IVM Institute for Environmental Studies

The non-use value of nature in the Netherlands and the Caribbean Netherlands

Applying and comparing contingent valuation and choice modelling approaches

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Report R-12/07
08 December 2012

Contents

Summary

Since 10 October 2010 Bonaire, Saba and Sint Eustatius (Statia) are part of the Netherlands. These three islands are referred to as the Caribbean Netherlands. The objective of this study is to assess the value that Dutch people as well as non-Dutch residents living in the Netherlands mainland assign to nature in the Caribbean Netherlands. This research applies two different stated preference techniques, the contingent valuation method (CVM) and choice experiments (CE), to determine the Willingness-To-Pay (WTP) of those living in the Netherlands for the conservation of ecosystem services and biodiversity in the Netherlands' mainland and the Caribbean Netherlands.

Both methods provided new insights into the way people value the non-use values of nature in a national and local context. The surveys provided evidence for a *nationalistic and community-based influence* on valuation of nature. Both the CVM and the CE methods showed that locally-oriented Dutch citizens value nature in their own neighbourhood or country relatively higher than citizens with a global perspective or foreigners who live in the Netherlands and who place a lower value on improvement of nature in their own environment

Both surveys also showed that the values for nature both in and outside of the Netherlands depend heavily on the *emotional mindset* of the respondent. For example, individuals who are unconcerned about the state of nature in general value improvements of nature less than those who are concerned about nature. In the same fashion, consumer confidence proved to be a strong explanatory variable for value for nature protection: individuals with a high level of consumer confidence express a higher WTP for nature protection.

Finally, several methodological lessons were drawn from the surveys. These include the detection of ordering, anchoring and scoping effects, as well as the correlation between preference and payment uncertainty.

The estimated WTP amount for non-use values of nature in the Netherlands and the Caribbean Netherlands also allowed for the calculation of the aggregated values of both value domains. The non-adjusted aggregated annual amount of non-use value of nature in the Netherlands and the Caribbean Netherlands is estimated at €65 million and €34 million, respectively. However, by adjusting for preference and payment uncertainty of the respondent, the aggregated annual amount for the non-use value for nature improvements in the Netherlands is estimated at €34 million and for the Caribbean Netherlands at €18 million.

Acknowledgements

We would like to thank a number of people who have been crucial for this study's success . First, we are very appreciative to all the students of the MSc course Environmental Resource Management in the year 2011/2012 who so energetically went out on the streets of the Netherlands to find interview people for this study. Similarly, we thank Brigitte Bendermacher of Multiscope for the online research facilitation. Next, we are very grateful to Hayo Haanstra and Astrid Hilgers of the Netherlands Ministry of Economic Affairs, Agriculture, and Innovation (EL&I) for providing the financial means that made this study possible. We are also thankful to a number of people at the Institute for Environmental Studies (IVM) at the VU University who provided enormous support during the research process. These include Marjolijn Staarink for the online mailing and Michal Lukasiewicz and Frank van der Laan for their assistance in making the survey available online. We are also thankful to Carel Drijver of the World Wildlife Fund of the Netherlands (WWF-NL) for endorsing our research ideas in the proposal stage. Finally, we want to express our appreciation to Luke Brander, Roy Brouwer, Jeroen van den Bergh, Paul Hoetjes and Bram Tijdhof for providing invaluable feedback in the design phase of the survey.

1 Introduction

In 10 October 2010 Bonaire, Saba and Sint Eustatius (Statia) became part of the Netherlands. These three islands are referred to as the Caribbean Netherlands. The islands in the Caribbean Netherlands now have the constitutional status of special Dutch municipality. This new status has major implications for both the Netherlands and the Caribbean Netherlands.

On the one hand, the new legal status of the islands in the Caribbean Netherlands affects local environmental legislation, policies and regulations. Local residents have to start paying tax to the Netherlands' treasury, but are also entitled to claim government service and support at a level comparable to what is provided in the mainland.

On the other hand, a unique and significant area of high value nature and stock of biodiversity is added to the Netherlands' Kingdom. As shown in Table 1.1, the Caribbean Netherlands measures more than 2,800 km^2 of marine reserves and is the home of 7 endemic plant species and 85 endemic animal species. For the Netherlands this is implies a substantial expansion in the diversity and richness of its nature. Politicians and policymakers commit Dutch governmental budget to important policy issues, of which a limited share is currently earmarked for conservation and preservation of the unique and endemic nature on Bonaire.

Table 1.1 Characteristics of nature in the Netherlands' Mainland and the Caribbean Netherlands

Nature indicator	Netherlands Mainland	Caribbean Netherlands
Area of terrestrial nature parks	12,685 km^2 (is 30% of total area)	49.4 km^2 (15.7 % of total area)
Area of marine nature parks	2,330 km^2 (is 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**** of which 1 in Caribbean Netherlands

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,10 ciliary worms, one mouse subspecies and a butterfly.

*** 3 protected areas in the North Sea are in the Exclusive Economic Zone; Vlakte 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 km^2.

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

The limited budget allotted for conservation of nature in the BES islands raises the question whether – and how much – European Dutch taxpayers value this exceptional, tropical and pristine nature on the Caribbean Netherlands. Therefore, the objective of this study is to assess the value that Dutch people as well as non-Dutch residents living in the Netherlands mainland assign to nature in the Caribbean Netherlands. [1]

This report is structured as follows. Chapter 2 provides a description of the samples of both the face-to-face survey (i.e. contingent valuation) and the online survey (choice model). The valuation techniques and well as the estimation methods applied in both surveys are explained in Chapter 3. Chapter 4 presents the final results of the contingent valuation survey and the choice modelling survey, respectively. Discussion and conclusions are drawn in Chapter 6.

[1] This sub-study is part of the TEEB project "What's Bonaire Nature Worth?" which aims to determine economic values of ecosystem goods and services and biodiversity of Bonaire. The project produces transparent information and analysis for Dutch and Dutch Caribbean policy makers to develop efficient financial and regulatory measures for protection of nature.

2 Survey design and methods

The study design was built using a comprehensive set of valuation techniques and survey modes. This Chapter explains the study design, describes the different samples and explains the valuation methods used to determine the non-use values of nature in the Caribbean Netherlands.

2.1 Study design

Because traditional valuation techniques are not possible when assessing non-use characteristics, this research proposes to use a non-use value stated preference survey as one means to determine the willingness-to-pay (WTP) for the conservation of ecosystem services and goods and biodiversity in Caribbean Netherlands.

This method has been criticized for generating unrealistic estimates of the value of nature because of the hypothetical nature of stated-preference valuation techniques. Further, economic values are often found to vary depending on the type of stated preference valuation technique applied. These drawbacks limit the acceptability and adoption of results generated through stated preference valuation.

However, these shortcomings can be compensated for by explicitly addressing its weaknesseses. Therefore, this study applies several combinations of survey modes (i.e. face-to-face and online surveying) and valuation techniques (i.e. contingent valuation methods – CVM and choice modelling – CE). The set-up of the study is represented in Figure 2.1.

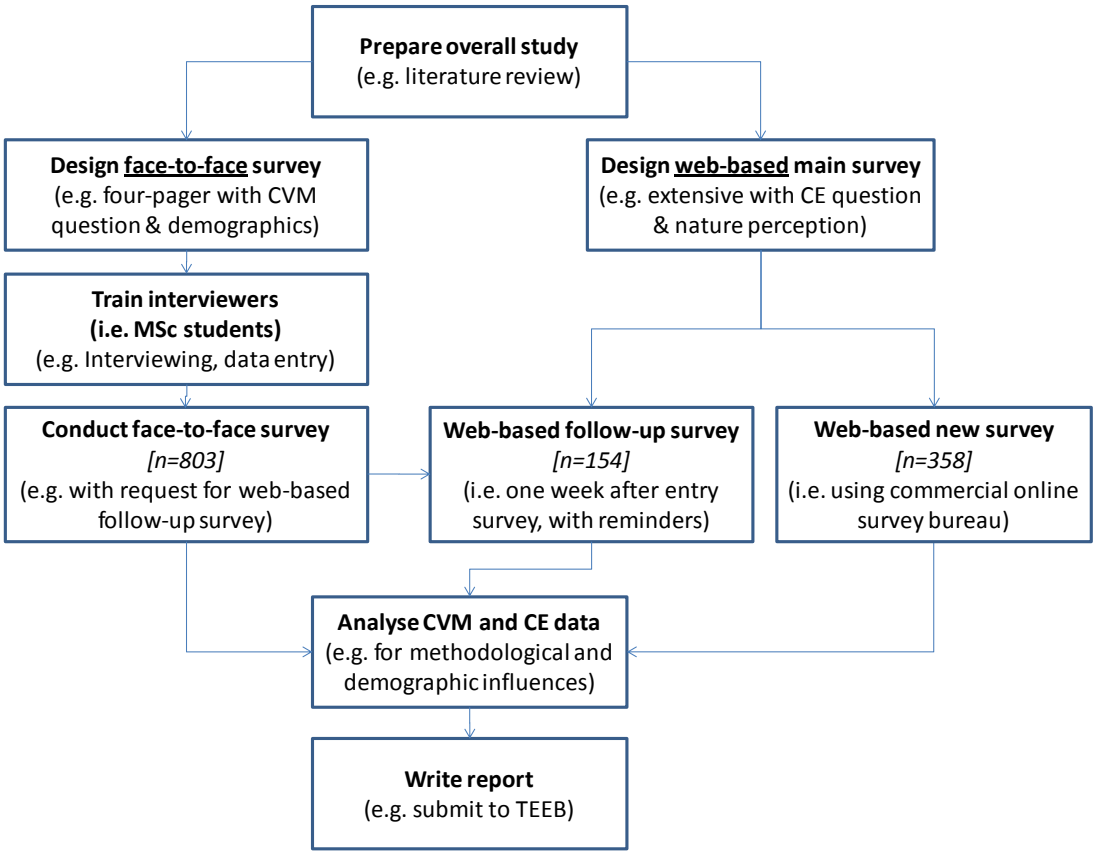


Figure 2.1 Sequence of methodological steps in the project

Table 2.1 provides the main characteristics of both the face-to-face survey and the online survey. The various versions within each survey are explained in the coming sections.

Certain information was collected in the two surveys: standard demographics, the follow-up questions to the willingness-to-pay (WTP) questions, the extent of fatigue and certainty of the valuation exercise and the opinion with regard to priorities in nature protection in the Netherlands and the Caribbean Netherlands. To ensure a large enough sample size to sufficiently reflect the heterogeneity of the Dutch population, interviewers gave the face-to-face survey to 803 respondents and 512 respondents filled out the online survey.

Due to size constraints of the questionnaires, certain types of information could only be covered by one of the two surveys. Societal priorities were determined in the face-to-face survey only, while consumer trust and political preferences were only measured in the online survey.

Table 2.1 Characteristics and subjects covered in the different surveys

	Contingent Valuation	**Choice Experiment**
Sample size	803	512
Valuation ordering: • NL before BES (Version 1) • BES before NL (Version 2) • NL and BES jointly (Version 3)	 267 299 237	
Survey provider: • Face-to-face follow-up • New respondents from survey bureau		 154 358
Valuation complexity: • Two attributes of nature conservation • Five attributes of nature conservation		 236 276
Demographics	x	x
Certainty of response and fatigue	x	x
Opinion on nature protection	x	x
Societal issues	x	
Consumer trust and happiness		x
View on world and nature		x
Political preference		x

2.2 Survey methods

2.2.1 Face-to-face survey with contingent valuation

Drawing lessons from the literature, the face-to-face survey was designed to encompass an economic valuation exercise based on the contingent valuation method (CVM). In order to encourage respondents to sign up for the follow-up online survey, the survey was brief and compact, containing a minimum number of questions while being sufficiently informative to allow for a comprehensive comparison with the online survey. The main version of the four-page questionnaire is provided in Annex A.

As shown in Table 2.1, different versions of the questionnaire were given to test for ordering effects. Version 1 of the questionnaire asked respondents first for the value of nature in the Netherlands mainland, then for their Willingness to Pay (WTP) for nature in the Caribbean Netherlands. In version 2, these two questions were placed in reverse order. In version 3 of the questionnaire, the WTP for nature protection in the Netherlands mainland and the Caribbean Netherlands were asked in a combined manner. By doing so, it was possible to test for ordering as well as scoping effects.

In all three versions, the WTP questions were preceded by a minimal but sufficient amount of information about the good to be valued. The information preceding the WTP for nature in the Netherlands Mainland was the following:

> *"Without additional protection, the Dutch nature will deteriorate further. Nature protection is a costly matter and, therefore, additional budget may be needed. By Dutch nature, we mean all flora and fauna in our country: from the Veluwe and to the Biesbos, from the beaver to the stork."*

After presenting this text, the respondent was asked whether in principle he or she would be willing to pay additional tax for the protection and possible improvement of nature in the Netherlands. If the respondent said yes, he or she could then give an undefined amount or choose an amount from a payment card with fixed payment levels per month (designed following the guidelines by Rowe *et al* (1996)). The respondent was instructed that he/she could choose any amount shown on the card or any other amount that he/she preferred, which implies that the WTP answers can be treated as a continuous variable in the analysis. If the respondent said no, the respondent was asked about the reasons for not willing to pay for additional nature protection in the Netherlands mainland.

The information preceding the WTP for nature in the Caribbean Netherlands was the following:

> *"On 10 October 2010, three of the six islands mentioned above where inaugurated as special Dutch municipalities. These three islands (Bonaire, St Eustatius, and Saba) now form the Caribbean Netherlands. Nature on these islands refers to land-based flora and fauna such as rare orchids and flamingo's, but more importantly cover vast marine areas inhabited by coral reefs, sea turtles and dolphins. Therefore, the Caribbean Netherlands represents a unique piece of Dutch nature. Also the nature in the Caribbean Netherlands is threatened and therefore needs more protection. The challenge for the Caribbean Netherlands is that only 20 thousand people live on the islands and who are unable to carry the full cost of nature protection. Therefore, additional support from the Netherlands is necessary."*

After presenting this text, the respondent was asked whether in principle he or she would be willing to pay additional tax for the protection and possible improvement of nature in the Caribbean Netherlands. Similar to the Netherlands Mainland WTP question, respondents who said yes could mention an undefined amount or chose from a payment card with fixed payment amounts per month. Respondents who said no would again be asked to explain the main reason not willing to pay for additional nature protection in the Caribbean Netherlands.

For Version 3, in which only one WTP question was posed for nature protection in both the Caribbean Netherlands as well as the Netherlands Mainland, the following introductory text was presented to the respondent:

> *"Without additional protection, the Dutch nature and the nature in the Caribbean Netherlands will deteriorate further. Nature protection is a costly matter and, therefore, additional budget may be needed. By Dutch nature, we mean all flora and fauna in our country: from the Veluwe and to the Biesbos, from the beaver to the stork.*
>
> *Nature on these islands refers to land-based flora and fauna such as rare orchids and flamingo's, but more importantly cover vast marine areas inhabited by coral reefs, sea turtles and dolphins. Therefore, the Caribbean Netherlands represents a unique piece of Dutch nature. Also the nature in the Caribbean Netherlands is threatened and therefore needs more protection. The challenge for the Caribbean Netherlands is that only 20 thousand people live on the islands and who are unable to carry the full cost of nature protection. Therefore, additional support from the Netherlands is necessary."*

Similar follow-up questions were posed to these respondents to determine their WTP as well as their motivations to pay or not pay for additional nature protection in the combined domains.

The surveys were conducted by MSc students enrolled in Environment Resource Management (ERM) program at the VU University, Amsterdam, as part of a course on economic valuation. Students were trained and the survey pre-tested. Non-Dutch students carried English questionnaires and were allowed to interview both Dutch citizens and foreigners living in the Netherlands. Dutch students only interviewed Dutch speaking citizens living in the Netherlands. The survey period was March and April 2012. The average interview took around 10 to 15 minutes and the average response rate was around 50%. The answers were entered by the interviewers in a pre-coded Excel database and analysed by the main authors of this study in the statistical software packages SPSS and STATA.

2.2.2 Online survey with choice model

Next, an online survey was designed to supplement the face-to-face survey, testing for methodological influences on the valuation of non-use values of nature in the Netherlands mainland and the Caribbean Netherlands. The online survey contains a choice experiment (CE) allowing for a greater level of detail about the good to be valued. The survey period was April-May 2012. The online survey was pre-tested using 20 respondents in order to ensure the comprehensibility of the questions and choice experiment, and to derive prior coefficient values for the final design of the experiment. As shown in Table 2.1, different versions of the questionnaire and choice experiments were implemented.

Origin of the respondents

The online survey respondents were drawn from two sources. Around one-third (1/3) of the 512 respondents originated from the face-to-face survey. These respondents provided their email address knowing that they would be invited to conduct an online survey on the same topic of nature in the Caribbean Netherlands. Two-thirds (2/3) of the respondents were provided by a specialised survey bureau (i.e. Multiscope B.V.) who provided a sample representative for the population of the Netherlands. These respondents were randomly selected from the consumer panel of Multiscope and contacted by e-mail. The 150,000 members of this panel were asked to subscribe to

the panel when they visited certain well-known websites that are used by a broad spectrum of the Dutch population, such as the online telephone directory, and national websites with information about public transport and car travel.[2] As can be seen in Table 2.2, the respondents provided by Multiscope are more experienced in conducting online surveys and therefore complete the survey substantially faster than the relatively inexperienced face-to-face follow-up respondents. The full version of the questionnaire is presented in Annex B.

Table 2.2 Time needed for completing the survey across different groups

Version	Number	Average time (minutes)
Multiscope (five attributes)	179	19
Multiscope (three attributes)	179	11
Dutch Follow-up (five attributes)	57	39
Dutch Follow-up (three attributes)	58	41
Foreign Follow-up (three attributes)	39	20
Total	**512**	**21**

Attributes and levels

The online survey varied in the complexity of the valuation task given to participants. The valuation task designed for the purpose of measuring the non-use value of nature in the Netherlands and the Caribbean Netherlands involves a minimum of three and a maximum five attributes. It also included four levels, each representing a level of environmental degradation or protection.

Attributes. Around half of the respondents completed a choice experiment with three attributes only: (1) the payment vehicle; (2) nature in the Netherlands mainland; and (3) nature in the Caribbean Netherlands. The other half of the respondents completed a choice experiment that included an additional two attributes: (1) nature in the neighbourhood and (2) nature in the rest of the world. By adding these two attributes, the scope of the choice experiment is substantially widened and therefore more likely to provide other valuation results.

The five attributes used in the online survey, which included an explanation of each attribute, as shown in Figure 2.2. Before presenting the attributes, the following text was shown:

> *"Worldwide, nature is under pressure. Without additional conservation efforts, nature will degrade further. Nature protection is costly and this is why choices will have to be made about what to protect and what not to protect. In the following questions, we will ask you to make six choices between three policy options that vary in terms of 'how much' nature is managed and 'where' nature is protected. These options consist of the following elements:"*

After showing this text, Figure 2.2 was presented. In the header of each attribute row, both the title and a pictogram are shown in order to maximize the comprehension by the respondent of the choice experiment.

[2] For more information, see www.multiscope.nl.

Nature in own surroundings 	Nature in your own surroundings includes plants and animals in local parks, meadows, forests and ponds in a circle of 10 kilometers around your home. This nature is easily accessible by bicycle and will therefore be used intensively by you and your family.
Nature in the Netherlands 	Nature in the remaining areas of the Netherlands includes plants and animals in our country, with the exception of your own surrounding. This includes our national nature, varying from the Veluwe to the Biesbos, and from the seal to the stork.
Caribbean Netherlands Nature 	The Caribbean Netherlands consists of the islands Bonaire, St Eustatius and Saba which have the status of special Dutch municipalities. Nature refers to land-based flora and fauna such as rare orchids and flamingo's, but more importantly cover vast marine areas inhabited by coral reefs, sea turtles and dolphins. Therefore this nature represents a unique piece of Dutch nature.
Nature Worldwide 	The nature outside the Netherlands includes all nature in the World with the exception of plants and animals in the earlier mentioned areas. This involves tropical rainforest and coral reefs, the North Pole and the Antarctic, as well as endangered species such as tigers and panda's.
Extra tax payment 	This last element involves the extra tax payment which you are willing to pay for the positive changes in nature in the presented management option. This concerns a real increase in tax which will be used for nature protection only.

Figure 2.2 Attributes used in the choice experiment

To explain the various levels of the attributes, the following text was presented in the online questionnaire, before showing Figure 2.3.

> *"The changes that nature can undergo may vary between small degradation to large improvements. The meaning of these changes is as follows."*

After explaining the attributes and the levels, an example card was shown to test whether the respondent understood the requested task. An example of the choice card is presented in Annex C.

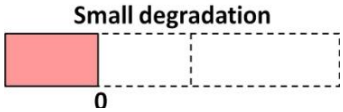
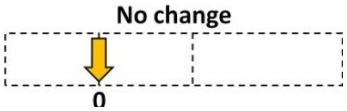
	Without additional nature protection, nature will gradually degrade. This means a decline in quality and quantity of nature in the coming 25 years.
	To maintain nature at current levels, additional nature conservation efforts are needed. In this case, quality and quantity of nature will not change in the coming 25 years.
	With some additional effort in nature conservation, we can even achieve slight improvements in the quantity and quality of nature in the coming 25 years.
	And if major conservation efforts are done, we can even realize major improvements in nature. This implies substantially more nature areas and higher levels of biodiversity in the coming 25 years.

Figure 2.3 Levels applied in the choice experiment

The design of the choice experiment allocated different combinations of levels to the different attributes, and which together made up the choice cards shown to respondents. The design was generated using the software Ngene, in accordance with the principle of D-efficiency.

The principle of D-efficiency holds that the design of a choice experiment is created in such a way that it provides the maximum amount of obtainable information and also the smallest variance of the choice model. A so-called 'point efficient design' of 24 and 48 choice cards has been generated for, respectively, version 1 (3 attributes) and 2 (all 5 attributes) of the choice experiment. The choice cards used prior estimates of the coefficient values obtained from the results of the pilot survey, as a design that includes prior information about coefficient values is more statistically efficient and more robust to model misspecification than statistical designs without prior information, or orthogonal designs that were often used in earlier studies (Ferrini and Scarpa, 2007). The design satisfies the properties of level balance, moderate attribute level overlap, and orthogonality (uncorrelated attributes) and excludes dominant choice options. A commonly applied 'blocking procedure' divides the total number of choice cards of the choice experiment in such a way that each respondent has to answer only 6 choice cards.

2.3 Estimation methods

2.3.1 Estimation methods of the contingent valuation survey

The contingent valuation (CV) questions more directly elicit WTP for nature protection. Answers to these CV questions are analysed by providing descriptive statistics of the WTP values. Mean WTP values of the sample and of subgroups of the sample are reported in Section 3.1. These mean values provide an informative picture of the WTP distribution since no large outliers of WTP can be observed in the data which otherwise could have a large influence on the mean value of WTP. Tobit regressions are used to examine the determinants of WTP. Tobit regressions are in order here and not OLS regressions because WTP ≥0, meaning that the data is censored at 0. This censoring would result in biased coefficient estimates of an OLS regression, while this censoring is adequately accounted for by a Tobit regression (Wooldridge, 2002).

2.3.2 Estimation methods of the choice experiment

A different method has been used of the analysis of the choice experiment (CE). It is not possible to directly observe the utilities (value) derived for every alternative for each respondent with choice data. These utilities have to be estimated from the choices that the respondents made in the experiment. The underlying assumption is that the individual chooses the alternative that gives him the highest utility level. The analyst knows that the non-chosen alternatives have lower utility values than the chosen alternatives. However, no information about the order of preference among the non-chosen alternatives is obtained. This information can be gathered in the aggregate, i.e. over a number of decision makers or repeated observation of one decision maker.

The attributes used in choice modelling experiments can be interpreted as sources of utility. It is useful to measure the contribution of these attributes to the overall level of utility associated with each alternative (commodity or good) in a choice set. This can be estimated by setting up a behavioural rule, as will be explained below. Subsequently, this behavioural choice rule is translated into a basic choice model which can be used to estimate the parameters that represent the contribution of attributes and socio-economic characteristics of alternatives to the overall choice outcome.

The overall utility associated with an alternative i and decision maker n can be divided into the contributions observed by the analyst and into one unobserved by the analyst. These sources are respectively denoted by V_{ni} and ε_{ni}, where the latter contains behavioural content, not merely an error. These components are generally assumed to be independent and additive, implying that the overall utility of an alternative U_{ni} can be represented by

$$U_{ni} = V_{ni} + \varepsilon_{ni}$$

The term V_{ni} is generally referred to as the "representative component of utility", which can be defined as a linear expression in which each attribute is weighted by a unique weight to account for that attributes marginal utility input. This can be represented by

$$V_{ni} = \beta_{0ni} + \beta_{1ni} f(X_{1ni}) + \beta_{2ni} f(X_{2ni}) + \ldots + \beta_{kni} f(X_{kni})$$

where f is a general notational form which can be different for each attribute. β_{1ni} is the weight associated with attribute X_{1ni} and alternative i, and β_{0ni} is a parameter not associated with any of the observed and measured attributes, defined as the alternative specific constant, which represents on average the role of all the unobserved sources of utility. Finally the overall utility of alternative U_{ni} can be represented by

$$U_{ni} = \beta_{0ni} + \beta_{1ni} f(X_{1ni}) + \beta_{2ni} f(X_{2ni}) + \ldots + \beta_{kni} f(X_{kni}) + \varepsilon_{ni}$$

under the assumption that U_{ni} is linear additive in the attributes and the parameters. By defining a utility expression of this form for each alternative and assuming that the unobserved influences have the same distribution and are independent across alternatives, the i subscript attached to ε can be removed. Then the functional form for the utility expression of a logit model is obtained (Hensher *et al.*, 2005).

Next, a basic choice model is derived from the behavioural rule discussed above. The probability of an individual, n, choosing alternative i is set equal to the probability that the utility of alternative i is greater than or equal to the utility associated with the

alternative *j* after evaluating each and every alternative in the choice set of *j = 1,…i,…*J alternatives. This can be formalized as

$$P_{ni} = prob(U_{ni} \geq U_{nj}) \forall j \in = 1,\ldots,J; i \neq j)$$

which is equivalent to

$$P_{ni} = prob[(V_{ni} + \varepsilon_{ni}) \geq (V_{nj} + \varepsilon_{nj}) \forall j \in j = 1,\ldots,J; i \neq j]$$

This equation contains information that is observable as well as unobservable to the analyst.[3] After rearranging it is apparent that the probability that an individual chooses alternative *i* is equal to the probability that the difference in the unobserved sources of utility of alternative *j* compared to *i* is less than (or equal to) the difference in the observed sources of utility associated with alternative *i* compared to alternative *j* after valuating each and every alternative in the choice set of *j = 1,..i,..J* alternatives. This can be represented as

$$P_{ni} = prob[(\varepsilon_{nj} - \varepsilon_{ni}) \leq (V_{ni} - V_{nj}) \forall j \notin j = 1,\ldots,J; i \neq j].$$

This model is usually estimated using a logit model:

$$P_{ni} = e^{\beta' x_{ni}} / \sum_j e^{\beta' x_{nj}} .$$

In this report a slightly modified version of the logit model is used. The logit model is adapted to account for the panel structure in the data. Each respondent answered six choice cards, which implies that the errors of the model are not independent. Therefore, we estimate an error term for each individual. Moreover, it is often observed that the error variance is larger for the choice alternatives (in this study environmental policy A or B) than the opt out alternative (in this case no additional protection measures) (e.g. Botzen and van den Bergh, 2012). This difference in variance can be accommodated by specifying an error correction term in the utility specifications of the choice alternatives, which is normally distributed with mean zero. The resulting model does not have an analytical solution and is simulated using Monte Carlo simulation methods based on 1,000 Halton draws (see Train, 2003).

[3] This lack of full information available to the analyst conditions the individual decision maker's utility maximization rule to be random utility maximization rule.

3 Sample description

This Chapter analyzes the results of the face-to-face and online surveys (other than the results of the economic valuation exercises, which are discussed in the next Chapter). Note that the results of the two surveys are discussed simultaneously.

3.1 Demographics

Table 3.1. highlights the most important statistics of the demographic surveyed. In terms of gender, both surveys are almost identical, with a minor overrepresentation of male respondents. Dutch-born citizens dominate the sample in both surveys. Due to an overrepresentation of young people in the face-to-face survey, the share of foreigners is higher than the non-Dutch share of the sample in the online survey. For the same reason, a limited share of the respondents in the face-to-face survey has children.

Table 3.1 Demographic information of the two surveys

	Face-to-face survey (Contingent Valuation)	Online survey (Choice Experiment)
Sample size	803	513
Male/female	51%/49%	52%/48%
Dutch born/not Dutch born	70%/30%	89%/11%
Children/no children	20%/80%	70%/30%

The overrepresentation of students in the face-to-face survey is also visible in the age distribution presented in Figure 3.1. The high peak around the age group of 24-27 is clearly caused by the high representation of young people in the face-to-face survey. Not surprisingly, the average age of the face-to-face survey and online survey differ substantially: 37 versus 51 years.

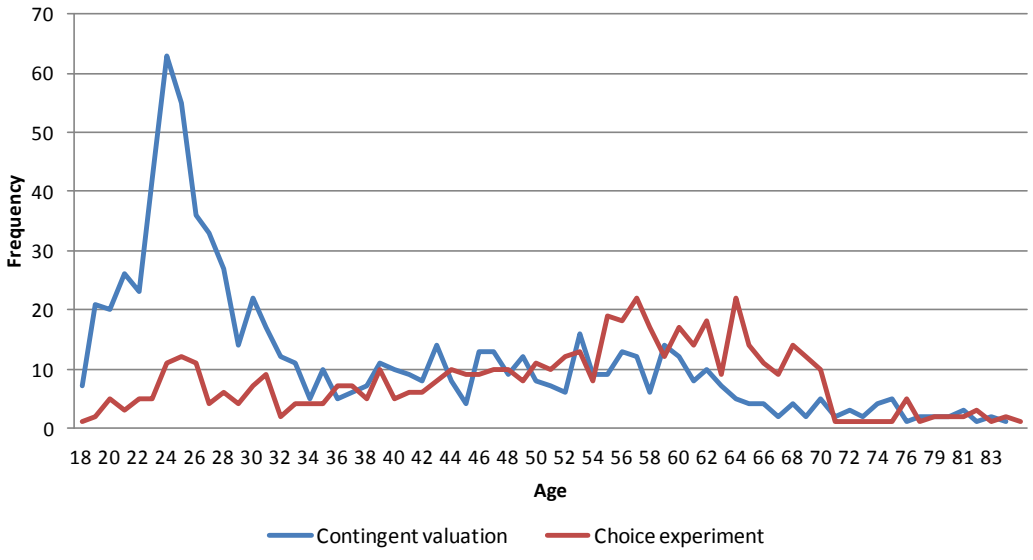


Figure 3.1 Age distribution across the total sample of the contingent valuation and the choice experiment

The income category of the respondents of both surveys is shown in Figure 3.2. Note that the income question in the two surveys differs. The face-to-face survey only gave three income category options, as shown in Figure 3.2, while the online survey was much more specific, offering 10 categories. The reason for limiting the income categories in the face-to-face survey was to minimise the non-responses and to encourage respondents to also take the online survey by not intimidating them with too specific income questions. Despite the different set-up of the income question, with respectively €2,060 and €2,170 the average income of the face-to-face survey and the online survey does not differ much. The detailed distribution of income for the online survey is shown in Figure 3.3.

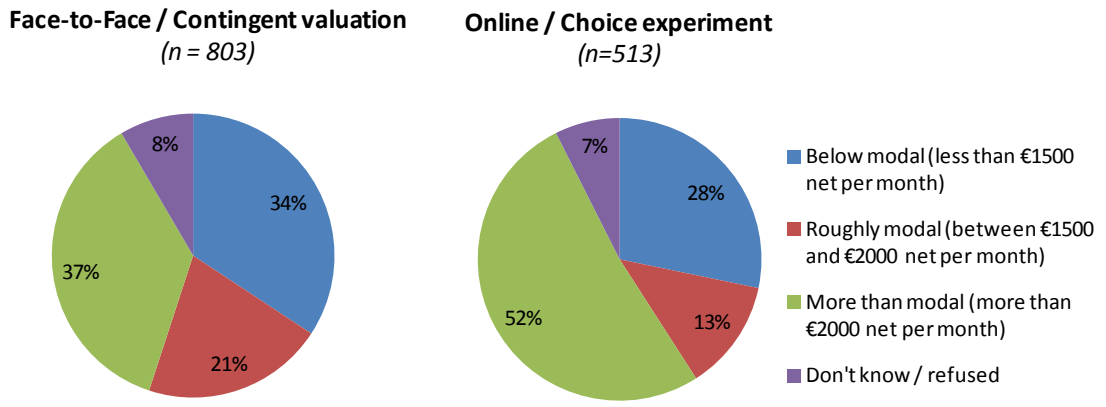


Figure 3.2 Income composition across both surveys

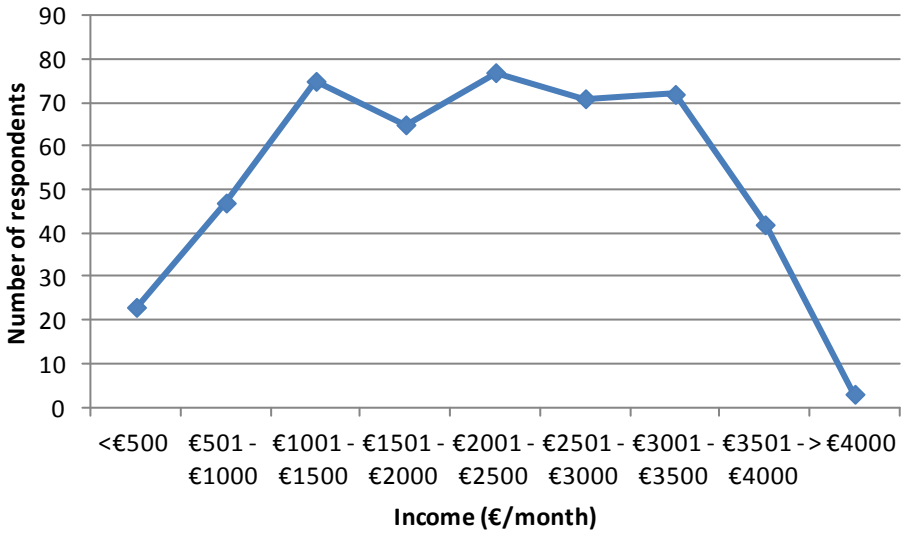


Figure 3.3 Income distribution across the total sample of the choice experiment

Finally, the level of education of both samples is shown in Figure 3.4. The relative overrepresentation of young people in the face-to-face survey is again apparent by the fact that majority of the highest education completed by the respondents at least exceed secondary education while the online survey has a relatively large share of older people who never completed more than a secondary education.

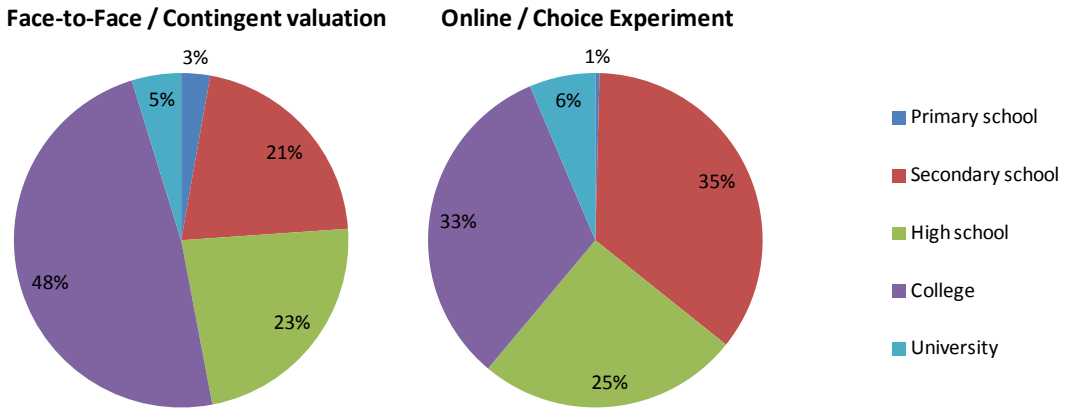


Figure 3.4 Completed education composition across both surveys

3.2 Societal topics

The face-to-face survey began by asking the respondents about their personal opinion with regard to the importance of a range of societal issues. Similar to earlier surveys conducted among Dutch citizens (Natuurmonumenten 2012), a Likert Scale between 1 and 10 was applied. The results of these questions are presented in Figure 3.5. The scores of the main societal issues of previous years from earlier surveys are also shown. No major changes are recorded. These findings suggests that, although the face-to-face survey contains an overrepresentation of respondents aged 20-30, the personal opinions about societal issues of our respondents are similar to personal opinions that have been elicited earlier using representative samples of the Dutch population. The similarity between the outcomes of both surveys combined with the fact that the Natuurmonumenten survey is strongly representative of the Dutch population implies that the bias of 20-30 aged people in the face-to-face survey does not lead to a bias in the outcome of the survey.

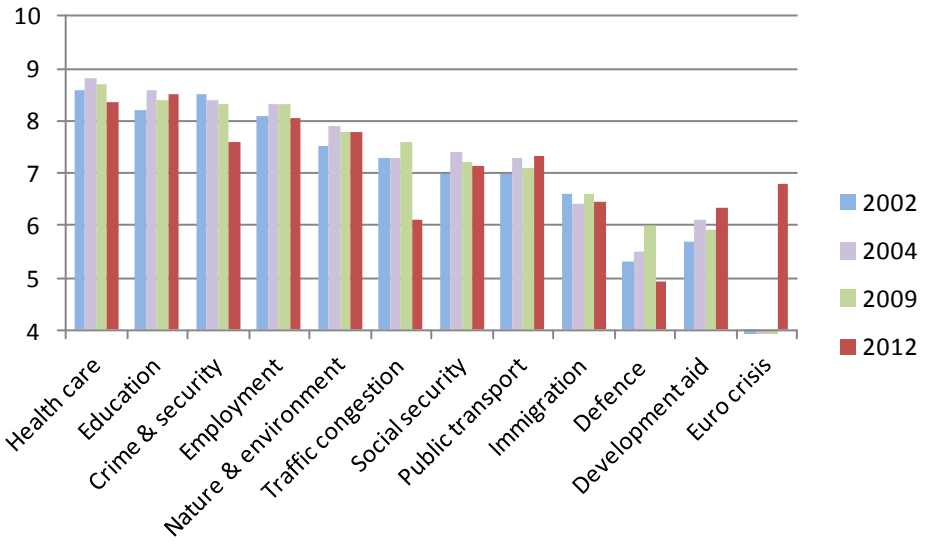


Figure 3.5 Absolute importance of societal issues over the last decade

Obviously, this study is especially interested in the ranking of "nature and the environment" relative to other topics. This is most clearly visible by comparing the scores relative to the average score given by the respondents in the overall exercise (see Figure 3.6). Traditionally, the most popular topics in the Netherlands remain education, health care and employment. Importantly, despite the importance of employment to respondents, and the negative effects the current economic crisis is having on it, the topic of nature and the environment remains to be a priority according to the respondents.

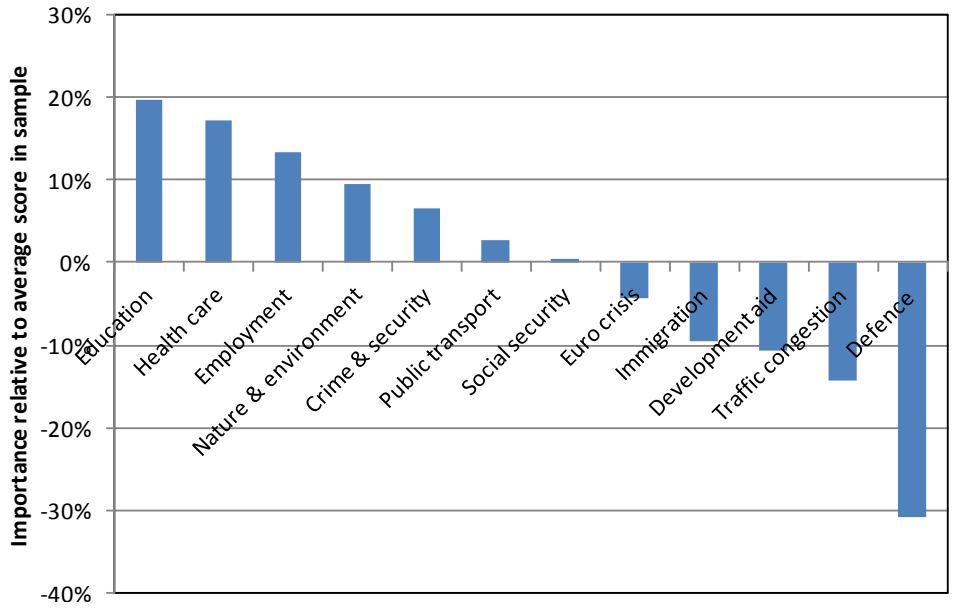


Figure 3.6 Relative importance of societal issues

The face-to-face survey also asks respondents to prioritize threats to nature in the Netherlands. Respondents were asked to indicate their opinion about the importance of each threat to Dutch Nature on a scale of 1 (not important) to 5 (very important). With the exception of pollution, Figure 3.7 shows how the majority of the threats are scored equally.

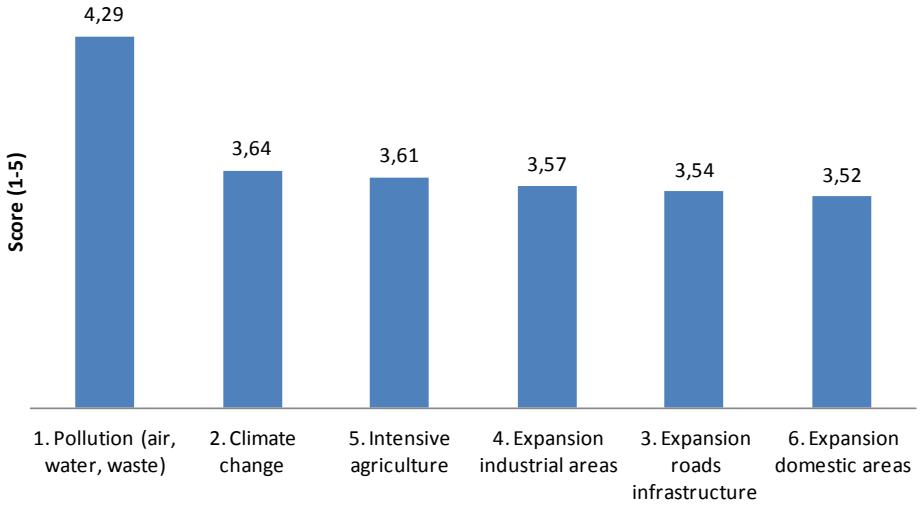


Figure 3.7 Importance of different environmental problems in the Netherlands

3.3 Consumer confidence

The online survey contained five questions that jointly measure consumer confidence in the Netherlands. Consumer confidence can be an important explanatory variable in determining the WTP for nature conservation. Consumer confidence is defined as "the degree of optimism that consumers feel about the overall state of the economy and their personal financial situation. How confident people feel about the stability of their incomes determines their spending activity and therefore serves as one of the key indicators for the overall shape of the economy. In essence, if consumer confidence is higher, consumers buy more, boosting economic expansion. On the other hand, if confidence is lower, consumers tend to save more than they spend, prompting the contraction of the economy" (CBS, 2012).

The consumer confidence indicator is composed of 5 elements, addressing the respondents' judgement about the past and future state of the national economy as well as the personal economic situation and the question whether today is a good time to buy luxury goods. The maximum score for each element is +1, the minimum score -1. The average scores of the five indicators are shown in Figure 3.8. With all indicators in the negative, it may be assumed that Dutch consumers are very pessimistic about the current economic situation. This matches the national measurements by the Dutch Statistics Office (CBS 2012), which also arrive at comparable record low scores for consumer confidence in the Netherlands.

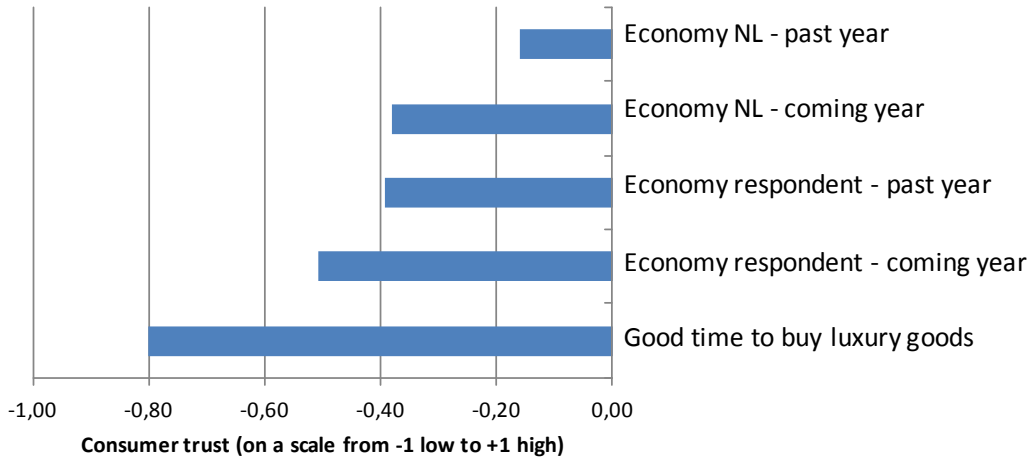


Figure 3.8 Consumer confidence on five main economic issues

As shown in Figure 3.9, with the exception of a few positive scores, the majority of Dutch citizens are very pessimistic about the national and personal economy. The average score for the consumer confidence at the time of the survey was -2.24.

Figure 3.9 Distribution of summed consumer trust across total sample

Despite the pessimism about the economic situation in the Netherlands, respondents are not unhappy. Respondents were asked, on a scale between 0 (very unhappy) to 10 (very happy), how happy they are about their life in general. As shown in Figure 3.10 the majority of the respondents scored more than a 6, with a peak around a 9.

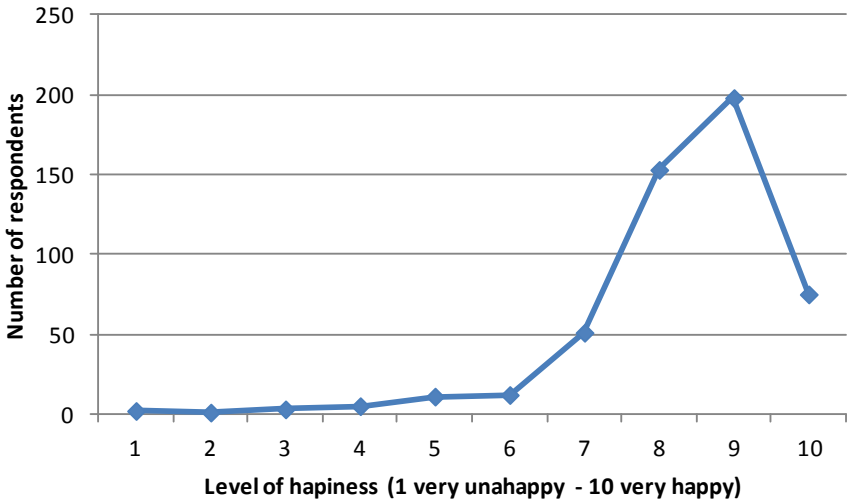


Figure 3.10 Distribution of level of happiness on a scale between 1 (very unhappy) and 10 (very happy)

3.4 View on nature and the globe

To get a better idea of how respondents perceive the importance of conserving nature on a more global scale, several questions were asked in the online survey on these topics. Respondents were asked to score each topic in a range from as being “Not at all important” to being “Very important”. Figure 3.6 summarises the results of the four themes investigated and distinguished between the sub-samples in the survey. A more detailed evaluation of these questions is provided in Annex D.

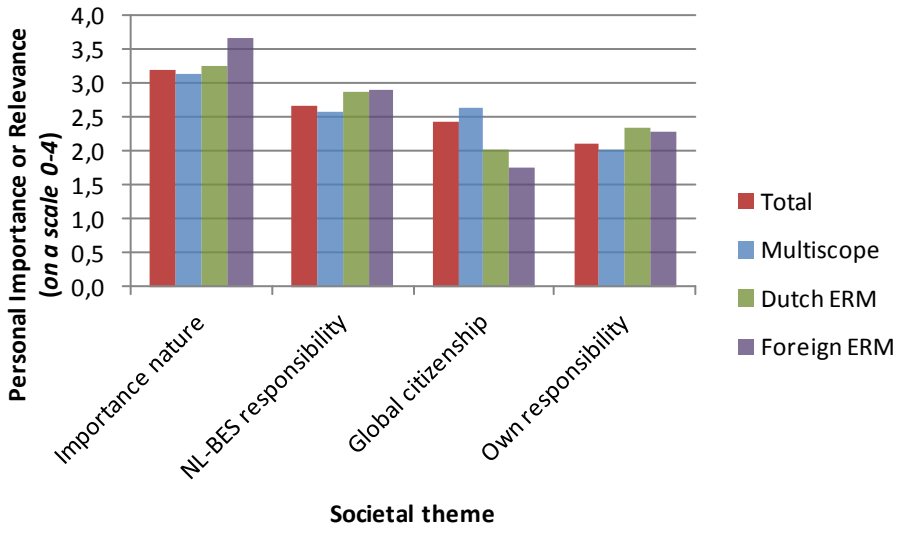


Figure 3.11 Respondents' perception on various societal themes (on a scale between 0 – not at all important – to 4 – very important)

The first question refers to the importance of nature to the respondent personally. This theme also scores highest in terms of importance to the respondent. The second highest-rated theme questioned whether the Netherlands government has a responsibility in managing nature in the Caribbean Netherlands. The majority of the respondents feel that the Netherlands government has a responsibility to provide technical and financial support in the management of ecosystems and biodiversity in the Caribbean Netherlands. The third theme refers to extent to which respondents consider themselves global citizens. Respondents were asked whether they fit the image of world citizens (i.e. travel a lot and are engaged in the wellbeing of people and the state of nature in other countries). Lastly, respondents were asked about the need for individuals to personally financially contribute to nature conservation. Of the four themes, this notion received the least support.

The same questions were also analysed on the basis of political preference of the respondents. Political preference was measured by asking respondents about which political party they would select if they were to vote at the time of the interview, as shown in Figure 3.12. The composition of political parties in the survey sample is comparable to the current composition measured in regular polls, although there is a slight overrepresentation of voters for the green party (GroenLinks) and underrepresentation of voters for the liberal party (VVD).

The opinions about nature, responsibility for funding nature protection, and global citizenship of the respondents match very well with the programmes of the main political parties in the Netherlands. The typical "green" parties in the Netherlands include GroenLinks (i.e. Green Left), Partij voor de Dieren (i.e. Animals Party), and the D66 (i.e. Global Democrats). The typical "non-green" parties in the Netherlands include the VVD (i.e. Republican Liberals), the CDA (i.e. Christian Democrats) and the PVV (i.e. National Party for Freedom).

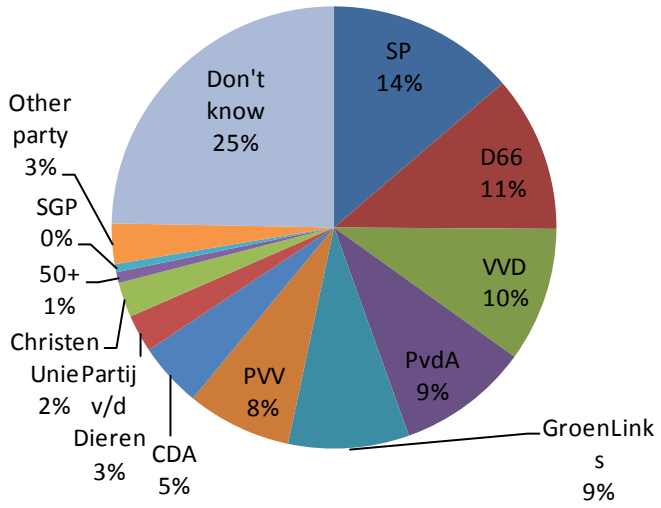


Figure 3.12 Distribution of political preference across the sample

The allocation of political preferences in relation to the four themes is shown respectively in Figure 3.13, Figure 3.14, Figure 3.15, and Figure 3.16. A clear pattern arises in which the voters for the green parties are strong supporters of nature, want the Dutch government to take responsibility for nature protection in the Caribbean Netherlands, and consider themselves as global citizens. The electorate of the non-green parties are clearly positioned at the other end of the spectrum. They consider nature less of a priority, dislike the idea of Dutch funds being spent for protection in of Caribbean Netherlands nature and also consider themselves to be Dutch, rather than global, citizens.

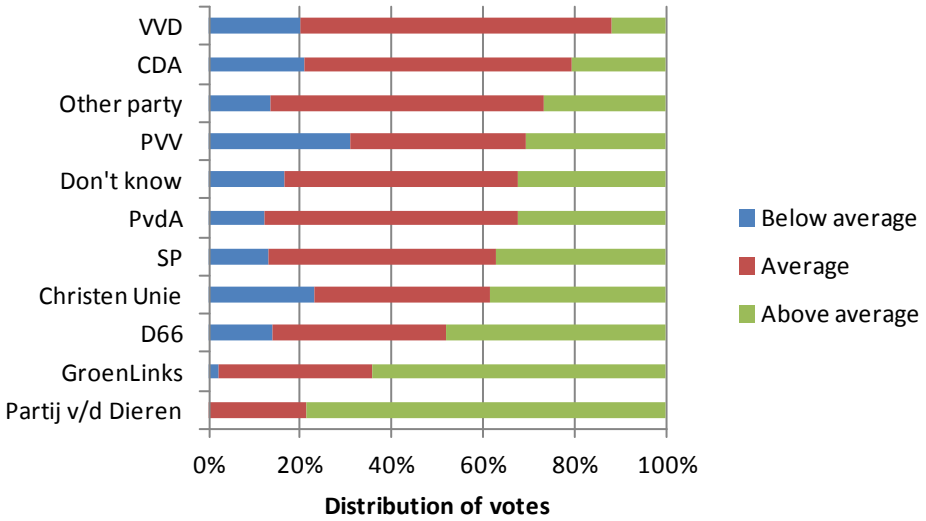


Figure 3.13 Importance of nature in general

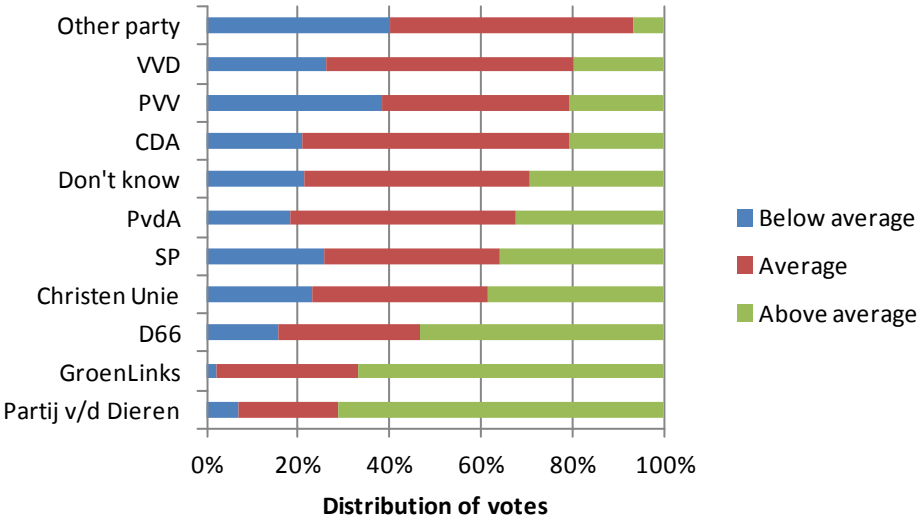


Figure 3.14 Personal financial responsibility for managing nature

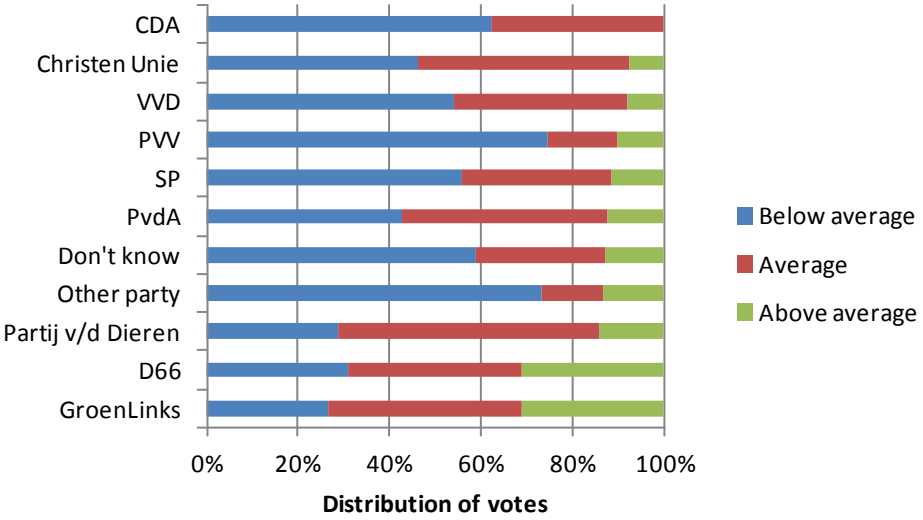


Figure 3.15 Netherlands' government responsibility to manage nature in the Caribbean Netherlands

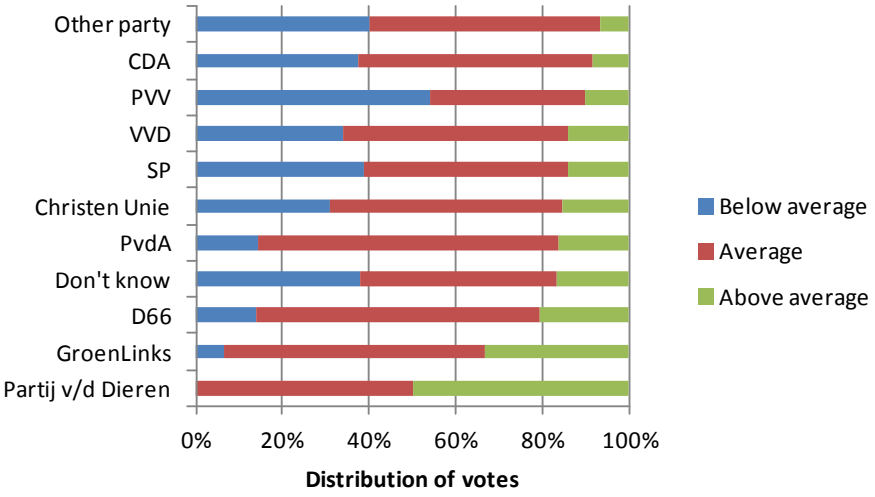


Figure 3.16 Level of 'world citizen"

To get a better understanding of the general public perception towards the need for nature protection in and outside of the Netherlands, several specific statements on this topic were presented to the respondents. The main purpose of this set of questions was to understand whether respondents tend to think locally or globally when perceiving nature and its protection. Figure 3.17 shows the results of this exercise.

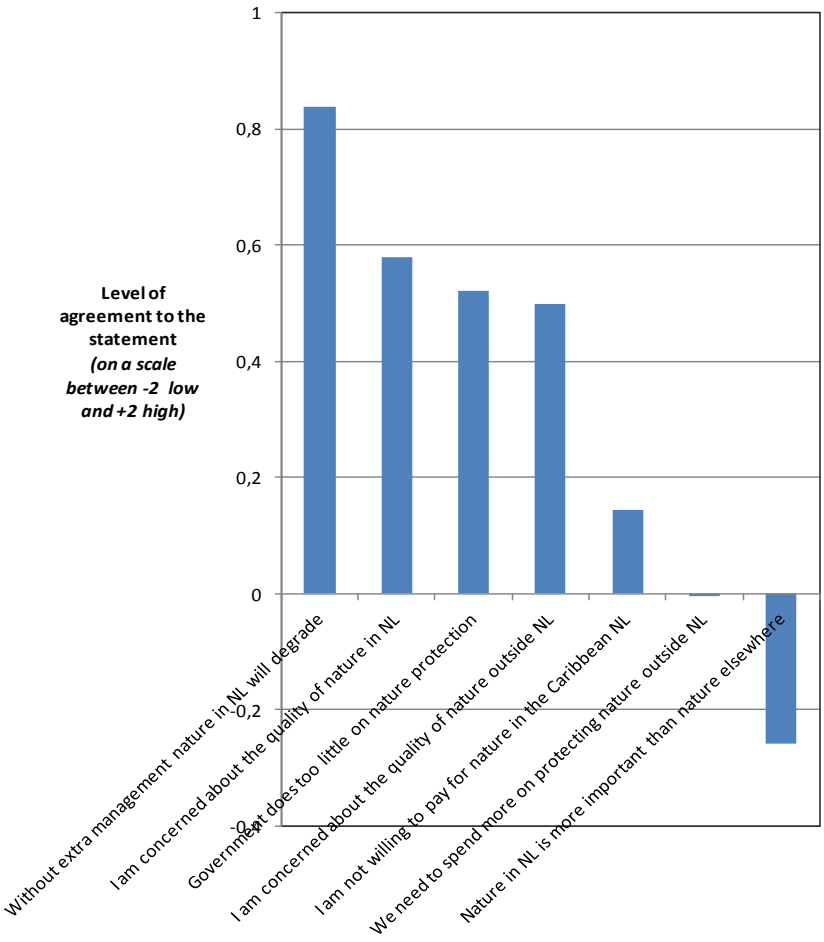


Figure 3.17 Average perception towards the need for nature protection in and outside of the Netherlands

Several conclusions can be drawn from the results presented in Figure 3.17. First, people are very convinced of the need for extra management to avoid nature degradation in the Netherlands. Likewise, respondents are genuinely concerned about the quality of nature in the Netherlands and feel that currently too little is done by the Dutch government to protect it. Second, similar sentiments can be found with regard to nature and nature management outside of the Netherlands. Respondents are also concerned about the quality of nature abroad. Third, despite the concern about foreign nature, the personal willingness to contribute and the willingness to spend more government funds for nature protection outside of the Netherlands receives less support. At the same time, people genuinely feel that nature outside of the Netherlands is as important as nature inside of the country. A more detailed evaluation of these statements is provided in Annex D.

3.5 Familiarity with the Caribbean Netherlands

The level of familiarity to the Caribbean Netherlands and the former Netherlands Antilles is likely to have a significant effect on the willingness to pay for protection of their natural areas . Obviously, the best way to get acquainted with the Caribbean Netherlands is to visit the islands. As shown in Figure 3.18, 18% of the 803 respondents have visited the former Netherlands Antilles. The majority visited the former Netherlands Antilles only once.

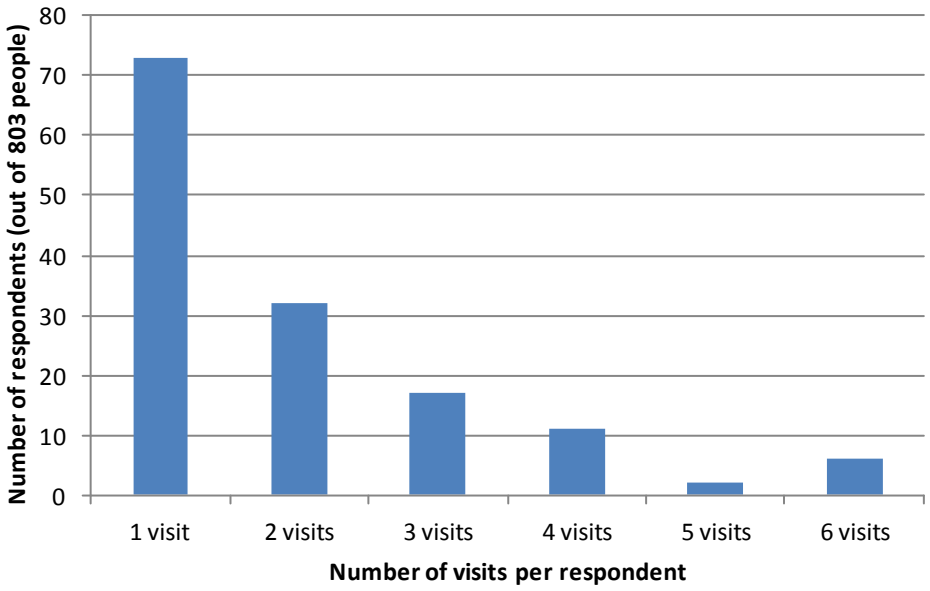


Figure 3.18 Visitation rate of the former Netherlands Antilles

Figure 3.19 shows that Curacao is the most popular destination within the former Netherlands Antilles (i.e. 37%), followed by Aruba (i.e. 24%), and Bonaire (18%). With the exception of St Maarten, this allocation of visitors matches relatively well with the tourism visitation rates published by the local Tourism Bureaus of the islands.

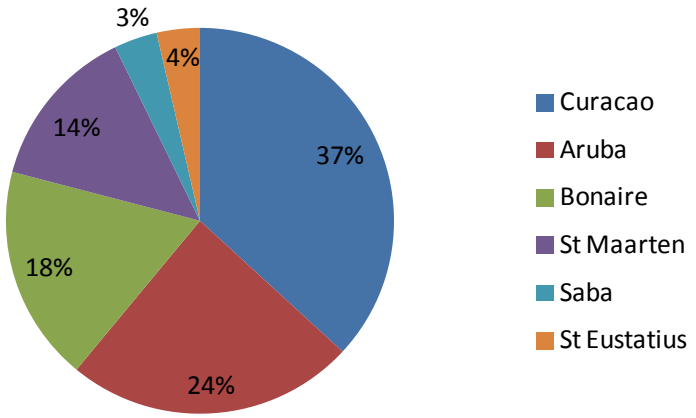


Figure 3.19 Distribution of visits to the islands of the former Netherlands Antilles

The likelihood of visiting the former Antilles in the future may also affect the WTP for nature protection in the region. After all, if one is likely to visit the Caribbean Netherlands and enjoy its natural beauty in the future, one may be more receptive for contributing towards its protection. The majority of the respondents (i.e. 40%) consider the likelihood of visiting the region small. Around 33% are likely to visit the former Netherlands Antilles in the future. Only 10% of the respondents are sure of not travelling to the region in the future.

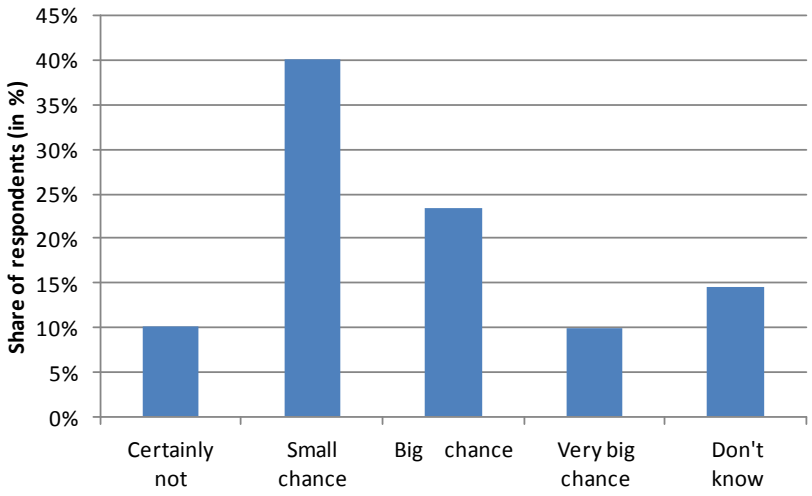


Figure 3.20 Likelihood of visiting the former Netherlands Antilles in the future

3.6 Certainty of response and fatigue

To get a better idea of the perceived difficulty and the level of confidence of the respondent about the choices made, it is common practice to inquire with the respondent how certain people actually are about the selected options in the choice experiment. Therefore, after each choice card, the respondent was asked to indicate the level of certainty about their choice on a scale between 1-10, where 1 means “very uncertain” and 10 means “very certain”. The average level of certainty indicated by each respondent is shown in Figure 3.21. The distribution of certainty is skewed towards the right, indicating that on average respondents are rather certain about their choices made.

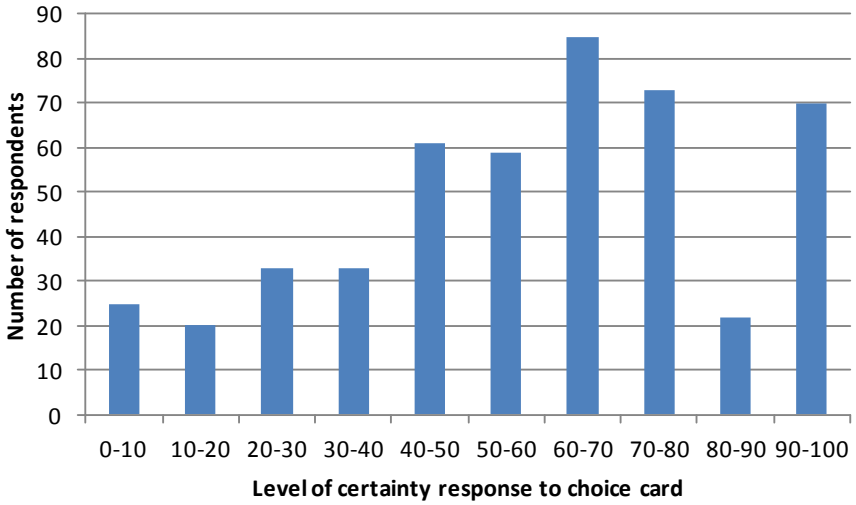


Figure 3.21 Distribution of certainty of the selected option in the choice card

The respondents were also asked how certain they were that they would truly pay the money amount they said they would. Respondents were asked to select the level of certainty on a scale between 0% (very uncertain) and 100% (very certain). The distribution of the certainty of actually paying the amount is shown in Figure 3.22. Similar to the choice certain shown earlier, the distribution is slightly skewed towards the right implying a relatively large share of respondents that are certain about actually paying the selected amount.

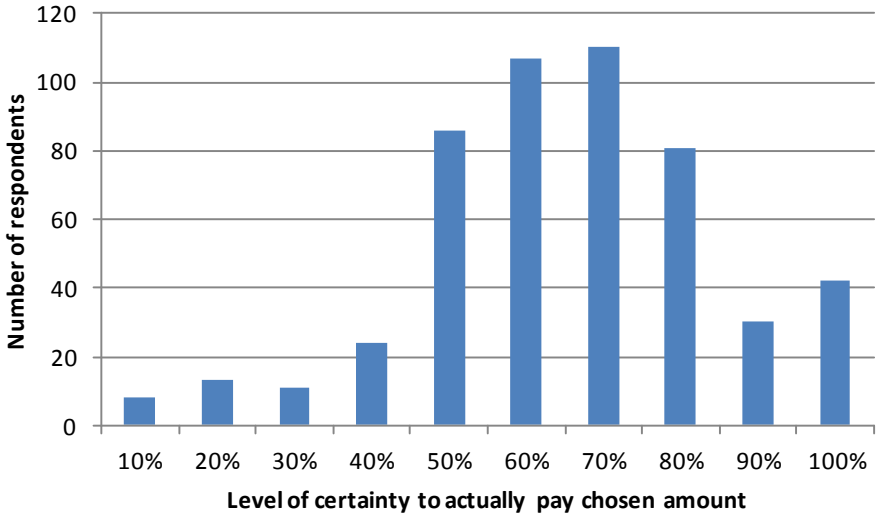


Figure 3.22 Distribution of certainty of the respondent's conviction to actually pay the chosen money amount

A logical question following these two observations is whether those people that are very certain about actually paying the chosen amount were also very certain in selecting specific choice options. And vice versa, those people that are very uncertain about actually paying the chosen amount may also be very uncertain in selecting specific choice options. Figure 3.23 shows the strong correlation between the two variables and thereby provides the key at which the estimated WTP amount should be discounted at in order to arrive at a realistic aggregated WTP amount for the population of the Netherlands as a whole.

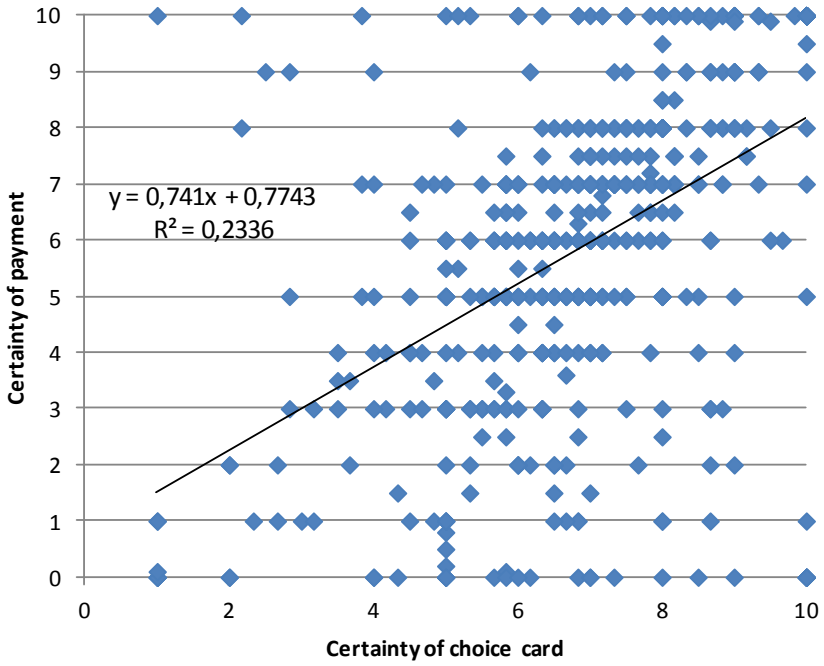


Figure 3.23 Correlation between the certainty of the selected option in the choice card and the certainty of the respondent's conviction to actually pay the chosen money amount

Another factor that may explain variation in the level of certainty of actually paying the chosen amount is whether the respondents experience fatigue during the choice experiment. Figure 3.24 shows that there is a small but distinct pattern appearing: people that were more certain about actually paying the chosen amount experienced less fatigue during the experiment.

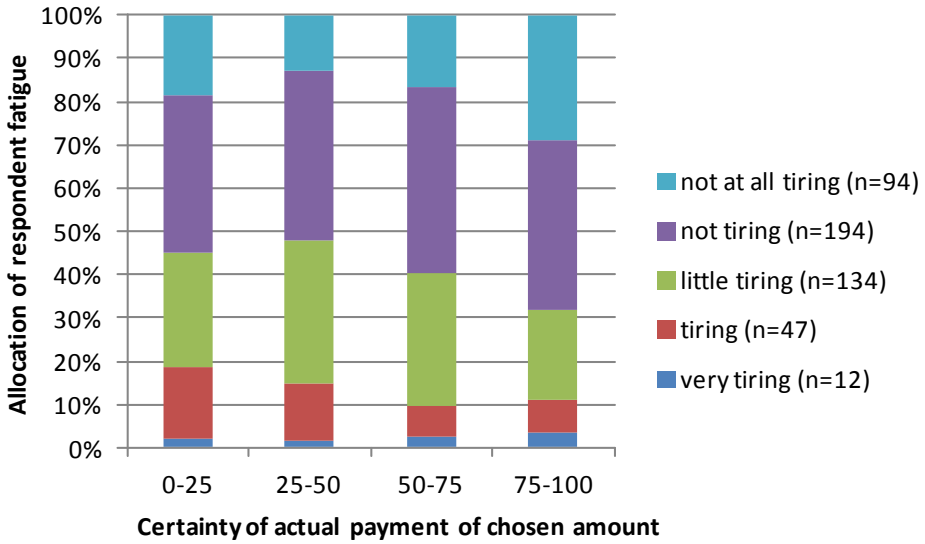


Figure 3.24 Composition of level of fatigue for the main categories of respondents' conviction of actually paying the chosen money amount

The final factor of potential influence investigated in this study is the image of the Caribbean Netherlands as presented in the national and international media. The former Netherlands Antilles received ample negative media attention due to allegations of corruption and mismanagement of public money. This may be one reason for respondents to be cautious about committing to pay to protecting nature in the Caribbean Netherlands. To test this hypothesis, a question was formulated in which respondents were asked about possible influences on the WTP for nature protection in the Caribbean Netherlands. The result of this inquiry is shown in Figure 3.25. The news about the corruption is not the most dominant factor affecting WTP estimates. Lack of bonds with the region and the economic crisis seem to be more important.

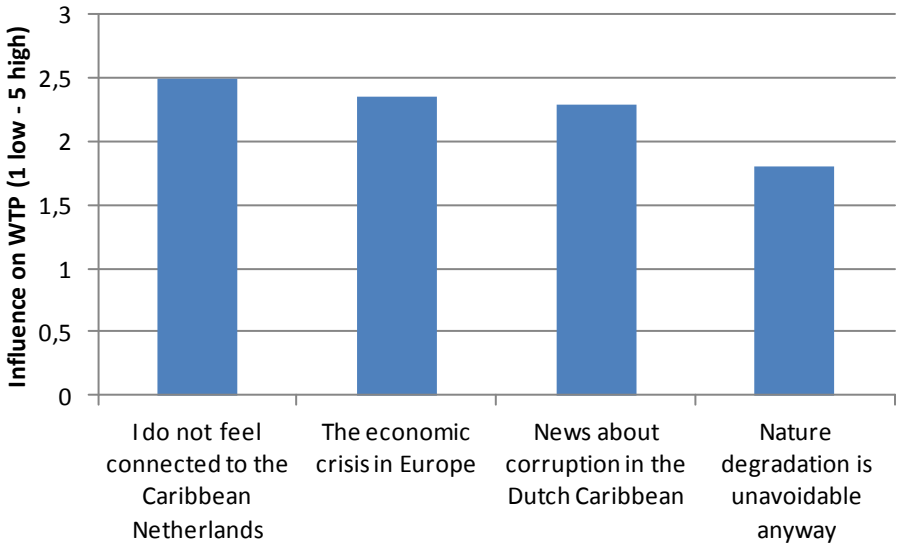


Figure 3.25 Factors influencing Willingness to Pay for the protection of nature in the Caribbean Netherlands

4 Results

4.1 Contingent valuation survey

4.1.1 WTP estimates of the contingent valuation survey

The contingent valuation survey asked in all versions whether respondents are in principle willing to pay higher taxes for the protection of nature with the answer options "yes" and "no". Version 1 asked this question first for the protection of Dutch nature and afterwards for the protection of nature in the Dutch Caribbean, while this order was reversed in version 2. Version 3 asked this question only once for the combined protection of nature in both the Netherlands and the Dutch Caribbean. Table 4.1 summarizes the answers to these questions.

Overall, a substantial proportion of respondents are willing to pay higher taxes for nature protection and the share of respondents with a positive WTP for protection nature in the Netherlands is slightly higher than for the Dutch Caribbean. In particular, 59% have a positive WTP for the protection of nature in the Netherlands in version 1 and this is 62% in version 2. 48% have a positive WTP for protection of nature in the Dutch Caribbean in version 1 and this is 54% in version 2. Only 45% of respondents have a positive WTP in version 3, which suggests that respondents viewed a single budget for nature protection in both the Netherlands and the Dutch Caribbean as less attractive.

Table 4.1 Share of respondents who are in principle willing to pay for nature protection per version

	Version 1 (N=267)	Version 2 (N=299)	Version 3 (N=237)
WTP Dutch nature	59%	62%	n.a.
WTP Dutch Caribbean nature	48%	54%	n.a.
WTP Dutch and Dutch Caribbean nature	n.a.	n.a.	45%

Notes: n.a. stands for not applicable.

Table 4.2 shows the average monthly WTP for nature protection per version. The WTP amounts in the table are the average over all respondents per version. In calculating this average, the WTP is set equal to zero for respondents who are in principle against paying higher taxes for nature protection. Although less people have a positive WTP for the protection of Dutch nature in version 1 than in version 2 (Table 4.2), the average WTP amounts are higher in version 1 (€10.82) compared with version 2 (€6.78). Similarly, WTP for nature protection in the Dutch Caribbean is slightly higher in version 1 (€4.83) than in version 2 (€4.34).

The following order effect appears to be present; if the WTP of the environmental good that is valued most (Dutch nature) is elicited first then this result in a higher subsequently elicited stated WTP for the environmental good that is valued less (Dutch Caribbean nature) compared with the version that first elicits the lower valued environmental good and afterwards the higher valued good. An explanation for this is that the second WTP amount is anchored to the higher (lower) amount that was stated in the first valuation question in version 1 (version 2). Interestingly, eliciting combined WTP for the protection of Dutch nature and Dutch Caribbean nature results in an

average of €4.73 per month, which is much lower than the WTP amounts summed for both areas in versions 1 and 2. An explanation may be that individuals find a common budget for nature protection in both areas unattractive which results in an anchoring of the stated WTP amount toward the lower valued environmental good (Dutch Caribbean nature).

Table 4.2 Monthly WTP per version averaged over all respondents

	Version 1 (N=267)	Version 2 (N=299)	Version 3 (N=237)
WTP Dutch nature	€10.82 (1.19)	€6.78 (0.88)	*n.a.*
WTP Dutch Caribbean nature	€4.83 (0.74)	€4.34 (0.63)	*n.a.*
WTP Dutch and Dutch Caribbean nature	*n.a.*	*n.a.*	€4.73 (0.67)

Notes: The standard error of the mean value is given in between brackets. n.a. stands for not applicable.

Table 4.3 shows the WTP amounts for nature protection averaged over only respondents with a positive WTP value per version. These are what are called conditional willingness-to-pay values (CWTP). The CWTP values sketch a similar picture as the WTP values in Table 4.2. CWTP values are significantly higher in version 1 than in version 2, due to the aforementioned order effect and anchoring. CWTP values in version 3 are above the CWTP values for the protection of nature in the Dutch Caribbean in versions 1 and 2, but significantly below the CWTP for only protection of Dutch nature and the CWTP amounts summed for both areas in versions 1 and 2. This confirms that the stated WTP amounts in version 3 are anchored toward the lower valued environmental good (Dutch Caribbean nature).

Table 4.3 Monthly WTP per version averaged over respondents with only a positive WTP value

Observations N in order of the rows	Version 1 (N=157 and N=126)	Version 2 (N=185 and N=161)	Version 3 (N=105)
CWTP Dutch nature	€18.25 (1.80)	€10.83 (1.33)	*n.a.*
CWTP Dutch Caribbean nature	€10.17 (1.43)	€7.93 (1.10)	*n.a.*
CWTP Dutch and Dutch Caribbean nature	*n.a.*	*n.a.*	€10.32 (1.28)

Notes: The standard error of the mean value is given in between brackets. n.a. stands for not applicable.

Table 4.4 shows average WTP values for both group of respondents who indicate that the probability that they will visit the Dutch Caribbean in the future is “large” or “100” and a group who indicates that this probability is “zero” or “small”. The former group can be interpreted as potential future users of nature in the Dutch Caribbean, while the later group can be characterized as non-users. Potential users have a higher WTP of about €1.3 in version 1 and €1 in version 2. This difference is especially large in version 3: namely, about €3.7. This seems to support our earlier statement that WTP stated for the combined nature protection in the Netherlands and Dutch Caribbean is

influenced (anchored) by the environmental good with a lower value (Dutch Caribbean nature). Although absolute differences in WTP between user and non-user may appear to be small, the relative differences are large; WTP for users is about 32%, 25% and 88% higher than for non-users in, respectively, versions 1, 2, and 3.

Table 4.4 Monthly WTP for users and non-users of Dutch Caribbean nature per version

Number of non-users and users	Version 1 (N=119, N=100)	Version 2 (N=148, N=111)	Version 3 (N=149, N=56)
Non-users WTP Dutch Caribbean nature	€4.31 (0.82)	€4.01 (0.86)	n.a.
Users WTP Dutch Caribbean nature	€5.67 (1.45)	€5.01 (1.20)	n.a.
Non-users WTP Dutch and Caribbean nature	n.a.	n.a.	€4.07 (0.64)
Users WTP Dutch and Dutch Caribbean nature	n.a.	n.a.	€7.65 (2.09)

Notes: The standard error of the mean value is given in between brackets. n.a. stands for not applicable.

WTP for Dutch and Dutch Caribbean nature may differ depending on whether people are Dutch or foreigners. Table 4.5 examines this by showing average WTP for subgroups of respondents who have, or have not, been born in the Netherlands. In both versions 1 and 2, WTP for Dutch nature is higher for respondents who have been born in the Netherlands. However, the results are ambiguous for nature in the Dutch Caribbean. WTP for the protection of Dutch Caribbean nature is higher among people born in the Netherlands in version 1, but lower in version 2. WTP for the protection of combined Dutch and Dutch Caribbean nature (version 3) is lower for the subgroup born in the Netherlands, which suggests that this valuation is anchored to the valuation of nature in the Dutch Caribbean.

Table 4.5 Average monthly WTP for subgroups of people born in the Netherlands

Born in NL	Number of born or not born in NL:	Version 1 (N=171, N=96)	Version 2 (N=105, N=192)	Version 3 (N=193, N=43)
Yes	WTP Dutch nature	€12.31 (1.59)	€6.88 (1.05)	n.a.
No	WTP Dutch nature	€8.16 (1.69)	€6.54 (1.59)	n.a.
Yes	WTP Dutch Caribbean nature	€5.24 (0.98)	€3.43 (0.56)	n.a.
No	WTP Dutch Caribbean nature	€4.10 (1.10)	€6.04 (1.48)	n.a.
Yes	WTP Dutch and Dutch Caribbean nature	n.a.	n.a.	€4.16 (0.57)
No	WTP Dutch and Dutch Caribbean nature	n.a.	n.a.	€6.92 (2.56)

Notes: The standard error of the mean value is given in between brackets. n.a. stands for not applicable.

After each question about WTP for nature protection, a follow-up question asked respondents how certain they were about the stated WTP amount on a scale from 1 (not certain at all) to 10 (completely certain). Such uncertainties, as have been formalised by Li and Mattsson (1995), may arise because respondents are uncertain about the meaning and description of the valuation task or about the exact value of the (unfamiliar) good (Shaik *et al.*, 2007). Figure 4.1 shows the distribution of stated certainty levels of WTP per version. Overall, the figure shows that most respondents are relatively certain about their choice since the large majority of respondents answered certainly levels of 5 or higher. Differences in reported certainty levels between the versions appear to be small. One exception is that the highest certainty level 10 is reported considerably less in version 2, which elicited WTP for nature protection in the Netherlands after WTP for nature in the Dutch Caribbean, compared with versions 1 and 3. A similar pattern can be observed in Figure 4.1, which shows the stated certainty levels of WTP for protection of nature in the Dutch Caribbean.

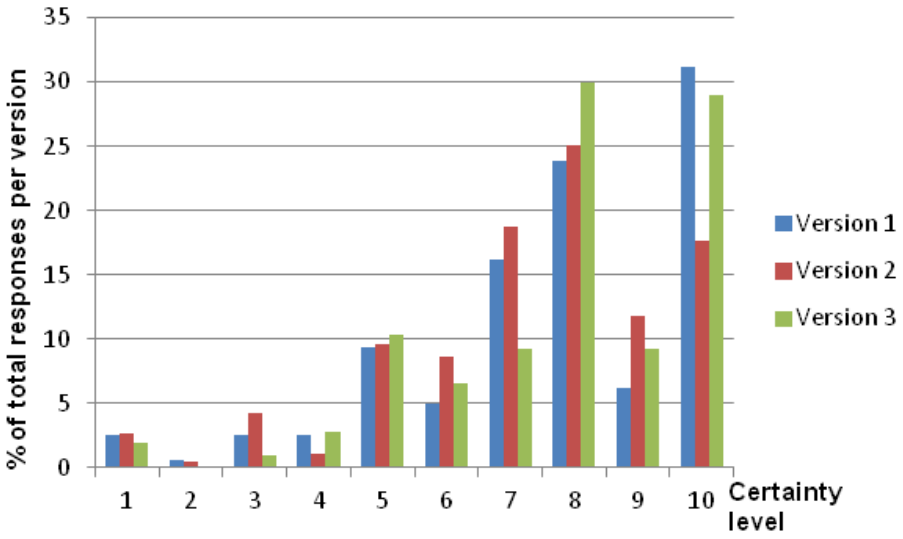


Figure 4.1 Stated certainty of WTP values for protection of Dutch nature in versions 1 and 2 and for protection of Dutch and Dutch Caribbean nature in version 3, as a % of total responses per version

Some studies have shown that higher levels of stated certainty in valuation surveys, which may be more reliable, are associated with lower WTP values, although findings between different studies are mixed (e.g. Alberini *et al.*, 2003). We examine in Figure 4.2 the relation between stated certainty of the answers to the valuation task and the WTP measures for nature protection obtained from our surveys. The results do not show a clear negative relation between WTP and the stated certainty level. In contrast, it appears that a slightly positive relation exists, but the trend is erratic. It should be noted that few observations exists for low levels of certainty (see Figure 4.21 and Figure 4.32) which implies that their relation with WTP cannot be established with a high degree of confidence.

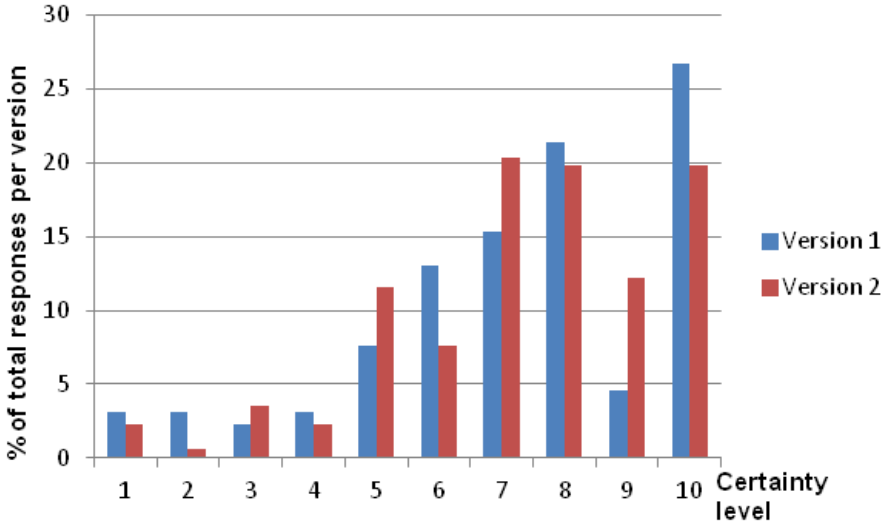


Figure 4.2 Stated certainty of WTP values for protection of Dutch Caribbean nature in versions 1 and 2, as a % of total responses per version

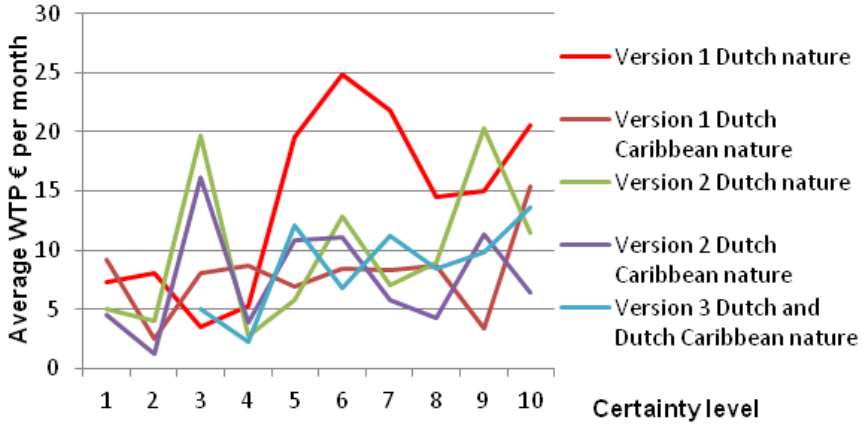


Figure 4.3 Relation between average WTP and stated certainty per version

4.1.2 Motivations behind WTP

Table 4.6 shows the results of Tobit models of the determinants of the WTP for protection of Dutch and Dutch Caribbean nature, which are pooled for versions 1 and 2. It also shows the results of a model of WTP for version 3 (a combined nature protection in the Netherlands and Dutch Caribbean). The table shows the results of the best fitting models, which only include variables that have a significant influence on WTP. Thus, insignificant variables have been excluded from the model (p-value>0.1), except for categories of dummy variables of the chance that the respondent will visit the Dutch Caribbean and of income. These have been included as long as one of these categories is statistically significant.[4]

[4] Variables that are statistically insignificant in all models are: perceived threat of pollution, perceived threat of industrialization, importance of the euro crisis, age, number of children, and being a student.

WTP for the protection of Dutch nature is significantly higher in version 1, as a result of the ordering effect explained in Section 4.1.1. Moreover, the WTP for Dutch nature appears to be positively related to the general importance individuals attach to nature and the environment and the perceived threat to nature of climate change and intensive agriculture. Of the socio-economic characteristics of the respondent, being born in the Netherlands ahs a positive effect on WTP for Dutch nature, as do having a university education and a higher than modal income. Household size influences WTP negatively (the bigger the household, the less the WTP).

Table 4.6 Coefficient values of Tobit models of the factors of influence on WTP for nature protection

	Versions 1 and 2		Version 3
Model of WTP for:	**Dutch nature**	**Dutch Caribbean nature**	**Dutch and Dutch Caribbean nature**
Constant	-46.6363***	-25.3223***	-27.3547***
Version 1	5.2121**	n.s.	n.a.
Importance nature and the environment	2.7946***	1.1418*	n.s.
Perceived threat of climate change	1.8017*	1.6900**	5.1318***
Perceived threat of intensive agriculture	2.0837*	n.s.	n.s.
Perceived threat urbanization	n.s.	1.8003**	n.s.
Small chance future visit to Dutch Caribbean	n.a.	5.2128	5.9370
Large chance future visit to Dutch Caribbean	n.a.	6.1706	12.5659***
Certain chance future visit to Dutch Caribbean	n.a.	7.078*	11.5475***
News corruption in Dutch Caribbean	n.a.	-1.3875**	-2.0000**
Feel unconnected to Dutch Caribbean	n.a.	-2.4270***	n.s.
Born in the Netherlands	8.7910***	n.s.	n.s.
Women	n.s.	-4.7243***	n.s.
Household size	-2.1017**	n.s.	n.s.
University education	9.8674***	n.s.	n.s.
Middle income	4.9146	3.1782	6.5721**
High income	9.4915***	4.8734**	7.7522**
Log likelihood	-1532	-986	-414
Number of observations	488	384	169

*Notes: *, **, *** indicate respectively significance at the 10%, 5% and 1% level. n.s. stands for not significant and n.a. stands for not applicable.*

WTP for the protection of Dutch Caribbean nature is positively related to the general importance individuals attach to nature and the environment, and their perceived threat to nature of climate change and urbanization. WTP is positively related to the chance that an individual will visit the Dutch Caribbean in the future, but this effect is only statistically significant for the highest level of this variable (i.e. the nature will be significantly protected). News regarding corruption in the Dutch Caribbean and

feelings of disconnectedness with the Dutch Caribbean negatively influence on WTP for nature protection there. WTP for nature in the Dutch Caribbean is positively related to income.

Version 3. Fewer variables appear significant in the model of WTP for the protection of Dutch and Dutch Caribbean nature (version 3). This may be due to the smaller number of observations for that analysis or because the explanatory variables have lower explanatory power in that model. The WTP in version 3 is positively related to the perceived threat to nature of climate change and the chance that the respondent will visit the Dutch Caribbean. While in the model of WTP for Dutch Caribbean nature only the highest category of that variable is significant, the two largest categories are statistically significant at the 1% level in the model of WTP in version 3. Moreover, news about corruption in the Dutch Caribbean has a negative influence of WTP in that version. These results suggests that the WTP value for Dutch and Dutch Caribbean nature is to a large degree influenced by the value placed on Dutch Caribbean nature. WTP in version 3 is positively related to income.

4.2 Choice modelling survey

4.2.1 Attribute only models

The choice model is first analyzed by estimating an 'attribute only' model for each of the two versions of the choice experiment. This attribute-only model includes only the attributes shown on the choice cards (levels of nature protection and of the tax) as explanatory variables. Such a simple model provides easy to interpret insights into the relative importance of each attribute on the respondent's choice for an alternative of environmental protection. The attribute only model of version 1 (see Section 2.3.2) of the choice experiment estimates the influence on the utility or value that individuals attach to environmental protection (choice alternative A or B) of the attributes nature protection in the Netherlands, nature protection in the Dutch Caribbean, and the tax. Formally,

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A constant parameter has been used to model the utility of the opt-out option, which is defined as no additional measures (and which leads to a small deterioration in the quality of nature in the Netherlands and the Dutch Caribbean. Each of the coefficients β_1 up to β_7 estimates the utility difference of environmental protection compared with the utility of the opt out (no additional nature protection measures). Table 4.7 shows the results of the attribute only model of version 1. The significant standard deviation of the error component indicates that the variance of the choice alternatives (A and B) is higher than the model variance of the status quo, as is expected. The pseudo R^2 of 0.4 indicates a good level of model fit. The coefficient estimates of all attributes are statistically significant at the 1% level.

Table 4.7 Results of the attribute only choice model of version 1

Variable	Coefficient estimate
Unchanged nature Netherlands	1.4714***
Small improvement nature Netherlands	1.8101***
Large improvement nature Netherlands	2.0857***
Unchanged nature Dutch Caribbean	1.2829***
Small improvement nature Dutch Caribbean	1.3218***
Large improvement nature Dutch Caribbean	1.4516***
Tax	-0.056***
Constant of the opt out option	1.2536***
Standard deviation error component	4.4777***
Log likelihood	-941
AIC	1.3419
Pseudo R^2	0.40
Number of observations	1416

*Notes: *, **, *** indicate respectively significance at the 10%, 5% and 1% level.*

The utility of environmental protection is positively related to the quality of nature in the Netherlands and the quality of nature in the Dutch Caribbean. Individuals value higher levels of protection more than lower levels in both areas. Moreover, the coefficients indicate that similar levels of environmental quality in the Netherlands are valued more than these levels in the Dutch Caribbean. As expected, the level of additional tax has a negative influence on the willingess of respondents to opt for one of the environmental policy alternatives.

Version 1. The coefficient estimates of the choice model provide information on the tradeoffs that respondents make between levels of environmental quality and price. This in turn allows us to derive a WTP estimate for the given levels improvement in environmental quality. These WTP estimates for the attribute only model of version 1 are shown in Table 4.8.

Table 4.8 Monthly WTP for levels of nature protection in version 1

Levels of nature protection	WTP
Unchanged nature Netherlands	€ 26.06
Small improvement nature Netherlands	€ 32.08
Large improvement nature Netherlands	€ 36.94
Unchanged nature Dutch Caribbean	€ 22.72
Small improvement nature Dutch Caribbean	€ 23.41
Large improvement nature Dutch Caribbean	€ 25.71

The maximum amount that respondents are on average willing to pay to prevent a deterioration of nature in the Netherlands and Dutch Caribbean are, respectively, €26.06 and €22.72 per month. These numbers are substantially higher than the WTP estimates for the similar levels of environmental protection that have been obtained using the contingent valuation survey. The WTP estimates increase with the level of environmental quality, because a high-quality ecosystem tends to be more valuable than a slightly-above average one. Remarkable here is that the upper bound of WTP for Dutch Caribbean nature (€25.71) is still smaller than the WTP for unchanged nature in the Netherlands (€26.06). This indicates that respondents place a higher value on

nature protection in the Netherlands, even though the WTP for Dutch Caribbean nature is also substantial.

Version 2. The attribute only model of version 2 estimates the value that individuals place on the following attributes: nature protection in the respondent's own region; nature protection in the Netherlands; nature protection in the Dutch Caribbean; nature protection in the world; and the proposed tax. Formally this reads:

$$U_{Environmental\ protection} = \beta_1 * unchanged\ nature\ region + \beta_2 * small\ improvement\ nature\ region + \beta_3 * large\ improvement\ nature\ region + \beta_4 * unchanged\ nature\ Netherlands + \beta_5 * small\ improvement\ nature\ Netherlands + \beta_6 * large\ improvement\ nature\ Netherlands + \beta_7 * unchanged\ nature\ Dutch\ Caribbean + \beta_8 * small\ improvement\ nature\ Dutch\ Caribbean + \beta_9 * large\ improvement\ nature\ Dutch\ Caribbean + \beta_{10} * unchanged\ nature\ worldwide + \beta_{11} * small\ improvement\ nature\ worldwide + \beta_{12} * large\ improvement\ nature\ worldwide + \beta_{13} * tax$$

A constant parameter has been used to model the utility of the opt out option, which is defined as "no additional measures which results in a small deterioration in nature in the region, the Netherlands, the Dutch Caribbean, and the world." Each of the coefficients β_1 up to β_{13} estimates the utility difference of environmental protection compared with the utility of the opt out (no additional nature protection measures).

Table 4.9 shows the results of the attribute only model of version 2. The significant standard deviation of the error component indicates that the variance of the choice alternatives (A and B) is higher than the model variance of the status quo, as is expected. The pseudo R^2 of 0.36 indicates a good level of model fit, but model fit is slightly lower than the model of version 1 as the higher AIC indicates.

Table 4.9 Results of the attribute only choice model of version 2

Variable	Coefficient estimate
Unchanged nature region	-0.1946
Small improvement nature region	0.301
Large improvement nature region	1.0508***
Unchanged nature Netherlands	0.3976
Small improvement nature Netherlands	0.7710**
Large improvement nature Netherlands	0.831***
Unchanged nature Dutch Caribbean	-0.0105
Small improvement nature Dutch Caribbean	1.0429***
Large improvement nature Dutch Caribbean	0.8121***
Unchanged nature world	0.3541*
Small improvement nature world	0.7800***
Large improvement nature world	1.3942***
Tax	-0.0560***
Constant of the opt out option	-0.6352
Standard deviation error component	5.0348***
Log likelihood	-1164
AIC	1.4237
Pseudo R^2	0.36
Number of observations	1656

*Notes: *, **, *** indicate respectively significance at the 10%, 5% and 1% level.*

Both an unchanged and a small improvement of nature in the respondent's own region are not valued significantly higher than a deterioration in nature in the respondent's own region. In contrast, a large improvement in nature in the respondent's own region is valued in a positive and significant way. Unchanged nature in the Netherlands is not valued significantly higher than a deterioration of nature, but a small and large improvement in Dutch nature are valued significantly more. A similar effect is found for nature protection in the Dutch Caribbean. All levels of improvements of nature in the world are significant and valued positively. The additional tax is highly significant and has a negative influence on choice for one of the environmental policy alternatives, as is expected.

Table 4.10 shows the WTP estimates for an improvement of nature of the significant attributes in version 2 of the CE. Recall that the experiment in version 2 included the attributes 'nature in own region' and 'worldwide nature,' in addition to nature in the Netherlands and Dutch Caribbean (the only attributes included in version 1).
The WTP for a large improvement in nature in the respondent's own region exceeds the WTP for nature in the remainder of the Netherlands. In general, the effect of adding the attributes decreased the WTP for nature protection in the Netherlands. This result demonstrates that expanding the set of tradeoffs for nature protection to other regions reduces the WTP for nature in their own country. Another interesting finding is that the WTP for nature protection in the Dutch Caribbean is higher in version 2 than version 1, and the WTP for a small improvement in Dutch Caribbean nature is larger than the WTP for a large improvement there. This latter finding is counterintuitive, and suggests that respondents find a small improvement in Dutch Caribbean nature sufficient. The WTP values for the protection of worldwide nature are slightly higher than for protection of nature in the Netherlands.

Table 4.10 Monthly WTP for levels of nature protection in version 2

	WTP
Large improvement nature region	€18.75
Small improvement nature Netherlands	€13.76
Large improvement nature Netherlands	€ 14.83
Small improvement nature Dutch Caribbean	€18.61
Large improvement nature Dutch Caribbean	€14.49
Unchanged nature world	€ 6.32
Small improvement nature world	€13.92
Large improvement nature world	€24.88

4.2.2 Complete models

The choice model has been extended in this study by including interaction variables in order to examine the influence on the value placed on nature protection of socio-economic and other characteristics of the respondent. In order to arrive at a complete choice model all possible interactions between explanatory variables and the attributes of the experiment have been tested. Insignificant interactions have been excluded from the final complete model.[5] The estimation results of the final complete model of version 1 of the choice experiment are shown in Table 4.11.

[5] Insignificant variables are: being a foreigner, having children, being a student, consumer trust, and a variable indicating whether or not news about the corruption in the Dutch Caribbean has influenced the choices made in the experiment.

Table 4.11 Results of the complete choice model of version 1

Variable	Coefficient estimate
Unchanged nature Netherlands	2.95001***
Unchanged nature Netherlands * Age	-0.0324**
Small improvement nature Netherlands	4.1935***
Small improvement nature Netherlands * Age	-0.0274
Small improvement nature Netherlands * Unconcerned about nature in Netherlands	-0.4753***
Large improvement nature Netherlands	4.7514***
Large improvement nature Netherlands * Age	-0.8570***
Large improvement nature Netherlands * Unconcerned about nature in Netherlands	-0.3982**
Unchanged nature Dutch Caribbean	2.7934***
Unchanged nature Dutch Caribbean * Age	-0.0307**
Small improvement nature Dutch Caribbean	5.6565***
Small improvement nature Dutch Caribbean * Age	-0.0416**
Small improvement nature Dutch Caribbean * Local oriented	-0.4186**
Small improvement nature Dutch Caribbean * Unconcerned about nature outside Netherlands	-0.3708***
Large improvement nature Dutch Caribbean	6.1989***
Large improvement nature Dutch Caribbean * Age	-0.0261**
Large improvement nature Dutch Caribbean * Female	-0.4934*
Large improvement nature Dutch Caribbean * Local oriented	-0.3982**
Large improvement nature Dutch Caribbean * Not responsible for Dutch Caribbean nature	-0.7660***
Large improvement nature Dutch Caribbean * Unconcerned about nature outside Netherlands	-0.3610*
Tax	-0.0839***
Tax * Income	0.0116***
Constant of the opt out option	-2.8741***
Constant * Low expectations of the decline of nature	1.5190***
Standard deviation error component	3.5859***
Log likelihood	-719
AIC	1.2979
Pseudo R^2	0.43
Number of observations	1,416

*Notes: *, **, *** indicate respectively significance at the 10%, 5% and 1% level.*

Version 1. Some of the more significant findings include: older respondent place a lower value on improvements of nature. Individuals who are unconcerned about nature in the Netherlands place a lower value on both a small and large improvement of Dutch nature. The same is true for nature improvements in the Dutch Caribbean, which is also negatively related to being unconcerned about nature outside the Netherlands. Individuals who are more locally oriented (in the sense that they do not care about the welfare and nature in other countries) place a lower value on both small and large improvements of nature in the Dutch Caribbean. Females value large improvements of Dutch Caribbean nature less than men. Individuals who do not think that the Dutch

government is responsible for nature protection in the Dutch Caribbean have a lower WTP for a large improvement of Dutch Caribbean nature. Individuals who have low expectations that nature will actually decline if no additional measures are taken are more likely to choose for the opt out (the alternative of no environmental protection). The significant and positive coefficient of the variable *tax*income* indicates that individuals with a higher income in general have a higher WTP for nature protection, as can be expected.

Version 2. The estimation results of the final complete model of version 2 of the choice experiment are shown in Table 4.12. This table shows the results of significant interactions of explanatory variables and the attributes of the choice experiment. Insignificant interactions have been excluded from the model.[6] An exception is income which is insignificant but included anyway because it is often an important explanatory variable in valuation studies.

The results show that foreigners who live in the Netherlands place a lower value on a large improvement of nature in their own (homeland) environment, while they value other attributes similarly as Dutch citizens. Individuals who are unconcerned about nature in the Netherlands value large improvements of nature in their own environment and in the remainder of the Netherlands by less than people who are concerned about nature in the Netherlands. Individuals who are unconcerned about nature outside the Netherlands place a lower value on small and large nature improvements in the Dutch Caribbean and the world. People who are more locally-oriented value small improvements of nature in the Dutch Caribbean less than people who may be described as world citizens. News about corruption in the Dutch Caribbean reduced the WTP for a large improvement of nature in that area. The significant and positive coefficient of the variable *tax * consumer confidence* indicates that individuals with a high (low) level of consumer confidence have a higher (lower) WTP for nature protection. Individuals who have low expectations that nature will actually decline if no additional measures are taken are more likely to choose to opt out.

[6] Interactions with the following variables were statistically insignificant: age, whether the respondent is a student, whether the respondent is female, and a variable representing respondents with children.

Table 4.12 Results of the complete choice model of version 2

Variable	Coefficient estimate
Unchanged nature own environment	-0.2785
Small improvement nature own environment	0.1125
Large improvement nature own environment	2.0025***
Large improvement nature own environment * foreign	-0.5648**
Large improvement nature own environment * Unconcerned about nature in Netherlands	-0.4043***
Unchanged nature Netherlands	0.4812
Small improvement nature Netherlands	0.9172***
Large improvement nature Netherlands	1.4026***
Large improvement nature Netherlands * Unconcerned about nature in Netherlands	-0.2414**
Unchanged nature Dutch Caribbean	1.2229**
Unchanged nature Dutch Caribbean * Unconcerned about nature outside Netherlands	-0.5161**
Small improvement nature Dutch Caribbean	2.3647***
Small improvement nature Dutch Caribbean * Unconcerned about nature outside Netherlands	-0.5612**
Large improvement nature Dutch Caribbean	1.9383***
Large improvement nature Dutch Caribbean * News corruption influenced choice	-0.7671***
Large improvement nature Dutch Caribbean * Unconcerned about nature outside Netherlands	-0.4819***
Unchanged nature world	1.7819***
Small improvement nature world	3.7846***
Small improvement nature world * Unconcerned about nature outside Netherlands	-0.6447***
Small improvement nature world * Local oriented	-0.4124***
Large improvement nature world	3.7748***
Large improvement nature world * Unconcerned about nature outside Netherlands	-1.0947***
Tax	-0.0869***
Tax * Income	0.0012
Tax* Consumer confidence	0.0146***
Constant of the opt out option	-4.0927***
Low expectations of the decline of nature	1.4908***
Standard deviation error component	3.7979***
Log likelihood	-966
AIC	1.3543
Pseudo R2	0.40
Number of observations	1656

*Notes: *, **, *** indicate respectively significance at the 10%, 5% and 1% level.*

5 Discussion and conclusions

5.1 Main lessons learned about the variations in WTP

The two surveys discussed in the previous Chapters have provided new insights into the ways in which Dutch and non-Dutch citizens value the non-market dimension of nature in the Netherlands and the Caribbean Netherlands.

The surveys provided evidence for a *nationalistic and community-based influence* on valuation of nature. Both the CVM and the CE methods showed that locally-oriented Dutch citizens value nature in their own neighbourhood or country relatively higher than citizens with a global perspective or foreigners who live in the Netherlands and who place a lower value on improvement of nature in their own environment

Both surveys also showed that the values for nature both in and outside of the Netherlands depend heavily on the *emotional mindset* of the respondent. For example, individuals who are unconcerned about the state of nature in general value improvements of nature less than those who are concerned about nature. In the same fashion, consumer confidence proved to be a strong explanatory variable for value for nature protection: individuals with a high level of consumer confidence express a higher WTP for nature protection.

The combination of methods used also allowed *methodological lessons* to be drawn. First, clear ordering and anchoring effects are found in the CVM survey. Inquiring about WTP for nature improvements in the Netherlands before asking for support for nature in the Caribbean Netherlands leads to higher values than the reverse order of questions.

Second, the CE survey demonstrates clear scoping effects. The model with two environmental attributes only (i.e. nature in the Netherlands and the Caribbean Netherlands) results in significantly higher WTP values for nature in both domains than is the case in the model with four environmental attributes (i.e. expanded by nature in own neighbourhood and global nature).

Third, the surveys reveal a strong correlation between the certainty with which the respondent provided the WTP estimates and the certainty that these same respondents have about actually paying the expressed amount. As will be shown in the remainder of this Chapter, this finding proves to be a crucial element in aggregating the WTP estimates to arrive at a total economic value of nature in the Netherlands and the Caribbean Netherlands.

5.2 Aggregate value of nature

After elaborating on the individual results of the surveys and explaining the variation of the WTP of the various elements of nature in the Netherlands and the Caribbean Netherlands, the question remains: what the aggregated non-use value of nature in the Netherlands and in the Caribbean Netherlands?

By adjusting for preference and payment uncertainty, **the aggregated amount for the non-use value for nature improvements in the Netherlands is estimated at €34 million for the Netherlands and and €18 million for the Caribbean Netherlands**.

The ranges of WTP estimates of the CVM (contingent valuation method) survey form the basis of the aggregation of the non-use value. As explained in the previous Chapter, the average WTP for nature protection in the Netherlands is estimated at

€8.74 ranging between €6.71 (version 2) and €10.77 (version 1). Similarly, the average WTP for nature protection in the Caribbean Netherlands is estimated at €4.58 ranging between €4.28 (version 2) and €4.88 (version 1). With 7.5 million households in the Netherlands (CBS 2011), the aggregated non-use value of nature in the Netherlands and the Caribbean Netherlands is estimated at €65 million and €34 million, respectively (see Table 5.1).

Table 5.1 Aggregated value of non-use value of nature in the Netherlands and in the Caribbean Netherlands

	Minimum	Average	Maximum
Netherlands Nature	€ 50 million	€ 65 million	€ 80 million
Caribbean Netherlands Nature	€ 32 million	€ 34 million	€ 36 million

The above approach is rather straightforward, yet also oversimplified because it ignores the impact of preference uncertainty revealed by the respondents. The hypothesis in this study is that preference uncertainty forms a basis for adjusting the aggregation of the individual WTP estimates into a national (non-use) value of nature. As was shown in Figure 3.23, a strong relationship was found between preference uncertainty and the conviction that respondents have in actually paying the expressed WTP. In other words, respondents with a low preference uncertainty also have little belief that the expressed amount will ever become a true payment. This finding allows for the adjustment of the expressed WTP in the calculation of a more plausible and reliable aggregate value.

Table 5.2 shows the adjusted WTP estimates taking into account preference uncertainty (first column) and payment uncertainty (second column). By adjusting the average WTP for nature in the Netherlands (i.e. €8.74 per household per year) and nature in the Caribbean Netherlands (i.e. €4.58 per household per year) with the belief in actually having to pay the expressed amount, a more realistic WTP is generated for each sub-group (this new WTP is grouped by category of preference uncertainty categorised in the first column of Table 5.2).

Table 5.2 Adjusted WTP estimates, corrected for level of certainty

Level of certainty	Actual payment share	WTP Dutch Nature (€8.74)	WTP Dutch Caribbean Nature (€4.58)
0-10	10%	€ 0.87	€ 0.46
10-20	18%	€ 1.57	€ 0.82
20-30	26%	€ 2.27	€ 1.19
30-40	34%	€ 2.97	€ 1.56
40-50	42%	€ 3.67	€ 1.92
50-60	50%	€ 4.37	€ 2.29
60-70	58%	€ 5.07	€ 2.66
70-80	66%	€ 5.77	€ 3.02
80-90	74%	€ 6.47	€ 3.39
90-100	82%	€ 7.17	€ 3.76

Next, the total amount for non-use value of nature in the Netherlands and the Caribbean Netherlands can be calculated by accounting for the relative size of each subgroup and combining this with the WTP calculated in Table 5.2. This aggregation process is shown in Table 5.3.

By adjusting for preference and payment uncertainty, the aggregated amount for the non-use value for nature improvements in the Netherlands is estimated at €34 million for the Netherlands and €18 million for the Caribbean Netherlands. This is substantially less than the non-adjusted method presented in Table 5.1 (i.e. €65 million and €34 million, respectively).

It should be noted that this non-use value is based on the CVM method that derived WTP for leaving the current quality of nature unchanged. The choice experiment results show that individuals have a higher WTP for improvements in nature compared with an unchanged nature stock. This implies that the aggregated non-use value would be higher if environmental policies improve current nature, instead of only keeping nature at a constant level. Policies that aim at improving the quality of natural systems are therefore more likely to receive public political and monetary support.

Table 5.3 Calculation of aggregate non-use value of nature in the Netherlands and in the Caribbean Netherlands

Level of certainty	Share in sample	Number of households	Value for Dutch Nature	Value Dutch Caribbean nature
0-10	5%	388,432	€ 339,531	€ 177,976
10-20	4%	310,746	€ 488,924	€ 256,285
20-30	7%	512,731	€ 1,165,269	€ 610,813
30-40	7%	512,731	€ 1,523,814	€ 798,755
40-50	13%	947,775	€ 3,479,510	€ 1,823,896
50-60	12%	916,700	€ 4,006,462	€ 2,100,115
60-70	18%	1,320,670	€ 6,695,544	€ 3,509,683
70-80	15%	1,134,222	€ 6,543,435	€ 3,429,950
80-90	5%	341,820	€ 2,211,024	€ 1,158,978
90-100	15%	1,087,611	€ 7,795,624	€ 4,086,325
Total		7,473,438	€ 34,249,135	€ 17,952,776

5.3 Topics for future research

The surveys that underlie the WTP estimates for nature in the Netherlands and the Dutch Caribbean have been conducted at a time when the Netherlands is facing as yet unresolved severe economic challenges. 2012 has seen a continuous stream of bad economic news about the European debt crisis, declining world trade, as well as about the adverse consequences of these events for the Dutch economy. At the same time there was a large expressed uncertainty about the abilities of the Dutch government coalition to cope with these events. Discussions of the government coalition about the reform of public finances failed, which eventually resulted in the resign of the Dutch cabinet during the time that the surveys for this research were being conducted.

As is apparent from our research results, confidence of our respondents in the state of the economy (i.e. consumer confidence) was very low. Yet, despite the economic crisis, the topic of nature and the environment remains to be a priority according to the respondents. Nevertheless, it is likely that the bad state of the economy has negatively influenced respondents' willingness-to-pay for improvements in nature. An interesting topic for future research is to examine how individual valuation of nature develops during the phase of economic recovery that is expected to occur during the coming years. Few studies have analysed the stability of individual preferences for nature over time, and research about the impacts of the economic crisis on such preferences hardly exists.

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Annex A Face-to-face questionnaire

vrije Universiteit amsterdam / IVM

Survey on Nature in the Netherlands and in the Caribbean Netherlands

This survey is part of a research project of the Institute for Environmental Studies at the VU University Amsterdam funded by the Ministry of Economic Affairs, Agriculture & Innovation. The study addresses Dutch nature as well as nature in the Netherlands Caribbean. Participation in this survey will take you no more than 10 minutes. There are no right or wrong answers: we are only interested in your opinion. Your responses are strictly confidential. The final results of the research are completely anonymous and in no way can be traced to individual responses.

Your opinion and time are greatly appreciated!

1. **I will mention 12 societal topics and ask you to express how important you find each of these topics by rating each on a scale of 1 (*not important*) to 10 (*very important*).**

	1	2	3	4	5	6	7	8	9	10
1. Traffic congestion										
2. Defence										
3. Social security										
4. Health care										
5. Immigration										
6. Nature and the environment										
7. Education										
8. Development aid										
9. Public transport										
10. Employment										
11. Crime / security on the street										
12. Euro crisis										

2. **Virtually anywhere in the world, nature is under pressure. This is also the case in Netherlands. Below a number of threats to nature in Netherlands are listed. Please indicate your opinion about the importance of each threat to Dutch Nature on a scale of 1 (*not important*) to 5 (*very important*).**

	Not important		<- ->		*Very important*	Don't know
	1	2	3	4	5	
1. Expansion of domestic areas						
2. Expansion of industrial areas						
3. Pollution (air, water, waste)						
4. Expansion of road infrastructure						
5. Climate change						
6. Intensive agriculture						
7. Other, specify						

Without additional protection, the Dutch nature will deteriorate further. Nature protection is a costly matter and, therefore, additional budget may be needed. By Dutch nature, we mean all flora and fauna in our country: from the Veluwe and to the Biesbos, from the beaver to the stork.

1. **Would you <u>in principle</u> be willing to pay additional tax for the protection and possible improvement of nature in the Netherlands?**

1. Yes (<u>Go to question 5</u>)		2. No (*<u>Go to question 4</u>*)	

2. **What is the main reason why you are not willing to pay additional tax for extra protection of Dutch nature?** *You can tick more than one box.*

1. I do not care about nature enough	
2. I am in favour of more protection but this should be paid from existing tax revenues	
3. I can't financially afford to contribute	
4. I doubt the effectiveness of nature protection	
5. Other societal problems are more urgent	
6. I do not cause nature problems and therefore am not responsible for solving it	
7. I pay enough taxes already	
8. Other, specify	
→ *after this question, go to <u>question 8</u>*	

3. **What is your maximum amount of <u>monthly additional tax</u> you are willing to pay for better nature protection so that further nature degradation in the Netherlands can be avoided? In making a choice, carefully take into account whether you actually can and are willing to pay this amount given your current income level.**

You can fill an amount from the table below or any other amount in this box: € ..... per month

€0	€2	€4	€8	€15	€30	€65	€120
€1.25	€2.50	€5	€10	€20	€40	€80	More than €120
€1.50	€3	€6	€13	€25	€50	€100	Don't know

4. **Indicate on a scale between 1 to 10 how certain you are about your choice of the amount: 1 means "*not certain at all*" en 10 "*fully certain*"**

5. **Below 5 reasons are mentioned for being willing to pay for extra nature protection in the Netherlands. Which of these fits best your own motivation? (***tick one box only***)**

1. Nature has as much right to exist as humans have	
2. Nature is crucial for the existence of humanity	
3. I like to experience nature and prefer to continue doing this in the coming future	
4. I want my children to experience healthy nature as well	
5. Humans are the cause of degradation and therefore are responsible to solve this problem	
6. Other, specify ……..	

I now want to ask you a few questions about nature in the Caribbean Netherlands.

6. **Did you ever visit one of the following islands which used to form the Netherland Antilles? (***If yes, tick each island that you visited***)**

1. Aruba		4. Saba	
2. Bonaire		5. St Maarten	
3. Curacao		6. St Eustatius	

7. **Indicate the likelihood that you will visit the Caribbean Netherlands in the future?**

1. Certainly not	
2. Small chance	
3. Big chance	
4. Very big chance	
5. Don't know	

On 10 October 2010, three of the six islands mentioned above where inaugurated as special Dutch municipalities. These three islands (Bonaire, St Eustatius, and Saba) now form the Caribbean Netherlands. Nature on these islands refers to land-based flora and fauna such as rare orchids and flamingo's, but more importantly cover vast marine areas inhabited by coral reefs, sea turtles and dolphins. Therefore, the Caribbean Netherlands represents a unique piece of Dutch nature. Also the nature in the Caribbean Netherlands is threatened and therefore needs more protection. The challenge for the Caribbean Netherlands is that only 20 thousand people live on the islands who are unable to carry the full cost of nature protection. Therefore, additional support from the Netherlands is necessary.

1. **Would you <u>in principle</u> be willing to pay additional tax for the protection and possible improvement of nature in the Caribbean Netherlands?**

1. Yes (*<u>Go to question 12</u>*)		2. No (*<u>Go to question</u> 11*)	

2. **What is the main reason why you are not willing to pay additional tax for extra protection of nature in the Caribbean Netherlands?** *You can tick more than one box.*

1. I do not care about nature enough	
2. I am in favour of more protection but this should be paid from existing tax revenues	
3. I can't financially afford to contribute	
4. I doubt the effectiveness of nature protection	
5. Other societal problems are more urgent	
6. I do not cause nature problems and therefore am not responsible for solving it	
7. I pay enough taxes already	
8. Other, specify	
→ *after this question, go to <u>question 14</u>*	

3. **What is your maximum amount of <u>monthly additional tax</u> you are willing to pay for better nature protection so that further nature degradation in the Caribbean Netherlands can be avoided? In making a choice, carefully take into account whether you actually can and are willing to pay this amount given your current income level.**

You can fill an amount from the table below or any other amount in this box: € ..... per month

€0	€2	€4	€8	€15	€30	€65	€120
€1.25	€2.50	€5	€10	€20	€40	€80	More than €120
€1.50	€3	€6	€13	€25	€50	€100	Don't know

4. **Indicate on a scale between 1 to 10 how certain you are about your choice of the amount: 1 means "*not certain at all*" en 10 "*fully certain*"**

5. **Which of following factors influenced the choice of the amount of the willingness to pay for nature in the Caribbean Netherlands? Please, use a scale between 1 (no influence) to 5 (major influence) to indicate the extent.**

	No influence		<->		***Major influence***	Don't know
	1	2	3	4	5	
1. News about corruption in the Dutch Caribbean						
2. The economic crisis in Europe						
3. I do not feel connected to the Caribbean Netherlands						
4. Nature degradation is unavoidable anyway						
5. Other, specify						

Finally, I would like to ask you several questions about yourself for statistical purposes. Your responses are strictly confidential and will not be used for any other purposes.

1. Man or woman?

1. Man		2. Woman	

2. How old are you? …….. *years old*

3. Were you born in the Netherlands?

1. Yes (*skip next question*)		2. No (*go to next question)*	

4. How long do you already live in the Netherlands? …….. *years*

5. How many persons are in your household, <u>including</u> yourself? …….. *persons*

6. How many children younger than 18 are in your household? …….. *children*

7. Is the <u>monthly net salary</u> (after taxes) of your <u>household</u> within the category modal income (between €1500 to €2000), or above this category, or below?

1. Below modal (less than €1500 net per month)	
2. Roughly modal (between €1500 and €2000 net per month)	
3. More than modal (more than €2000 net per month)	
4. Don't know / other, specify ….	

8. What is the highest level of education that you <u>completed</u>?

1. Primary / elementary school		4. University	
2. High school / vocational school		5. Others, specify	
3. College high		……	

9. Which of the following categories characterizes you best?

1. Entrepreneur / employer		5. Student	
2. Full time/part time employee		6. Pension	
3. Jobless / searching for job		7. Other, specify	
4. Housewife / houseman		……	

We would like to approach you within a month to ask you a number of follow-up questions about the value of nature. You can do this from home via the internet and it will take you not more than 10 minutes. For this reason, could we note down your e-mail address? This e-mail address will only be used for this research and will be treated strictly confidentially.

E-mail address	

THIS IS THE END OF THE SURVEY

WE THANK YOU VERY MUCH FOR YOUR KIND COOPERATION IN THIS RESEARCH!

Name interviewer	

Annex B Online survey questionnaire

Survey Version 2

Welcome to this survey which is part of a research project of the Institute for Environmental Studies at the VU University Amsterdam. The study addresses Dutch nature as well as nature in the Caribbean Netherlands. Participation in this survey will take you no more than 10 TO 15 minutes. There are no right or wrong answers: we are only interested in your opinion. Your responses are strictly confidential. The final results of the research are completely anonymous and in no way can be traced to individual responses. Your cooperation and honest opinion are highly appreciated!

Please start the survey by filling your username and password.

Before we ask you some questions about nature conservation, we would like to know how you personally view the current economic situation.

introeconomie

1. Do you feel that the economic situation in the Netherlands in the last 12 months has:

- ○ Improved
- ○ Worsened
- ○ Remained the same

1,2,3	vraag1

2. What do you expect to happen in the coming 12 months? The economic situation in the Netherlands will:

- ○ Improve
- ○ Become worse
- ○ Remain the same

1,2,3	vraag2

3. If we consider more durable goods such as Furniture, washing machines and televisions, do you consider this a good or bad time to buy such expensive products, or non of both?

- ○ Good time
- ○ Bad time
- ○ Non of both

1,2,3	vraag3

4. In the last 12 months, has the financial situation of your household:

- Improved
- Worsened
- Remained the same

1,2,3	vraag4

5. And for the coming 12 months, do you expect the financial situation of your household to:

- Improve
- Become worse
- Remain the same

6. How important is nature to you personally?

- Not at all important
- Not important
- Somewhat important
- Important
- Very important

1,2,3,4,5	vraag6

7. How important is it for you to personally contribute financially to nature conservation?

- Not at all important
- Not important
- Somewhat important
- Important
- Very important

---

8. Some people consider themselves as world citizens. They travel a lot and are highly engaged in the wellbeing of people and the state of nature in other countries. To what extent do you fit this image?

- Fits my profile perfectly
- Fits my profile in many ways
- Fits my profile
- Does not fit my profile very well
- Does not fit my profile at all

1,2,3,4,5	vraag8

On 10 October 2010, three of the six islands mentioned above where inaugurated as special Dutch municipalities. These three islands (Bonaire, St Eustatius, and Saba) now form the Caribbean Netherlands. Nature on these islands refers to land-based flora and fauna such as rare orchids and flamingo's, but more importantly cover vast marine areas inhabited by coral reefs, sea turtles and dolphins. Therefore, the Caribbean Netherlands represents a unique piece of Dutch nature.

Nature in the Caribbean Netherlands is threatened and therefore needs more protection. The challenge for the Caribbean Netherlands is that only 20 thousand people live on the islands who are unable to carry the full cost of nature protection. Therefore, additional financial support from the Netherlands is necessary.

9. How responsible do you consider the Netherlands government to be for managing nature in the Caribbean Netherlands?

- ○ Very responsible
- ○ Partly responsible
- ○ Not responsible
- ○ Absolutely not responsible
- ○ Don't know

---

10. Statements:

- The current government gives too little importance to nature conservation
- Nature in the Netherlands is more important to me than nature in the rest of the world
- I am not willing to pay for nature conservation in the Caribbean Netherlands
- We need to reserve more funds for the protection of rare nature outside of the Netherlands
- Without additional conservation efforts, nature in the Netherlands will degrade
- I am concerned about the quality of nature in the Netherlands
- I am concerned about the quality of nature outside of the Netherlands

10b. Levels (Fully agree, agree, agree nor disagree, disagree, completely disagree, Don't know)

Nature Conservation

Worldwide, nature is under pressure. Without additional conservation efforts, nature will degrade further. Nature protection is costly and this is why choices will have to be made about what to protect and what not to protect. In the following questions, we will ask you to make six choices between three policy options that vary in terms of 'how much' nature is managed and 'where' nature is protected. These options consist of the following elements:

See attached attribute list.

The changes that nature can undergo may vary between small degradation to large improvements. The meaning of these changes is as follows.

See attached level list.

We now present you an **example card** on which you can indicate your preferred nature conservation option. On each card you will see two management options: "Option A" and "Option B". Each option suggest a certain change in nature in your own surroundings, nature in the Netherlands, nature in the Caribbean Netherlands, and nature in the rest of the world, but also the increased tax that go together with these changes.

Please click "Option A", "Option B" or "no measures" here.

In this example, you can choose between:

- "**Option A**" in which, in the coming 25 years, nature in your own surroundings and in the Netherlands in general will improve somewhat, nature in the Caribbean Netherlands will degrade somewhat, and the nature in the rest of the world will remain unchanged. This option will cost you €25 of extra tax per month.
- "**Option B**" in which, in the coming 25 years, nature in your own surroundings will remain unchanged, nature in the Netherlands will degrade somewhat, nature in the Caribbean Netherlands will improve substantially, and the nature in the rest of the world will improve somewhat. This option will cost you €5 of extra tax per month.
- "**No measures**" is the relevant option if you in principle do not want to pay more tax for nature conservation or if the extra tax payment in option A and option B is too much for the offered changes in nature. We assume in this option that nature in all areas will degrade somewhat in the coming 25 years.

Can you please indicate which is your preferred option in the above example?

We are going to sub-sequentially show you 6 choice cards. The only thing you need to do is select your preferred option. After each card, we will ask you how certain you are about your choice on a scale between 1-10, where 1 means "very uncertain" and 10 means "very certain". In making a choice, carefully take into account whether you actually can and are willing to pay this amount given your current income level.

---

11. How tiring did you consider making the choices?

- Not at all tiring
- Not tiring
- Little bit tiring
- Tiring
- Very tiring

1,2,3,4,5 | vraag11

12. Did you study and make the choices with the same level of attention for all of the cards?

- No
- Yes

12b. Can you indicate from which card onward your level attention reduced?

From card number

---

13. Which element in the choice cards was most influential in making your choice for one of the options?

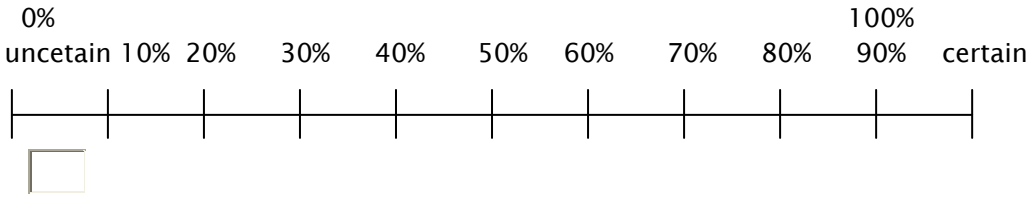
(please select one element only)

- Nature in own surroundings
- Netherlands nature
- Nature in the Caribbean Netherlands
- Nature in the rest of the world
- The extra tax payment
- Otherwise, specify

1,100,

1,2,3,4,5,6 | vraag13

14. How certain are you about the fact that you will truly willing to pay the selected money amount? Please select the level of certainty on a scale between 0% (very uncertain) and 100% (very certain)and fill the amount in the cell below.



percentage

vraag14

15. Did the negative attention in the media about the government in the former Netherlands Antilles influence your choices?

- No, this did not influence my choices
- Yes, this did have an influence

16. Did you select the option "No measures" with one or more of the six cards?

- No
- Yes

16b. Please indicate why you chose "no measures" in one or more of the choice cards?

- My income is too low
- Nature protection is not important enough
- I rather spend my money on other things
- I am willing to contribute to nature protection but I am against higher taxes
- I doubt the need for more nature protection
- Other reasons, please specify 1,500,

Finally, I would like to ask you several questions about yourself for statistical purposes. Your responses are strictly confidential and will not be used for any other purposes.

17. What is your monthly Net Household Income (so after tax payment, inclusive of your partner's income)?

Monthly Net Household Income

In euro

vraag17

You can also tick one of the following categories:

- ○ Less than Euro 400 per month
- ○ Euro 401 - 800 per month
- ○ Euro 801 - 1200 per month
- ○ Euro 1201 - 1600 per month
- ○ Euro 1601 - 2000 per month
- ○ Euro 2001 - 2400 per month
- ○ Euro 2401 - 2800 per month
- ○ Euro 2801 - 3500 per month
- ○ Euro 3501 - 4500 per month
- ○ meer dan Euro 4500 per month

1,2,3,4,5,6,7,8,9,	vraag17b

18. Can you indicate, on a scale between 0 to 10 how happy you are a your life in general (0=very unhappy, 10=very happy)?

	0	1	2	3	4	5	6	7	8	9	
Answer:	○	○	○	○	○	○	○	○	○	○	○

1	1,2,3,4,5,6,7,8,9,	vraag18

19. How much in total do you donate to nature and environmental organizations on an annual basis, if any?

Total amount in euro: ____

20. If you were asked to vote today, which political party would you vote for?

- ○ SP
- ○ VVD
- ○ PVV
- ○ PvdA
- ○ CDA
- ○ GroenLinks
- ○ D66
- ○ Christen Unie

- SGP
- Partij v/d Dieren
- 50+
- Don't know
- Others, specify

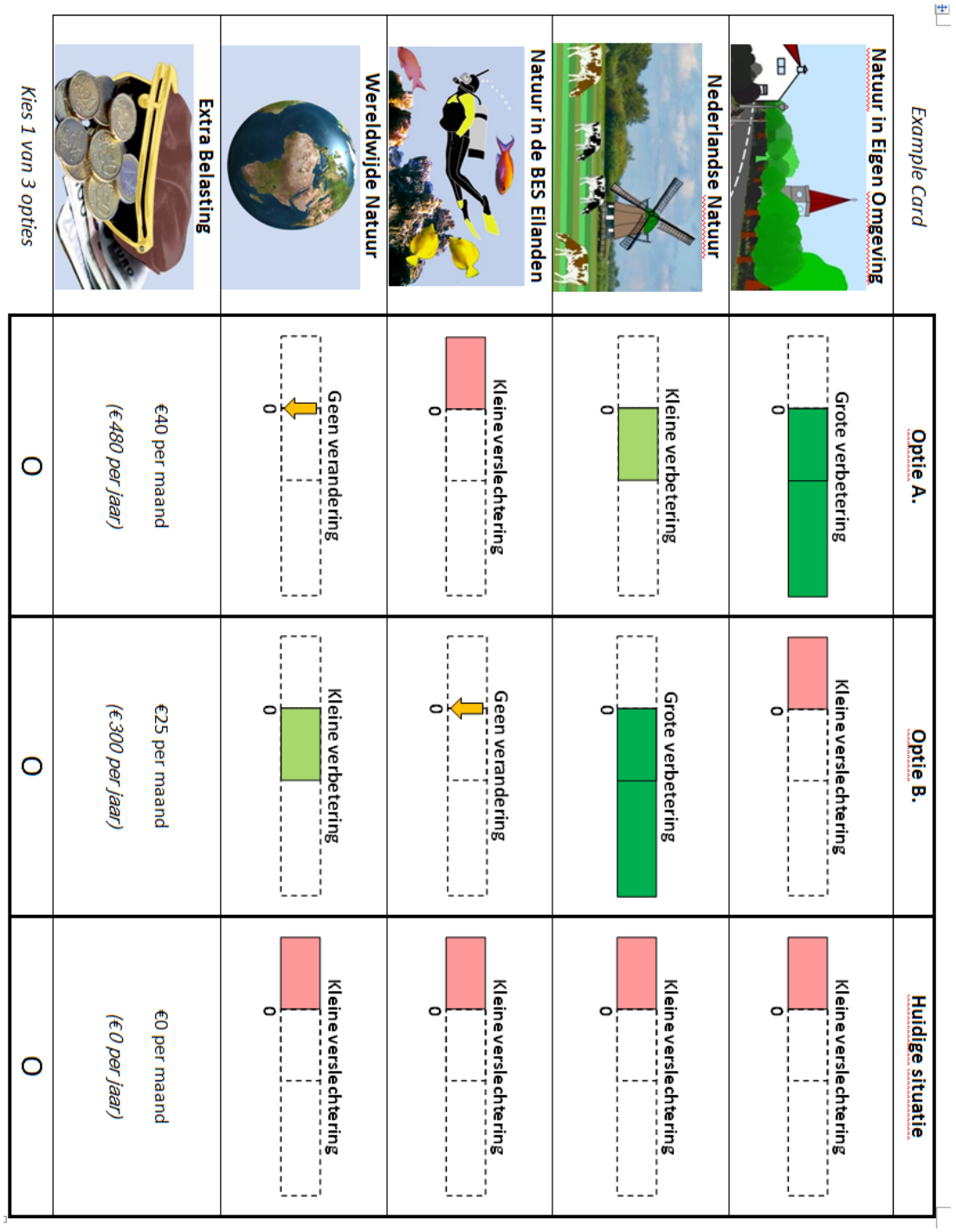
1,250,

YOU HAVE REACHED THE END OF THE SURVEY

ALL YOUR ANSWERS HAVE BEEN RECORDED

WE WANT TO THANK VERY MUCH YOU FOR YOUR KIND COOPERATION!

Annex C Example Choice Card



Annex D Evaluation of societal theme statements

How important is nature to you personally?

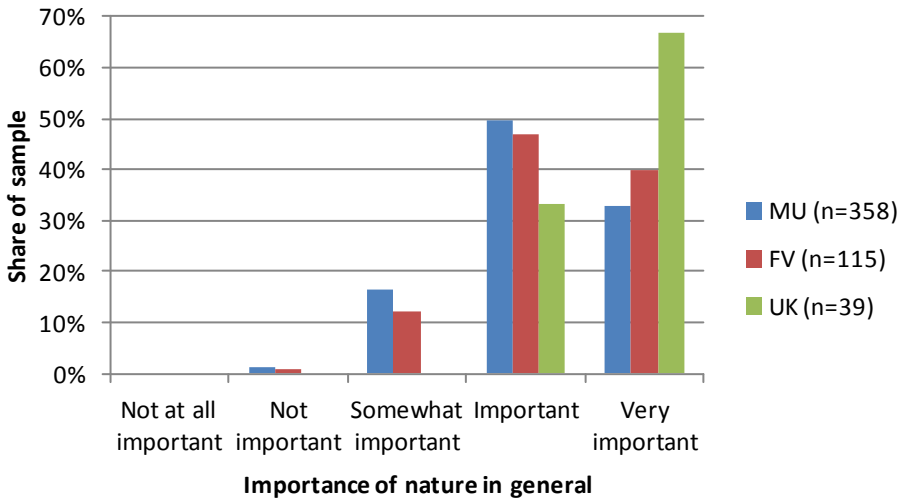


Figure D.1 Importance of nature

How important is it for you to personally contribute financially to nature conservation?

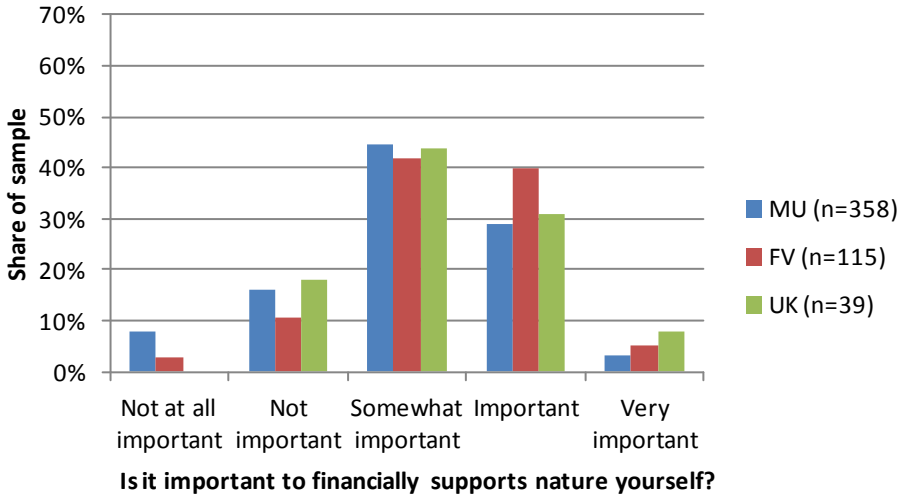


Figure D.2 Importance of paying for nature

How responsible do you consider the Netherlands government to be for managing nature in the Caribbean Netherlands?

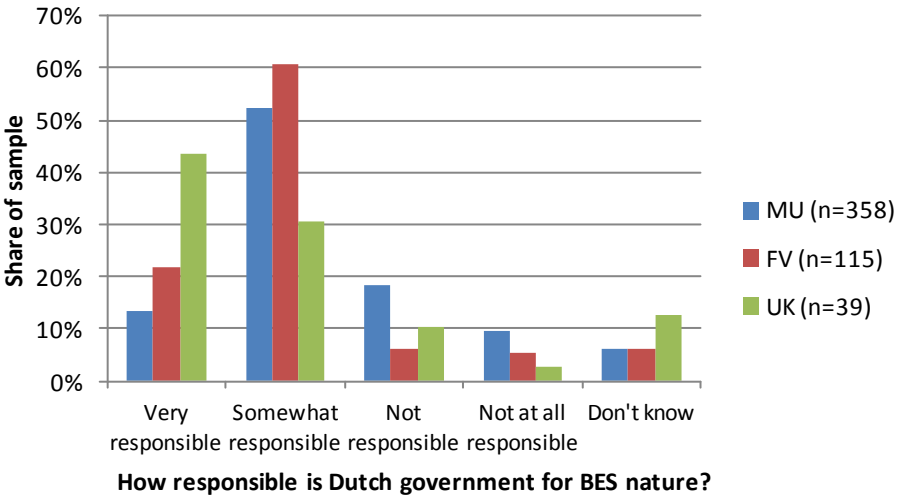


Figure D.3 Government's responsibility to manage nature in Caribbean Netherlands

Some people consider themselves as world citizens. They travel a lot and are highly engaged in the wellbeing of people and the state of nature in other countries. To what extent do you fit this image?

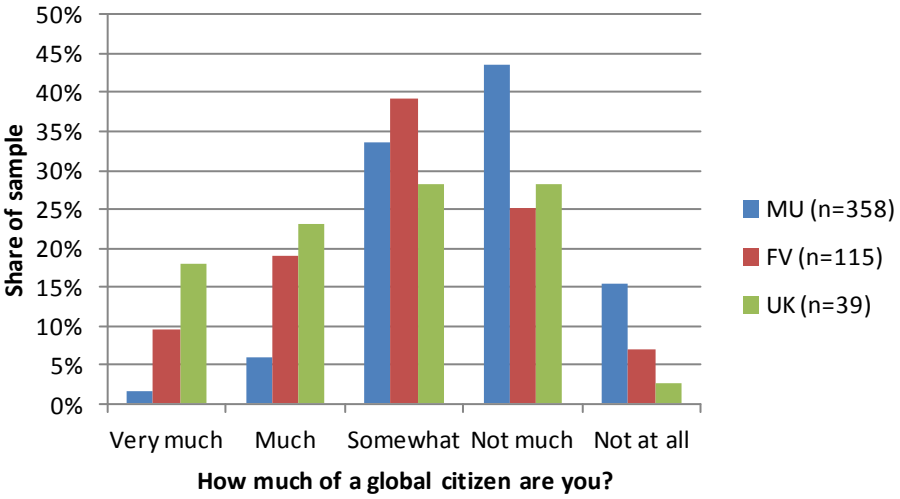


Figure D.4 Level of global citizenship

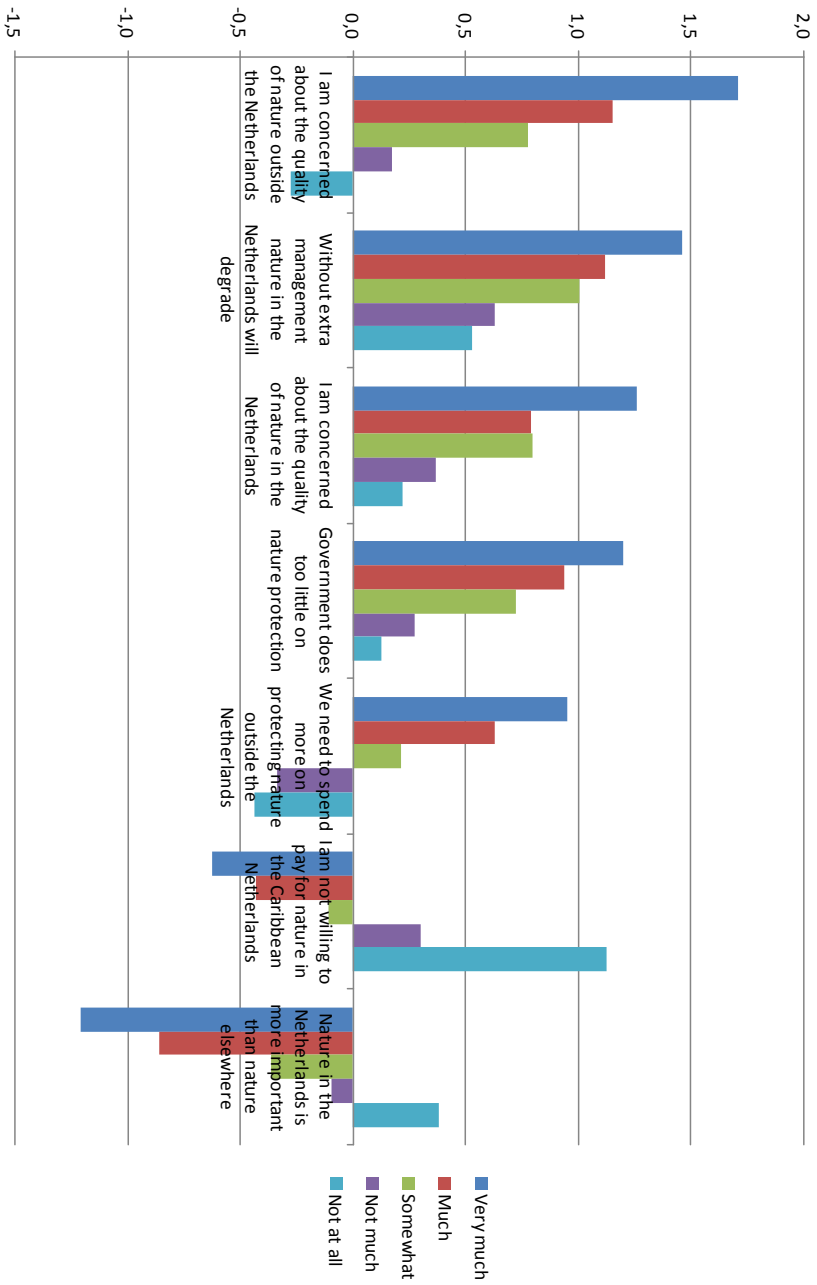


Figure D.5 Specified perception towards the need for nature protection in and outside of the Netherlands