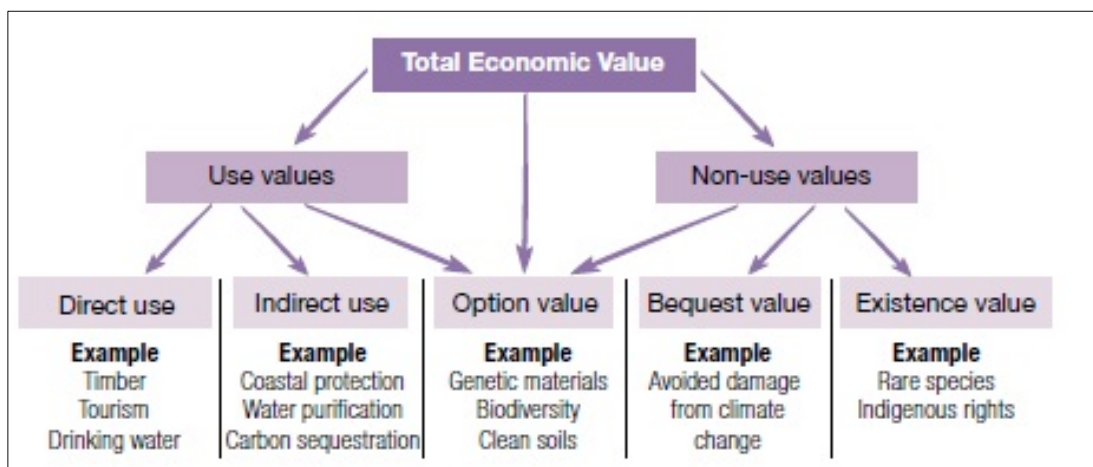


Figure 4 Framework of the Total Economic Value (TEV). Only direct use values and non-use values are determined for this research.

2.2 Choice modelling

The best valuation technique for recreational and cultural services on a SIDS island is 'choice modelling' according to van Beukering *et al.*, 2007 and TEEB, 2010. With this technique respondents are asked in an indirect way for their WTP with the use of a choice experiment. The Saba respondents will be asked to choose between different scenarios presented on a choice card. A combination of attributes (environmental services) with different levels forms a scenario, and one of the attributes has to be the payment vehicle (TEEB, 2010). This payment attribute can be a tax or a fee but in this case it is defined as a contribution. In this way trade-offs between different attributes can be observed by the respondents choice involving a payment for a particular scenario with particular levels for different attributes (Lacle *et al.*, 2012).

2.2.1 Design of the choice experiment: attributes

Five attributes are used in this study representing topic important in the conservation of the natural environment of Saba. Both marine and terrestrial ecosystems are included in these attributes used for the household choice experiment. The attributes were adapted from previous studies. The attributes with their corresponding levels are presented in Table 2.

Table 2 Attributes of the choice experiment and corresponding levels

Attribute	Level 1	Level 2	Level 3	Level 4	Level 5
Natural landscape	Poor	Moderate	Excellent	-	-
Quality of coastal waters	Poor	Moderate	Good	Excellent	-
Free roaming goat management	Free roaming	Fenced	-	-	-
Quality of the Saba Bank	Poor	Moderate	Good	Excellent	-
Contribution per year	\$0	\$24	\$60	\$180	\$500

One of the attributes, the ‘payment vehicle’, was not formulated as a ‘fee’ but as a ‘contribution’. This change of formulation was decided after a research trip made by Wolfs Company to Saba and the seminar with the local stakeholders. The choice for the wording ‘contribution’ is so that there would be no connotation with the government by using the word tax and fee. Two other attributes that were adapted after the stakeholder seminar include ‘quality of coastal waters’ and the ‘quality of the Saba Bank’, the stakeholder seminar also lead to adaptation of pictograms. The attributes will now be explained in more detail:

- The natural landscape attribute refers to the overall quality of the terrestrial landscape on Saba. This includes vegetation quality, pollution, the landscape beauty as well as the attractiveness for recreational and cultural activities for Sabans (e.g. hiking). Used in the drawings is Mount Scenery as that is the specific landscape view for Sabans. To keep the choice simple only three levels were used: poor, moderate and excellent.
- This attribute was used to describe the quality of the waters that are surrounding the Saban coast. Hence, the attribute included the reef quality (fish, algae and coral biodiversity) and the water quality (clarity) and is representing recreation activities by Sabans, e.g. diving, snorkelling, swimming, and fishing. Four levels of this attribute were used: poor, moderate, good and excellent.
- This attribute refers to management options to control free-roaming goats on Saba. Free-grazing animals are causing damage and are increasing erosion. After the seminar it became clear that there is a division among Sabans about this problem. It was interesting to investigate if there was a preference by Sabans to manage this problem, which is why two straightforward levels were presented on the choice cards: Free roaming and fenced.
- This attribute was similar to the ‘quality of coastal waters’ as it refers to the health of the Saba Bank, so the health of life as well as the water was taken into account. Biodiversity is related to a healthy ecosystem. The Saba Bank is included in the choice experiment because it is important for the island’s economy and its culture. The same levels as ‘quality of coastal waters’ were also used here, namely, poor, moderate, good and excellent.
- This is the payment vehicle of the choice experiment. It represents a monetary contribution that all Saban households would make, which would be used strictly only for environmental management on the island. It describes the change in a yearly household income as a payment for a specific scenario. Five different levels were used: \$0, \$24, \$60, \$180 and \$500 per year. Additionally the contribution per month was presented on the cards.



2.2.2 Choice sets

The choice cards for the choice experiment were composed in a program called Sawtooth. In total, eight choice sets were designed. Each choice set consisted of 6 choice cards and 1 explanation card or example card, which is shown in Figure 5. On each card there was a choice to make between three scenarios: A, B and C. The first two scenarios A and B, changed on every new choice card, the levels of the attributes differ per card. Whilst, option C or the '*expected future without extra management*' was the same in all six choice cards. This scenario included only the first level of each attribute.
















Version 3 – Example Card			
	Option A	Option B	Expected future without extra management
Natural landscape	 Excellent	 Moderate	 Moderate
Coastal waters	 Excellent	 Moderate	 Moderate
Livestock management	 Fenced goats	 Fenced goats	 Free roaming goats
Saba Bank	 Excellent	 Good	 Poor
Contribution	 \$600 per year (\$40 per month)	 \$180 per year (\$15 per month)	 \$ 0 per year (\$ 0 per month)

Figure 5 Example card of the choice experiment. This card was used to explain the choice experiment to respondents

2.3 Household survey

The household survey was conducted between May and June in 2013. These surveys were collected by Master students who worked together with an interview team, mostly inhabitants of Saba. This household survey of Saba was combined with the choice experiment. The combination was needed to give possible explanations for the respondents choices made with the choice experiment and vice versa. The survey was adapted from the household survey of last year's research on Bonaire (Lacle *et al.*, 2012). After a seminar with local stakeholders the survey was completed and ready for a pre-test phase. This pre-testing phase was necessary to verify possible difficulties of the survey and could also indicate the time needed per survey. Due to time constraints only four people were tested in this pre-testing phase together with the opinion of members of the interview team. After addressing the difficulties of the testing phase the survey was adapted. Some formulations of questions were changed. Ultimately, the survey consists of 30 questions (Appendix A) and the structure was as follows;

- General questions about origin and household composition
- Environmental questions including possible threats to environment on Saba.
- Choice experiment
- Statements about nature and culture
- Recreational participation of respondents
- Provisioning services questions including local fish and medical plants
- Saba Bank knowledge
- Recreational fishing by respondent
- Demographics of the respondent

2.3.1 Collecting data

The total number of respondents is 301, which is 1 more than the set target. As explained earlier, an interview team conducted the surveys. All interviewers were instructed during a training course given by two master students. The interviewers received 15 surveys, a choice set and an interview protocol per time. After conducting 15 surveys by the interviewer the results and the choice set were collected by the research team. Then a new package of 15 surveys and a new Choice Experiment set was given back to the interviewer. This was done to be sure that the 8 versions of the Choice Experiment were evenly used among the 301 surveys, so a distribution of ~37/38 per version would be equal. As there was no data available about households per village, the respondents were approached by the research team using their own network. However, with 301 households being interviewed, it is safe to say that approximately 30 percent of all households on the island were interviewed. The raw data of the surveys were entered in Microsoft Office Excel 2007; this program was also used for creating graphs and tables. After cleaning the raw data in Excel the data was imported in IBM SPSS version 21.0 for statistical analysis. The Choice Experiment (CE) results were separately analysed.

2.4 Difficulties

During the research some difficulties did occur. The first thing was the limited amount of time to collect the data. The time frame was roughly six weeks. The data used for comparing the collected sample was retrieved from the Central Bureau of Statistics (CBS) from the Caribbean Netherlands. Unfortunately, there is no recent data about household numbers on Saba. Data found in Statistical Yearbook of the Netherlands Antilles of 2009 was used to calculate the current household numbers. Secondly, approaching people for this survey was sometimes hard since more surveys are collected on Saba. People on Saba get questionnaires of other studies the whole year around and are a bit sceptical about a new survey. With the help of our (local) interviewers approaching possible respondents became easier. The last difficulty was the acceptance of this research. There was an overall feeling that other problems had a higher priority than the valuation of Saba's nature. The acceptance changed positively during the time the research team was staying on the island and explained the purpose and goal of the study.

3 Analysis and results

3.1 Sample and representativeness

As was explained in section 2.4.1 the goal was to conduct an equal distribution of the 8 choice sets versions. Thus a distribution of ~37/38 per version would be equal. Figure 6 indicates that version number 1 and 3 are overly represented compared to version 5, 6 and 7. This dissimilarity is not likely to affect the results of the choice experiment.

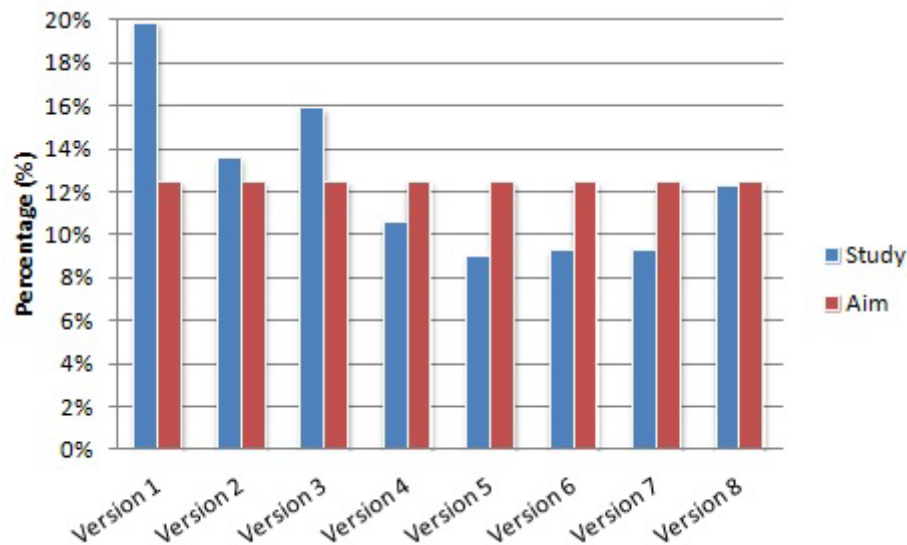


Figure 6 Division of the choice sets

Saban population

To find out if this sample is representative for the island, it has to be compared with the socio-demographic data of the Saban population. The data used for this comparison is retrieved from CBS Caribbean Netherlands as explained in section 2.5. The characteristics *gender* and *age* are compared with the CBS data from 2013 and almost no difference is observed. Comparing the age categories the younger ages are more present within the sample, which corresponds well with the CBS data (Figure 8). The Saban population is a mix of nationalities. About 31% of respondents are originally from Saba, other respondents are mostly from other the Caribbean islands, North America or from the Netherlands mainland. The most recent data about the origin country of Sabans is from the year 2011. Although, immigration/emigration has an influence on the population nationalities, the collected sample represents the population nationalities quite well (Figure 9), although North America and the Netherlands are overrepresented, whilst Latin America and Former Netherlands Antilles are underrepresented. When incomes of the respondents are compared with CBS data from 2012, two categories are underrepresented ' \$0 – \$1001' and '\$1501-\$2001' (in US dollars before taxes) (Figure 10).

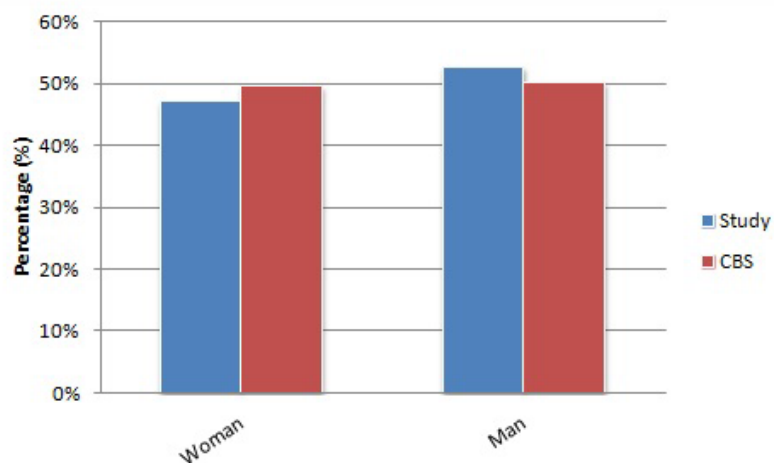


Figure 7 Comparison of 'gender' between the collected sample and CBS data from 2013

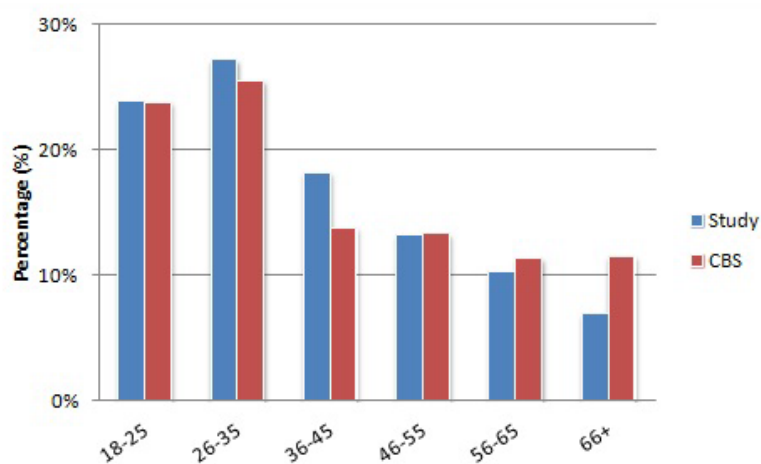


Figure 8 Comparison of 'age' between the collected sample and CBS data from 2013

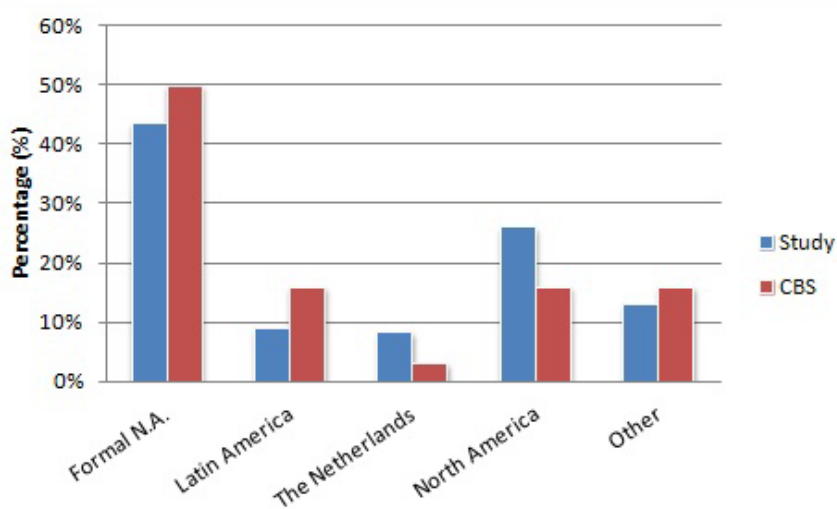


Figure 9 Comparison between the origin of the collected sample and CBS data from 2011

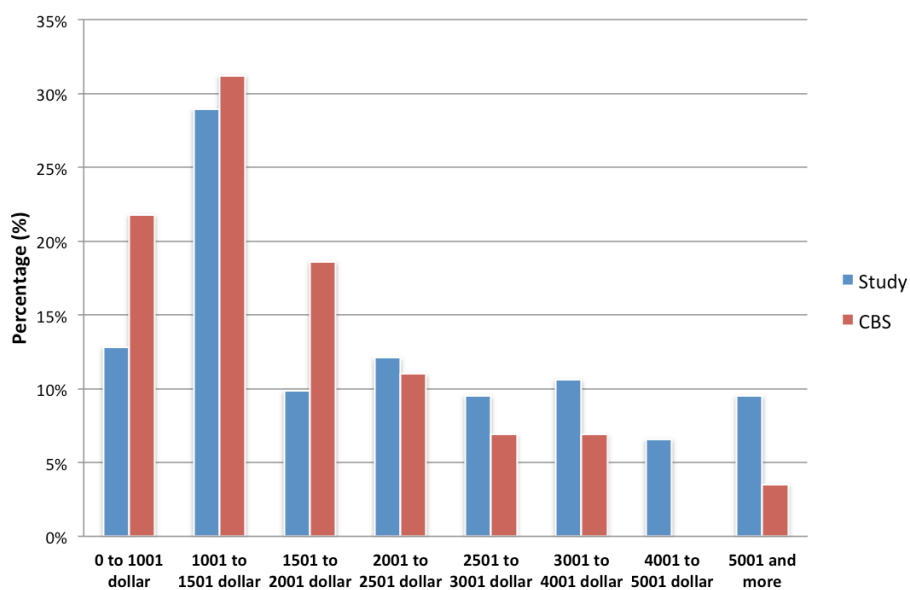


Figure 10 Income of the respondents compared with CBS data from 2012

3.2 Experience of nature by residents of Saba

In the survey sections focusing on environmental awareness, recreation and specifically the Saba Bank were inserted in order to analyze the connection Sabans have with the surrounding ecosystems and their corresponding services.

Environmental Awareness

The first question is about the perception of environmental awareness of Saban people. From Figure 11 one can see that 45 % of respondents see themselves as environmentally aware on an average level and 26% as more than average. Altogether, a high percentage of the Sabans consider themselves environmentally aware, only 15% consider themselves aware on a less than average level.

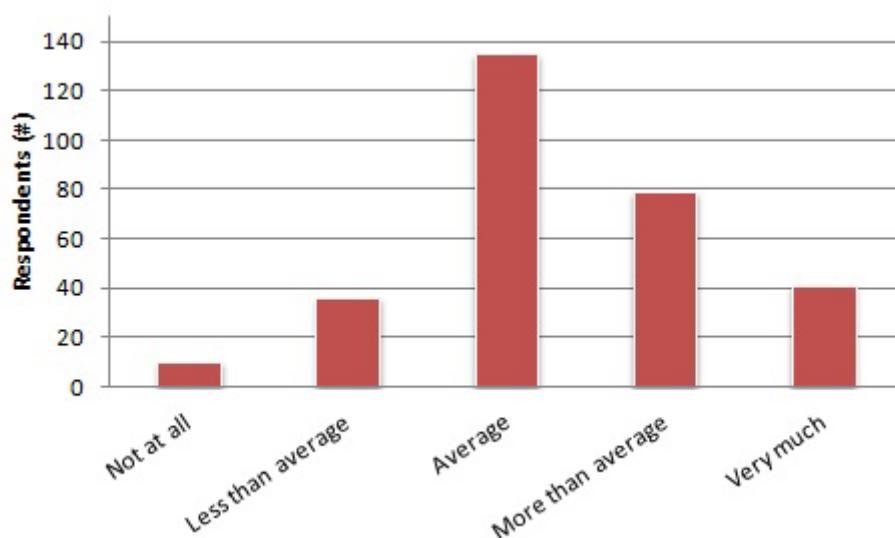


Figure 11 The environmental awareness considered by respondents

The respondents were questioned about the environmental activities they are involved in to avoid degradation of nature in a timeframe of one year. The activities mostly participated in are 'avoid littering' (95%), 'buy locally produced fruit and vegetables' (75%) and 'purchase environmentally friendly products' (64%) (Figure 12). The activity that is performed the least by respondents is 'donate money to an environmental cause' (13%). Additionally a Pearson correlation test was conducted between the amount a respondent participates in the environmental activities and if the respondent was 'born on Saba' or 'not born on Saba'. A respondent 'born on Saba' participates less in environmental activities than a respondent 'not born on Saba' at a significant level of 0.01 with a Pearson correlation of -0.210.

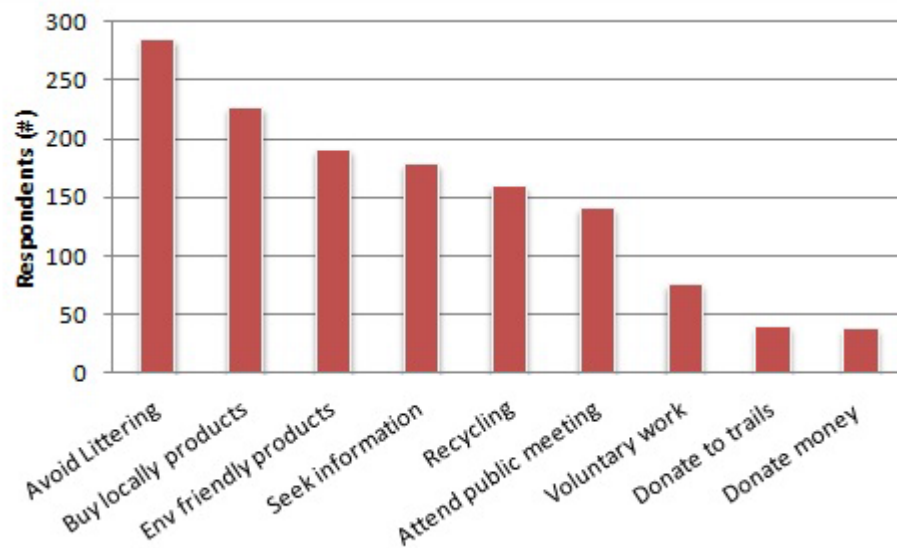


Figure 12 Environmental activities done by respondents in the last year

The section about environmental awareness also contains a question about the perception on potential threats to the Saban environment. The respondents were asked to score a list of sixteen potential threats on a scale from 1 (not important at all) to 5 (very important) or with 0 (don't know). In addition to this the respondent received the option to mention another threat that was not included on the list. Weights were assigned to these scores in order to convert the rating to a score between 0 and 10. This weighting system is adapted from previous studies (van Beukering *et al.*, 2009). Score 1 was rewarded 0 points, 2 was rewarded 3 points, 3 was rewarded 5 points, 4 was rewarded 7 points and 5 was rewarded 10 points. Figure 13 presents the list of threats with the corresponding new scores. One can see that the most important threat stated by Sabans is a potential oil spill. This threat is referring to the oil terminal on neighbour island St Eustatius and to oil tankers. Solid waste is the second most important problem. Plastic bottles can routinely be seen along the roads and on hiking trails. No waste separation takes place on the island. All waste is sent to the landfill and subsequently burned. The other three problems in the top 5 are common problems on most of the Caribbean island in the Leeward area. Hurricanes, for example, are a constant threat to these islands. Additionally, free grazing by animals is a common Caribbean island problem. Some of the potential threats are not a concern among the Sabans, e.g. diving & snorkelling and free roaming guinea pigs and rabbits. This might be due to a lack of awareness on the possible impact of these two threats if not managed correctly.

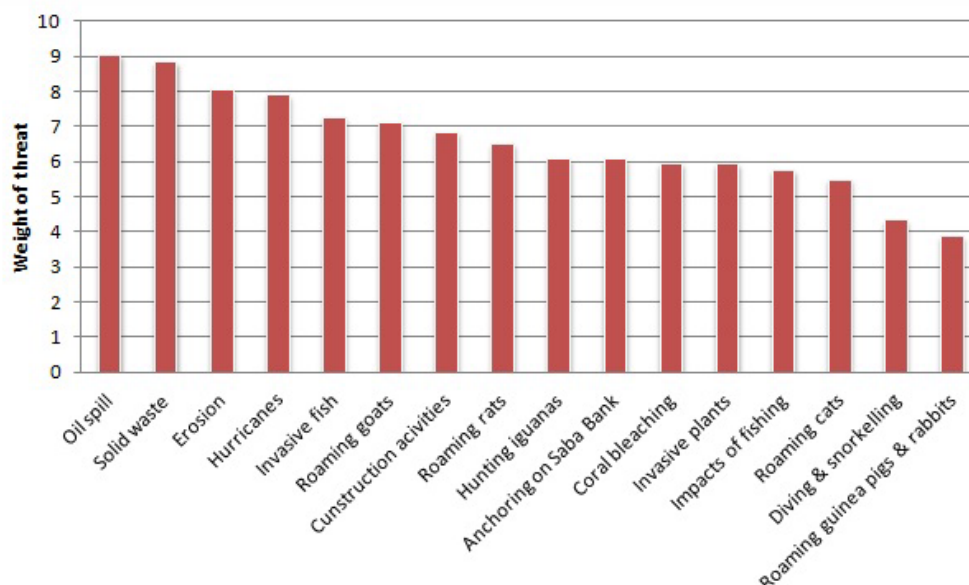


Figure 13 Threats ranked from most important to least important by Sabans

Environmental statements

In section IV of the survey a question with seven statements was included. Five out of the seven statements were about the connection between Saban people and nature and two were about unique Saban houses as a cultural aspect on Saba. People had to respond to these statements with whether they agree or not agree (on a Likert scale) and were subsequently ranked (van Beukering *et al.*, 2009). The results where most are in agreement: statement number 2, 'Healthy nature is crucial for my family and me', with which 64% of respondents totally agree, statement number 4, 'The nature on Saba is important for the island economy', with which 72% of the respondents agree. What is prominent is that most respondents disagree with statement number 1, 'As long as the animals don't destroy my property, they're not my problem', this might point to the solidarity in the Saban culture and that the problem is seen as a communal problem. People of Saba are proud of the unique Saban house architecture and this is also reflected in the responses to the statement where most of the respondents say that the typical Saban houses are important to them.

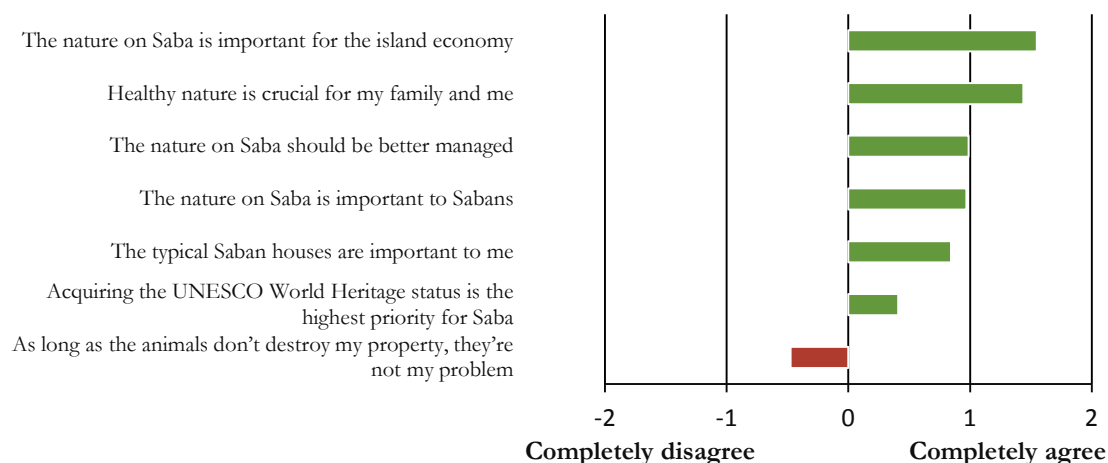


Figure 14 Responses to various statements proposed to the respondents. Answers ranging from -2 (completely disagree) to 2 (completely agree)

Saba Bank

A section about the Saba Bank was included to see if people are aware about the uniqueness of this area and if they see the importance of the Saba Bank to the island. First people were asked if they had heard about the Saba Bank of which 84% responded with 'yes'. When people answered positively to this question they were asked what they could tell about this area; the interviewer had a checklist in front of him/her and checked the words while people were telling what they know about the Saba Bank. This checklist included among others the biological uniqueness (e.g. sharks and dolphins), 'research' but also other connections between the Saba Bank and the island economy (Figure 15). Most of the people are aware that the Bank is important for the Saban fish sector and that it contains a high biodiversity (Figure 15). However, more detailed information such as species and regulations such as anchoring were less frequently mentioned. Additionally, the respondents did not mention the diving sector as much as an important aspect of the Saba Bank.

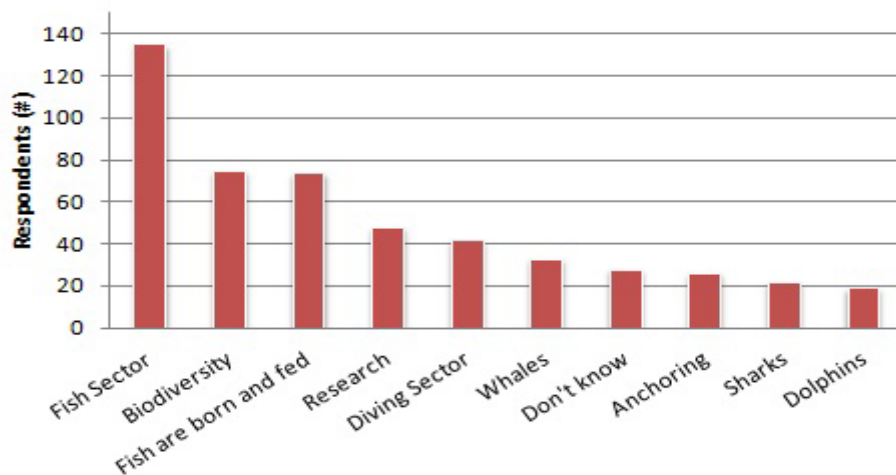


Figure 15 The ranking of what the respondents think is corresponding with the Saba Bank area

Recreation

To determine the recreational and cultural value the participation of the locals in recreational activities are examined. The joy people experience directly from nature contributes to its value. Respondents were asked if they participated in a specific recreational activity and how often. The list consisted of twelve activities and also an opportunity to fill in some other activity that was not included on the list. Figure 16 shows a ranking of the activities that respondents participate in. Weights were assigned to these scores the same as with the environmental score, statements and the threats in sections above. The activities in which households on Saba mostly enjoyed nature is 'beach', 'hiking', 'swimming' and 'gardening'. Additionally an ANOVA test was conducted in order to see if there was a significant difference between the participation in certain recreation between people 'born on Saba' and people 'not born on Saba'. People born on Saba participate significantly more in 'Spear fishing' at a significant level of 0.01. Spear fishing is a traditional fishing method on the island. People not born on Saba participate significantly more in 'Hiking', 'Diving' and 'Snorkelling'. The last recreational section was about fishing in free time. People were asked if they or somebody in their household participate in recreational fishing, 16% responded with 'yes' to this question. The main motive for participating in recreational fishing is for relaxation and catching food purposes.

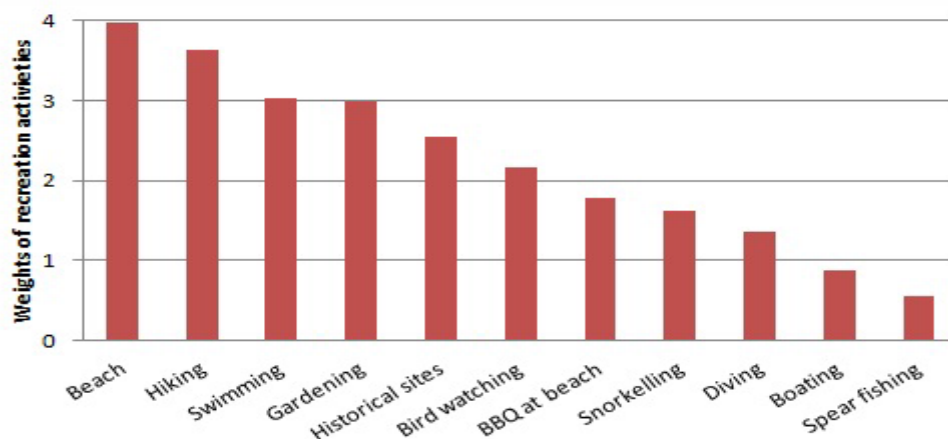


Figure 16 Ranking of the recreational activities respondents participate in. 4 is ranked highest

Plant use

For the determination of the cultural value of plant use two directional use questions were included in the survey. The first question is about whether the respondents use local plants for (medicinal) purposes and a next one was specified which plants the people are using and how often. The medicinal plant list on the survey was composed with help of the local medicinal handbook '*Folk Remedies on a Caribbean Island, the Story of Bush Medicine on Saba*'. 40% of respondents answered that they use local plants for medicinal purposes or cooking. Plants mostly used are Lemongrass, Soursop Bush and Sprain Bush. They are mostly used for Cold/Flu and Tea. Besides this medicinal list, Aloë, Basil and Mint were mostly mentioned; with Aloë used as body care product while Mint and Basil are used as Tea or Food flavour.

Consumption of fish and lobster

The consumption of locally caught fish and/or lobster was also analyzed. The largest group consume locally caught fish only once a month (38%) and the second largest group of the people never eat locally caught fish/lobster (37%). This low consumption can probably be explained by the fact that the fish caught by local fishermen is directly sold to St. Maarten.

3.3 Willingness to pay (WTP) and choice experiment

The next part of the survey is about the willingness to pay (WTP). The Saba people are questioned if they are willing to pay for nature management on their island or to improve the current management. In this subchapter the results of this question, asked to the residents of Saba is discussed together with the correlation between WTP and residential characteristics.

3.3.1 WTP in principle

The question '*Are you in principle willing to pay for nature management on Saba?*' was answered 'yes' by 60% of the respondents (Figure 17). When people answered 'yes' they can also tell which preference they have for the investment of this money, 55% of the people like to see the money go to the Saba Conservation Foundation (SCF). While 15% of the respondents prefer the Saba Government and only 7% choose the Dutch Government.

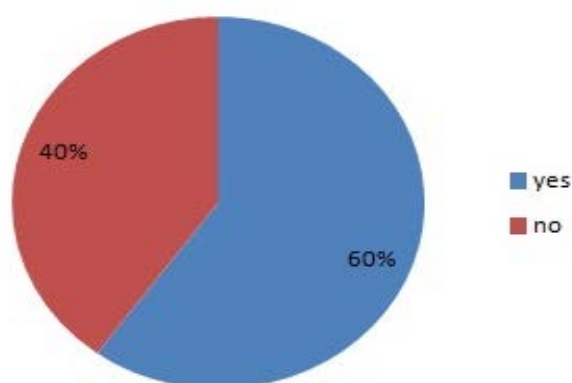


Figure 17 The preparedness to pay for nature management by the respondents

3.3.2 Choice experiment

From the results of the choice experiment an opinion of the WTP by the respondents can be made and the contribution people are willing to make is measured.

WTP per attribute

From the responses that were given in the choice experiment, the respondent's willingness to pay can be determined. A multi-nomial logit regression model analysis of the choice data was conducted in order to identify the WTP per attribute. The attributes are all dummy coded except for the environmental fee attribute, which is coded as a continuous variable. The estimated coefficients on the attributes are all statistically significant at the 1% level ($p < 0,01$) (please see Annex C for details on WTP calculations).

Within figure 18 one can see the WTP per month per household for the management of nature and the relative importance between attributes expressed by the respondents when choosing between different scenarios. The willingness to pay per month for an improvement in nature to the highest quality levels is **13 USD per month per household**. The alternative specific constant (ASC) seen within the figure and forming part of the WTP calculation represents the preference of respondents to avoid the 'expected future without extra management' scenario and opt for one of the alternative management scenarios. Basically ASC explains the value people have for the management of nature that is not explained by the attributes included in the choice experiment.

What is prominent is the high value assigned to 'Quality of coastal water', which is relatively more than the value for the 'Natural landscape'. The attribute 'Free roaming goat management' also provides a positive utility to respondents, meaning the population of Saba prefers to see management of free-grazing animals and thus the fenced scenario.

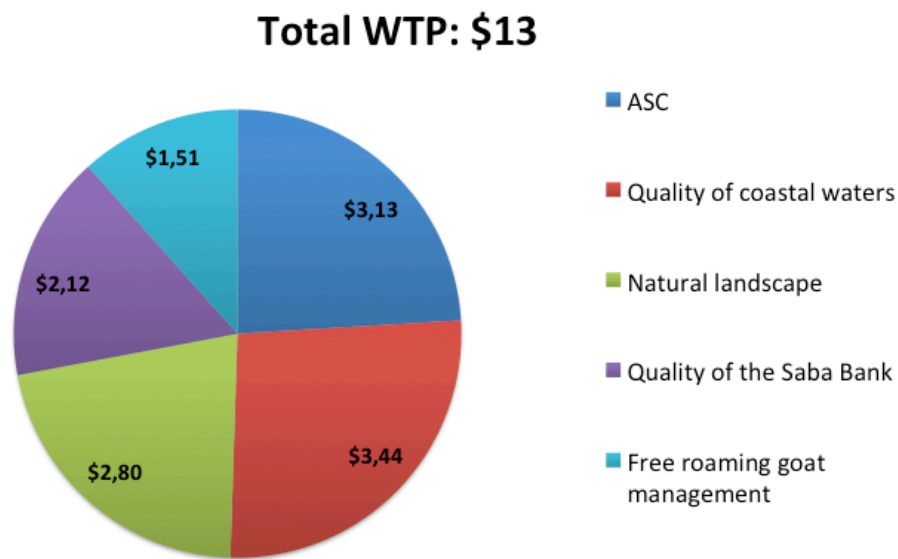


Figure 18 WTP per month per household in USD

Attributes

After the choice experiment respondents were asked to indicate the importance per attribute when making their choices between scenarios. This was done by asking the respondents to indicate the attribute importance on Likert scale from 1 (not important) to 5 (very important), as weighted according to van Beukering *et al.*, 2009. 'Coastal waters' and 'Natural landscape' were indicated as most important while 'Contribution' is considered as the least important attribute (Figure 19).

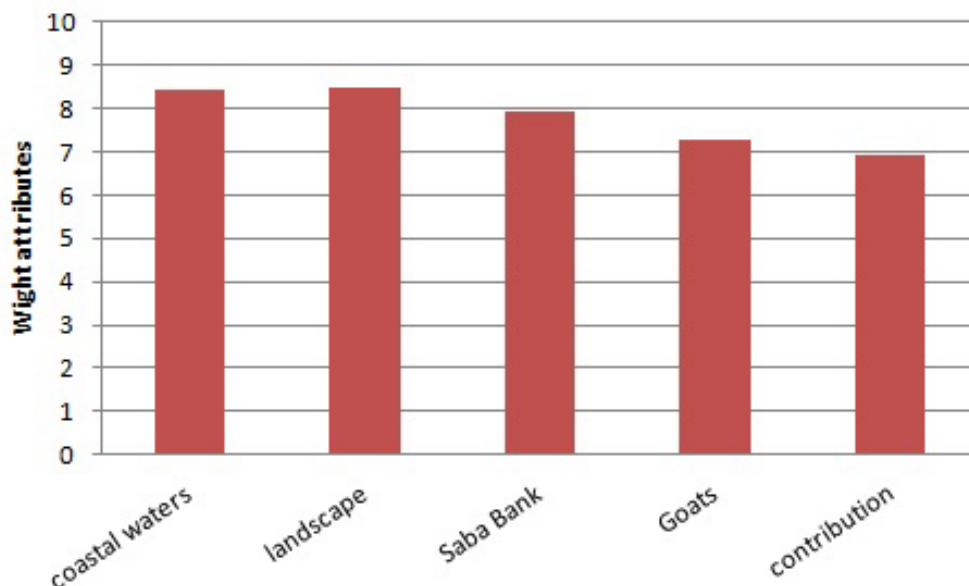


Figure 19 Importance stated by the residents of Saba per attribute

Opting out

In total 15 respondents refused to participate in the choice experiment. When respondents choose several times the '*expected future without extra management*' or refused to do the choice experiment they were asked further about their motivation behind this choice. Apart from these 15 respondents another 23 explained why they did not always choose for the management scenarios. The explanation mostly provided was 'I cannot afford it /the costs are too high' and 'I am not confident that the money will be used as specified'.

Characteristics influencing WTP

The WTP is significantly correlated with *Income*, *Threat score*, *University* and *WTP in principle*. The correlations were positive meaning that a rise in income level goes hand in hand with a rise in WTP, whether the respondent perceived more threats, whether a respondent has a university degree and whether the respondent was in principle willing to pay for nature management.

Total WTP per year

As there is no recent data for the number of households on Saba, data from the Statistical Yearbook of the Netherlands Antilles from 2009 (page 72) was used. No number of households is stated, however the number of fixed telephone connections in 2008 was; 709. In January of that same year 1,537 people were living on the island (CBS). The latest data found on the population of Saba is January 2013, whereby 1,991 people lived on the island (CBS). Correcting for this population growth, with a constant household size of 2.16, approximately 918 households is assumed as the amount of households on Saba.

The total WTP for nature management on Saba is 143,201 USD per year. This is calculated by the monthly WTP per household, 13 USD times the number of households on Saba, 918, times 12 months. The WTP results demonstrates that people are willing to support nature management on their island. They also indicate that people value ecosystems and its services and that the cultural and recreational value provided by these ecosystems is important to the Saban community. Table 3 gives an overview of the total WTP per attribute in the CE. See for more information annex C.

Table 3 Calculation of the total WTP per year in total and per attribute

	WTP per household per month	WTP per household per year	Total WTP per year*
ASC	\$3.13	\$37.52	\$34,439
Quality of coastal waters	\$3.44	\$41.27	\$37,888
Natural landscape	\$2.80	\$33.58	\$30,826
Quality of the Saba Bank	\$2.12	\$25.48	\$23,386
Free roaming goat management	\$1.51	\$18.15	\$16,662
Total WTP	\$13.00	\$155.99	\$143,201

* Based on the estimate of 918 households on Saba

4 Conclusions, recommendations and limitations

4.1 Conclusions and recommendations

The aim of this research was to answer the research question:

What is the recreational and cultural value of the marine and terrestrial ecosystems of Saba to its inhabitants?

The total WTP for nature management on Saba is 143,201 USD per year. To answer this question a choice experiment was conducted with a supporting household survey among the residents of Saba. The choice experiment revealed that there is a preference for additional nature management. Most respondents want to avoid the 'future without extra management' scenario. The WTP has a positive relationship with *Income*, *Threat score*, *University degree* and *WTP in principle*. The attributes 'natural landscape' and 'quality of the coastal waters' are seen as more important than 'Saba Bank', 'roaming goats' and 'contribution' were seen as the least important one.

Nature is seen as crucial for most Sabans and their family, people also agree that Saba's natural environment is important for the economy of the island. This was expressed through statements within the survey as well as the utility levels expressed for the attributes 'natural landscape' and 'quality of coastal waters' in the choice experiment. The attributes 'natural landscape' and 'quality of the coastal waters' are the attributes linked to recreational and cultural activities. To investigate the recreational and cultural link between the residents of Saba and the natural environment more in detail a list of activities was presented to the respondents. Hiking, swimming and the beach are the most popular activities. The value expressed through the WTP may also involve non-use values, such as the fact that many would want to preserve the ecosystems for future generations. Additionally, the concern for nature is reflected when residents confirmed some potential threats as important. A potential oil spill from tankers passing by and solid waste issues on the island are rated as the most important threats to the natural capital of Saba. Finally, residents also make a cultural use of nature through the use of local plants for medicinal or cooking purposes.

The Saba Bank is seen as important for culture and the island economy due to its rich fish stocks. The Saba Bank is important for Saba but might have a lower utility to residents since most residents will never visit this area due to its remoteness. However, with the supporting survey it was observed that the link between the Saba Bank area and the fishing sector is common knowledge among the residents. Besides this economic importance, a high biodiversity hotspot was also mentioned by a large part of the residents.

The attribute 'Free roaming goat management' also provides a positive utility to respondents, meaning the population of Saba prefers to see management of free-grazing animals and thus the fenced scenario. From a policy perspective it was important to find out on which side the balance of the residential relationship with free roaming goats is heavier, managing or not managing free roaming goats. Through having two choices in the choice experiment the explicit opinion of the public could be derived. This opinion is to protect the environment and introduce goat management schemes. However, awareness needs to be worked on, as it is evident that most of the people, including the goat owners, are not aware about the problem. The main problem is that goat owners are used to leaving their goats roam free, as they do not have the resource to buy fodder. Guidance is needed to solve this problem. Especially

in the dry seasons when the unmanaged goat population will increase shore erosion because they start to dig up roots from plants. Investigation into how to communicate and solve this problem in a way that most people agree with will help to develop management strategy to decrease the impacts of the goats.

Communication on nature management is key in creating awareness and is desired by the residents on Saba. Even though people are willing to pay for nature management a part of the respondents were concerned about the current nature management policies. It is rather important to encourage public awareness meetings. From the survey comments it can be concluded that more sharing of information on the status of nature and management hereof will be highly appreciated by the population.

All of the above results lead to the conclusion that the natural environment of Saba is important to its residents. Efforts should be made to create a combination of economic development and the capacity of the natural resource to support social and economic development (Folke *et al.*, 2002). Improvement of nature management will be beneficial for the Saban population as it contributes to the island economy as well as to the cultural identity. Existing threats can have a negative socio-economic impact on the wellbeing of the society and the resident of Saba clearly want to preserve the islands ecosystems as well as for their economy.

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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 Saba government and employees of SCF. We would like to express our gratitude to governor Jonathan Johnson and the Executive Council for their hospitality and the time mister Johnson took to share his vision.

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Annex A Questionnaire Household Survey

A.1 Survey

RECREATIONAL AND CULTURAL VALUE TO RESIDENTS OF SABA

I. Name Interviewer:	V. Interview ID no.:	
II. Date of interview:		
III. Location:	Village:	
IV. Start time/end time of interview	Start time:	End time:

HELLO MY NAME IS..... I AM HELPING THE VU UNIVERSITY AMSTERDAM WITH THEIR RESEARCH CALLED "WHAT'S SABA'S NATURE WORTH?". WE ARE DOING A SURVEY TO SEE HOW IMPORTANT NATURE IS TO THE PEOPLE OF SABA. WITH NATURE WE MEAN TREES, FLOWERS, OCEAN AND BEACH AND WE WANT YOUR OPINION ABOUT THIS. **EVERYTHING THAT YOU TELL US WILL BE KEPT STRICTLY CONFIDENTIAL.** THE INTERVIEW WILL TAKE ABOUT TWENTY MINUTES. WOULD YOU BE WILLING TO PARTICIPATE?

I. General Questions

1. Are you born on Saba?

1] Yes CONTINUE WITH QUESTION 3	<input type="checkbox"/>
2] No	<input type="checkbox"/>

2. If not, where are you from? (check only one) GO TO QUESTION 3

1] Aruba	<input type="checkbox"/>	7] Elsewhere in Latin America	<input type="checkbox"/>
2] Curaçao	<input type="checkbox"/>	8] Netherlands mainland	<input type="checkbox"/>
3] St Maarten	<input type="checkbox"/>	9] North America	<input type="checkbox"/>
4] Statia	<input type="checkbox"/>	10] Elsewhere, specify:	<input type="checkbox"/>
5] Bonaire	<input type="checkbox"/>	11] Refused	<input type="checkbox"/>
6] Elsewhere in the Caribbean	<input type="checkbox"/>		

3. For how long have you been living on Saba?

4. In which village on Saba do you live?

5. How many people live in your house that are part of your family?

1] Number of adults		2] Number of children	
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II. Environmental awareness

6. 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 much	<input type="checkbox"/>
3] Average	<input type="checkbox"/>		

7. Did **you** do any of the following environmental activities in the past year?

	1] Yes	2] No
1] Seek environmental information (<i>On Internet, TV, newspaper, radio etc</i>)	<input type="checkbox"/>	<input type="checkbox"/>
2] Attend public events related to the environment	<input type="checkbox"/>	<input type="checkbox"/>
3] Avoid littering	<input type="checkbox"/>	<input type="checkbox"/>
4] Buy locally grown fruit and vegetables (<i>e.g. biological garden at the Level</i>)	<input type="checkbox"/>	<input type="checkbox"/>
5] Recycle material (<i>e.g. bottles or bags</i>)	<input type="checkbox"/>	<input type="checkbox"/>
6] Purchase environmentally friendly products (<i>reusable bags etc</i>)	<input type="checkbox"/>	<input type="checkbox"/>
7] Donate money for the trails on the island	<input type="checkbox"/>	<input type="checkbox"/>
8] Donate money to an environmental cause (<i>e.g. a nature conservancy organization</i>) IF YES, SPECIFY: USD IN THE LAST YEAR	<input type="checkbox"/>	<input type="checkbox"/>
9] Did you do any voluntary environmental work (<i>e.g. clean up nature</i>)? IF YES, SPECIFY:HOURS IN THE LAST YEAR	<input type="checkbox"/>	<input type="checkbox"/>
10] Other, specify: ...	<input type="checkbox"/>	<input type="checkbox"/>

8. How important do you consider the following potential threats to the marine and land environment on Saba? (*1 being not important at all and 5 being very important*)

	1 Not important at all	2 Not important	3 Neutral	4 Somewhat important	5 Very important	0 Don't Know
1] Hunting iguanas	1	2	3	4	5	0
2] Overgrazing by goats	1	2	3	4	5	0
3] Foreign/invasive plants (<i>e.g. Coralita</i>)	1	2	3	4	5	0
4] Cats hunting animals	1	2	3	4	5	0
5] Rats	1	2	3	4	5	0
6] Guinea Pigs & rabbits	1	2	3	4	5	0

	Not important at all	Not important	Neutral	Somewhat important	Very important	Don't know
7] Invasive fish (e.g. <i>Lionfish</i>)	1	2	3	4	5	0
8] Construction and runoff	1	2	3	4	5	0
9] Hurricanes	1	2	3	4	5	0
10] Solid waste & litter	1	2	3	4	5	0
11] Erosion	1	2	3	4	5	0
12] Impact diving / snorkelling	1	2	3	4	5	0
13] Impacts of fishing	1	2	3	4	5	0
14] Anchoring on Saba Bank	1	2	3	4	5	0
15] Oil spill from St. Eustatius	1	2	3	4	5	0
16] Coral bleaching	1	2	3	4	5	0
17] Other, specify:	1	2	3	4	5	0

9. Are you in principle willing to pay for nature management on Saba?

1] Yes CONTINUE WITH QUESTION 10	<input type="checkbox"/>
2] No CONTINUE WITH QUESTION 11	<input type="checkbox"/>

10. Would you have a preference for one of the following organizations to manage the collected funds? *Check most preferred answer.*

1] Saba Conservation Foundation	<input type="checkbox"/>	4] Non-Profit Organization (e.g. <i>Greenpeace</i>)	<input type="checkbox"/>
2] Government of Saba	<input type="checkbox"/>	5] Other, specify:	<input type="checkbox"/>
3] Government of the Netherlands	<input type="checkbox"/>	6] Don't know / no preference	<input type="checkbox"/>

III Choice Experiment

REFER TO THE INTERVIEW PROTOCOL

IMPORTANT: FILL VERSION NUMBER_____

[REMIND THE RESPONDENT THAT THIS IS AN ANONYMOUS QUESTIONNAIRE AND THAT THIS EXPERIMENT IS HYPOTHETICAL AND THAT THEY SHOULD CHOOSE THE SCENARIOS REGARDLESS OF WHO IS MANAGING THE FUNDS]

SHOW THE **EXAMPLE CHOICE CARD** HERE

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

Quality of coastal waters for fishing and recreation activities (diving, snorkelling, swimming). This takes into account reef quality (*fish, algae and coral biodiversity*) as well as water quality (*clarity, pollution...*).

Natural landscape refers to the landscape beauty and the attractiveness for recreational activities on Saba (*e.g. hiking*). This takes also into account the vegetation quality, as well as litter.

Quality of Saba Bank refers to the health of the Saba bank. Biodiversity is related to a healthy ecosystem.

Free roaming goats management refers to management options to control the goats on Saba.

The contribution per year is a fee that **all Sabans** would contribute, which would be used strictly for environmental management on the island.

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 ITEM FOR ONE SCENARIO BELONG TOGETHER AND INDICATE 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!**

Below is an example card of 3 options. To make a choice between the 3 options you should look at all of the items that shape the option (yearly contribution, quality of coastal waters, etc.).

In **Option A** the quality of the coastal water and the natural landscape are both excellent, the goats are fenced so there are fewer roaming animals on the island. The Saba Bank quality is also excellent and you are contributing \$500 a year to the environmental management on Saba.

In **Option B** the quality of the coastal water and natural landscape are both moderate, the goats are fenced, the Saba Bank quality is good and you are contributing \$180 a year.

In the **third option**, "Expected future without extra management" option, the threats to the environment are not dealt with and so the situation has deteriorated compared with today. The

quality of the coastal waters and the natural landscape are moderate, the quality of the Saba Bank is poor, roaming goats are 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 SECOND 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 A RESPONDENT REFUSES, TRY TO FIND OUT WHY OR SEE EXPLANATION IN THE PROCOTOL ON PAGE 4

START WITH CHOICE EXPERIMENT

11. Record the respondent's answers to each choice question and the certainty of the choice in the table below. *(Check only one box per row).*

Choice Set	1. Option A	2. Option B	3. Option C	Refused
Choice Card 1				
Choice Card 2				
Choice Card 3				
Choice Card 4				
Choice Card 5				
Choice Card 6				

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	

[ONLY ASK THE FOLLOWING QUESTION IF THE RESPONDENT HAS CHOSEN SCENARIO "EXPECTED FUTURE WITHOUT EXTRA MANAGEMENT" EACH TIME OR REFUSED TO MAKE A CHOICE, OTHERWISE SKIP TO QUESTION 14]

13. You have chosen the 'Expected Future Scenario' in each card or refused to make a choice. Can you explain why? (*Check only one*)

1] I am not responsible for the damage to the environment	<input type="checkbox"/>	6] Don't need another tax no matter what it is used for	<input type="checkbox"/>
2] I am not confident that the money will be used as specified	<input type="checkbox"/>	7] I couldn't understand the questions/ Too hard to make the choices	<input type="checkbox"/>
3] I do not believe there are serious threats to the environment	<input type="checkbox"/>	8] The choices weren't relevant to me / Didn't describe what matters to me	<input type="checkbox"/>
4] The issues are more complex than these questions suggest	<input type="checkbox"/>	9] Other, specify...	<input type="checkbox"/>
5] I cannot afford it /The costs were too high	<input type="checkbox"/>	10] Don't know/refused	<input type="checkbox"/>

14. In making your choices, how important were the following items to you? (*1 being not important at all and 5 being very important*)

	not important	not very important	neutral	somewhat important	very important
1] Quality of coastal waters	1	2	3	4	5
2] Landscape	1	2	3	4	5
3] Quality of the Saba Bank	1	2	3	4	5
4] Free roaming goat management	1	2	3	4	5
5] Yearly contribution	1	2	3	4	5

IV. Statements

15. Do you agree or disagree with the following statements?

Statement	completely saagree	omewhat sagree	neutral	omewhat agree	completely agree
1] As long as the animals don't destroy my property, they're not my problem.	1	2	3	4	5
2] Healthy nature is crucial for my family and me.	1	2	3	4	5
3] The nature on Saba should be better managed.	1	2	3	4	5
4] The nature on Saba is important for the island economy.	1	2	3	4	5
5] The nature on Saba is important to Sabans.	1	2	3	4	5
6] The typical Saban houses are important to me.	1	2	3	4	5
7] Acquiring the UNESCO World Heritage status is the highest priority for Saba*	1	2	3	4	5

*Saba is nominated to become a UNESCO World Heritage site, which means that it is internationally recognized as a special cultural landscape (e.g. traditional houses) to be protected and therefore limiting (new non-traditional) constructions.

V. Recreation16. How often do **you** participate in each of the following activities in nature?

	1] Never	2] Once a year	3] Once a month	4] Once a week	5] More than once a week
1] Hiking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2] Bird watching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3] Going to the beach	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4] Visiting historical sites	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5] Gardening	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6] Diving	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7] Snorkelling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8] Boating/ sailing/ kayaking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9] Other forms of fishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10] Swimming/ wading	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11] BBQ at the beach	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12] Other, specify:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17. How often do **you** eat locally caught fish and/or lobster?

1] Never	2] Once a month	3] Once a week	4] More than once a week	5] Every day
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

18. Do **you** make use of medicinal plants?

1] Yes	CONTINUE WITH QUESTION 18	<input type="checkbox"/>
2] NO	CONTINUE WITH QUESTION 19	<input type="checkbox"/>

19. If yes, which plants do you use, how often do you use it and for what purpose?

	1] Never	2] 1-6 times a year	3] 7-12 times a year	4] More than once a month	5] More than once a week	To what purpose? Specify:
1] Lemon Grass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2] Wild Tobacco	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3] Sprain Bush	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4] Trumpetwood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5] Headache Bush	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6] Mosquito Berry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7] Coralita	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8] Soursop Bush	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9] Red Vine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10] other, specify:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

VI. Saba Bank

20. Do you ever heard about the Saba Bank?

1] Yes	CONTINUE WITH QUESTION 20	<input type="checkbox"/>
2] NO	CONTINUE WITH QUESTION 21	<input type="checkbox"/>

21. In your view, what is special about the Saba Bank?

THERE IS A LIST WITH KEYWORDS, IF THE RESPONDENT IS MENTIONING ONE OR MORE OF THESE WORDS CHECK THEM! **DO NOT READ THE OPTIONS TO THEM!**

Keywords	Checkbox	Keywords	Checkbox
1] Fish sector/fisheries (on Statia)	<input type="checkbox"/>	7] Biodiversity	<input type="checkbox"/>
2] Diving sector	<input type="checkbox"/>	8] Science/Research	<input type="checkbox"/>
3] Fish are born & fed	<input type="checkbox"/>	9] Anchoring	<input type="checkbox"/>
4] Whales	<input type="checkbox"/>	10] Do not know	<input type="checkbox"/>
5] Dolphins	<input type="checkbox"/>	11] Other...	<input type="checkbox"/>
6] Sharks	<input type="checkbox"/>		

VII. Recreational Fishing in your household

22. Do you or someone else in your household currently fishing for recreational purposes?

1] Yes	CONTINUE WITH QUESTION 23	<input type="checkbox"/>
2] No	CONTINUE WITH QUESTION 27	<input type="checkbox"/>

23. How many people currently fish for recreational purposes in your household? Number:

24. How many fishing trips did your household made in the last year?

1] # Fishing trips per month (average)	
2] Average catch per trip	# fish / kg

25. Can you indicate what the motivation of your household is to go out fishing? *Check all applicable boxes*

1] I enjoy fishing/ I find it relaxing	<input type="checkbox"/>	5] For tradition: my family has always fished	<input type="checkbox"/>
2] I catch for food	<input type="checkbox"/>	6] Fishing strengthens the bond with my friends & family	<input type="checkbox"/>
3] To give catch to family and friends	<input type="checkbox"/>	7] Other, specify ...	<input type="checkbox"/>
4] I catch fish to sell the fish	<input type="checkbox"/>		

26. Do people in your household mostly go shore fishing or do you fish from a boat?

Type	Checkbox	Percentage
1] Shore fishing	<input type="checkbox"/>	
2] Boat fishing	<input type="checkbox"/>	

VIII. Demographics

[REMINDER: FOLLOWING QUESTIONS ARE FOR STATISTICAL PURPOSES ONLY]

27. Gender:

1] Male	<input type="checkbox"/>	2] Female	<input type="checkbox"/>
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28. May I ask what age category you belong to?

1] 18-25	<input type="checkbox"/>	4] 46-55	<input type="checkbox"/>
2] 26-35	<input type="checkbox"/>	5] 56-65	<input type="checkbox"/>
3] 36-45	<input type="checkbox"/>	6] 66+	<input type="checkbox"/>

29. What is the highest level of education you have completed?

1] None	<input type="checkbox"/>	4] College/University (bachelors)/HBO	<input type="checkbox"/>
2] Primary school	<input type="checkbox"/>	5] Masters degree or other post-graduate	<input type="checkbox"/>
3] High school/technical school/MBO	<input type="checkbox"/>	6] Don't know/refused	<input type="checkbox"/>

30. May I ask your **household income**, before taxes, in US \$ for the last **month**?
(Refer to income card)

LETTER:

31. If you have any other comments, please leave them in the box below.

--

IF RESPONDENT WANTS TO LEAVE HIS OR HER PERSONAL INFORMATION IN ORDER TO RECEIVE INFORMATION OF THE REPORT, ASK HIM OR HER TO DO SO NOW AND RECORD IT.

Name (optional): _____
 Phone (optional): _____
 E-mail (optional): _____

THIS IS THE END OF THE QUESTIONNAIRE; THANK THE RESPONDENT FOR HIS/HER TIME AND PATIENCE!!!

A.1.1 Income card











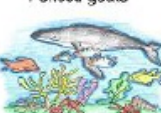




Income card

Associated with question 30 (Demographics section)
















T.	Less than 250	Y.	3.000 - 3.999
U.	250 – 549	E.	4.000 - 4.999
B.	500 – 749	Q.	5.000 - 5.999
N.	750 – 999	J.	6.000 - 6.999
F.	1.000 - 1.249	R.	7.000 - 7.999
V.	1.250 - 1.499	K.	8.000 - 8.999
G.	1.500 - 1.749	S.	9.000 - 9.999
A.	1750 – 1999	C.	10.000 - 12.499
W.	2.000 - 2.499	Z.	12.500 - 15.000
H.	2.500 - 2.999	L.	More than 15.000
















Caution! This is gross monthly income in US \$
















Annex B Choice Experiment Example
















Version 3 – Example Card			
	Option A	Option B	Expected future without extra management
Natural landscape	 Excellent	 Moderate	 Moderate
Coastal waters	 Excellent	 Moderate	 Moderate
Livestock management	 Fenced goats	 Fenced goats	 Free roaming goats
Saba Bank	 Excellent	 Good	 Poor
Contribution	 \$500 per year (\$40 per month)	 \$180 per year (\$15 per month)	 \$ 0 per year (\$ 0 per month)
















Version 3 – Card 1
















	Option A	Option B	Expected future without extra management
Natural landscape	 Poor	 Moderate	 Moderate
Coastal waters	 Excellent	 Moderate	 Moderate
Livestock management	 Free roaming goats	 Fenced goats	 Free roaming goats
Saba Bank	 Good	 Moderate	 Poor
Contribution	 \$ 24 per year (\$2 per month)	 \$180 per year (\$15 per month)	 \$ 0 per year (\$ 0 per month)

Version 3 – Card 2			
	Option A	Option B	Expected future without extra management
Natural landscape	 Excellent	 Poor	 Moderate
Coastal waters	 Poor	 Good	 Moderate
Livestock management	 Free roaming goats	 Fenced goats	 Free roaming goats
Saba Bank	 Poor	 Excellent	 Poor
Contribution	 \$ 60 per year (\$ 5 per month)	 \$500 per year (\$40 per month)	 \$ 0 per year (\$ 0 per month)

Version 3 – Card 3			
	Option A	Option B	Expected future without extra management
Natural landscape	 <p>Excellent</p>	 <p>Moderate</p>	 <p>Moderate</p>
Coastal waters	 <p>Good</p>	 <p>Excellent</p>	 <p>Moderate</p>
Livestock management	 <p>Free roaming goats</p>	 <p>Fenced goats</p>	 <p>Free roaming goats</p>
Saba Bank	 <p>Moderate</p>	 <p>Poor</p>	 <p>Poor</p>
Contribution	 <p>\$ 24 per year (\$ 2 per month)</p>	 <p>\$500 per year (\$40 per month)</p>	 <p>\$ 0 per year (\$ 0 per month)</p>

Version 3 – Card 4			
	Option A	Option B	Expected future without extra management
Natural landscape	 Excellent	 Moderate	 Moderate
Coastal waters	 Poor	 Moderate	 Moderate
Livestock management	 Fenced goats	 Free roaming goats	 Free roaming goats
Saba Bank	 Good	 Excellent	 Poor
Contribution	 \$ 60 per year (\$ 5 per month)	 \$ 180 per year (\$ 15 per month)	 \$ 0 per year (\$ 0 per month)

Version 3 – Card 5			
	Option A	Option B	Expected future without extra management
Natural landscape	 Moderate	 Poor	 Moderate
Coastal waters	 Moderate	 Poor	 Moderate
Livestock management	 Free roaming goats	 Fenced goats	 Free roaming goats
Saba Bank	 Good	 Moderate	 Poor
Contribution	 \$500 per year (\$40 per month)	 \$ 60 per year (\$ 5 per month)	 \$ 0 per year (\$ 0 per month)

Version 3 – Card 6			
	Option A	Option B	Expected future without extra management
Natural landscape	 Poor	 Excellent	 Moderate
Coastal waters	 Good	 Excellent	 Moderate
Livestock management	 Free roaming goats	 Fenced goats	 Free roaming goats
Saba Bank	 Poor	 Excellent	 Poor
Contribution	 \$ 24 per year (\$ 2 per month)	 \$180 per year (\$15 per month)	 \$ 0 per year (\$ 0 per month)

Annex C WTP calculations

The results of the regression model are summarized in Table 4. The table presents that all the estimated coefficients of the attributes are significant at the 1% level ($P < 0.01$). These estimated coefficients were also used to calculate the mean household WTP to move from one attribute level to a higher attribute level. Thus the mean household WTP to move from a poor natural landscape state (not shown in the table) to a situation with moderate natural landscape is estimated to be 731 USD. The mean WTP to go from the omitted categories (the lowest attribute level) to one of the other attribute levels is shown in column 'WTP'. The coefficients are representing the utility function of an attribute. To use the natural landscape as an example; to move from a poor natural landscape to an excellent natural landscape, utility will increase by 1.015. The highest increase in utility is seen by 'quality of coastal waters'.

The Krinsky and Robb (1986) procedure is used to estimate 95% confidence intervals for each WTP estimate. Upper and lower 'CI' represents the confidence interval for the WTP measure so for poor natural landscape to moderate natural landscape the mean annual WTP per household is between US\$ 510 – US\$ 1126.

The alternative specific constant (ASC) represents the preference of respondents to avoid the 'expected future without extra management' (option C) scenario and choose one of the alternative management scenarios (option A or B). In this case there is a positive and significant preference for environmental management as the ASC is over above the differences between scenarios that are represented by the attributes. This preference is even more plausible as most respondents answered that were very certain about the choices they made with the choice experiment.

Table 4 Multi-nomial logit regression result

	Coefficient	SE	P	WTP	Lower CI	Upper CI
ASC	1.134	0.137	0.000**	986	703	1473
Natural landscape: moderate	0.841	0.090	0.000**	731	510	1126
Natural landscape: excellent	1.015	0.091	0.000**	883	630	1338
Coastal water: moderate	0.690	0.102	0.000**	600	405	926
Coastal water: good	1.156	0.109	0.000**	1006	707	1521
Coastal water: excellent	1.248	0.118	0.000**	1085	770	1625
Livestock: fenced	0.549	0.060	0.000**	477	339	717
Saba bank: moderate	0.478	0.098	0.000**	415	229	706
Saba bank: good	0.768	0.103	0.000**	668	450	1050
Saba bank: excellent	0.770	0.102	0.000**	670	447	1046
Contribution	-0.001	0.000	0.000**			

The results of the initial analysis using the multi-nominal regression model are suspected to suffer from a hypothetical bias, which causes WTP estimates that are unrealistically high. Therefore, a different methodology is used to calculate WTP estimates.

The coefficients calculated for each attribute with the multi-nominal model are still valid, which means that the relative WTP for different attributes in the CE can be used. To estimate the total WTP for nature conservation the payment vehicle is used: 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. Because the relative WTP for different attribute levels is still valid, the absolute WTP for the highest level of each attribute is determined. After the WTP for the highest attribute levels is calculated, the lower levels can be determined with the relative WTP between the levels of an attribute as well. Results are presented in Table 5.

Table 5 WTP estimates based on the average fee for nature conservation chosen in the choice experiment

	Coeff	WTP per household per month	WTP per household per year
ASC	1.134	\$3.13	\$37.52
Natural landscape: moderate	0.841	\$2.32	\$27.81
Natural landscape: excellent	1.015	\$2.80	\$33.58
Coastal waters: moderate	0.690	\$1.90	\$22.81
Coastal waters: good	1.156	\$3.19	\$38.25
Coastal waters: excellent	1.248	\$3.44	\$41.27
Goats: fenced	0.549	\$1.51	\$18.15
Saba Bank: moderate	0.478	\$1.52	\$18.19
Saba Bank: good	0.768	\$1.32	\$15.83
Saba Bank: Excellent	0.770	\$2.12	\$25.48