

Climate Protection in Seychelles Through Tourism: The advantages of a small-sized destination

Results of a tourist survey conducted by students from the University of Seychelles

Benno Rothstein and Timo Wernsdörfer

Introduction and thematic background

The topic of climate change is currently one of the most controversially debated subjects. Climate change affects everyone; and the actions of each person are responsible for the emission of greenhouse gases, including the amount of meat consumed, commuting to work by car, sending letters, or flying to tourism destinations like Seychelles. The economically most prosperous 10% of the world's population are responsible for approximately 49% of all greenhouse gas emissions (Radermacher, 2018). More and more people are becoming aware of their actions and the resulting CO₂ emissions.

Climate change is no longer only the subject of discussions between politicians at international level, but is now also worrying the younger generations. Countless pupils and students from across the world, led by the young Swedish climate activist Greta Thunberg, are protesting every Friday as part of the 'Fridays for Future' campaign. They are drawing attention to the consequences of climate change and calling for politicians to rethink their positions and take action.

CO₂ contributes to the greenhouse effect due to its characteristics of radiation. The proportion of CO₂ in the atmosphere is increased by human activity. In addition to industry, the combustion of fossil fuels to produce energy is responsible for the majority of anthropogenic CO₂ emissions. It is worth noting that CO₂ emissions from air travel are now also receiving increasing attention. In 2018, for the first time, an airline was ranked the 10th largest emitter of greenhouse gases in Europe. Only coal-fired power plants are responsible for emitting more greenhouse gases.

In order to prevent the continued warming of the planet, global CO₂ emissions should be drastically reduced. In terms of the principle of prevention, the best way to reduce these emissions would be, for example, not to fly in the first place. If this is unavoidable, there is the possibility of making a kind of compensation payment, the so-called carbon offset.

The basic idea of carbon offsetting is to save the amount of greenhouse gases released due to individual activity at a different location. The first step is to calculate the amount of CO₂ emissions for a trip or a period of time. The individual then pays a certain amount of money according to the quantity of CO₂ emitted. This money is used to finance emissions reduction actions. The previously discharged quantity of greenhouse gases is thus offset by the emission-reducing measure. For the climate, it does not matter where carbon mitigation takes place. In the meantime, it would be possible to compensate for almost all greenhouse gas-emitting activities. For example, carbon offset providers advertise by compensating business trips or their own heating costs (DEHST, 2008). In Germany, however, the most common form of voluntary compensation is air travel, accounting for around 30% of all compensations (UBA, 2015a).

The amount of money paid for compensation is used to finance climate protection projects which help to reduce or avoid emissions. In recent years, offsetting has become increasingly popular and attractive. In addition to offering air-travel offsets, a steadily increasing number of providers now sell offsets for cruises, events, as well as daily household energy consumption. In the case of air travel, the amount of CO₂ emitted during the flight is calculated and offset by paying a certain amount. Depending on the provider, these payments are used for climate protection projects in different regions around the world. With the help of the money paid, an avoidance or reduction of greenhouse gas emissions is achieved elsewhere. Accredited projects financed by offset payments go hand in hand with sustainable and socio-economic development in the project countries according to the United Nations Sustainable Development Goals (SDGs). For this reason, these projects have been checked in advance to ensure that they can be registered and implemented in accordance with the CDM (Clean Development Mechanism) and the Gold Standard. The CDM mechanism with the Gold Standard certification is the strictest existing standard for climate protection projects. Voluntary CO₂ compensation payments, with their far-reaching sustainability-related interactions, represent a very promising method for project countries to achieve their own climate neutrality and contribute to the continuing battle against climate change in the future.

Most climate protection projects are implemented in developing and emerging countries because CO₂ abatement costs are often lowest there. This is why the greatest greenhouse gas savings can be achieved there (DEHST, 2008). CO₂ reduction projects are therefore financed where they can be done most cheaply. This approach is very reasonable and correct, as it allows climate protection to be implemented as reasonably as possible or, in other words, as much climate protection as possible can be achieved with a given amount of money. In addition, a certain regionalization can be observed. For example, reforestation projects usually take place in Latin America or Africa. Climate protection projects in the area of

renewable energies are mainly implemented in Asia and non-European countries such as Georgia, Russia or Turkey (Radermacher, 2018).

In the end, carbon offsetting aims to achieve a climate-neutral status and to reduce one's own CO₂ footprint to zero. By using sequestration, such as reforestation projects, it is possible to achieve a positive climate balance. This means that if the individual takes responsible action, this will result in less CO₂ in the atmosphere than they caused by their behaviour (Radermacher, 2018).

The instrument of voluntary carbon offsets is not the only instrument that can be used to achieve the 'two-degree target', but it represents a major step for each individual to achieve climate neutrality. However, avoiding and reducing greenhouse gases in the first place should always take priority over compensating for emissions. Offsetting should therefore only be considered if an activity appears unavoidable (UBA, 2018).

In light of people's willingness to purchase voluntary offsets on the market (Verified Emission Reductions (VERs) generated by climate-protection projects), the more knowledge they have about the instruments, the more likely they are to compensate. Climate and environmentally friendly behaviour also play a role. People who have little or no interest in the environment also tend to compensate less. The greater the knowledge and affinity to the environment, the greater the willingness to do so. Gender may also play a role. In Germany, for example, women are more willing to compensate than men (UBA, 2015b).

Most tourists do not usually know the exact local situation of the climate project they decide to support and so will not get the chance to visit the selected climate project. By linking compensation projects with destination countries, tourists are given the opportunity to support a climate project at their holiday destination. If they receive a comprehensive explanation and can make an on-the-spot visit to the project, the customer can establish a direct connection between the compensation payment made and the co-financed project. It would also be possible to implement such compensation projects, for example, in co-operation with a hotel in the destination. The installation of a greenhouse in combination with an integrated solar system within the hotel complex of a project partner is an example of such a project. Planting their own food reduces the amount of goods that would otherwise need to be imported and the associated CO₂ emissions, while increasing sustainability. The electricity generated by the photovoltaic system from renewable energies flows into the hotel complex and supports the hotel's own electricity supply. Local workers can be trained to do the construction, maintenance and repair of the plant, ensuring trouble-free operation. In addition, the plant facility could be remotely monitored from the country where the carbon offset provider is located (in this case Germany). In this way, any problems can be solved as quickly as possible. Of course, there are many other options how such an in-destination

offsetting project could work, for example, by partnering with a local NGO and supporting coral restoration or seagrass rehabilitation.

Objective of the investigation and structure of the paper

In the light of the current climate debate, the aim of this work is to examine the instrument of voluntary carbon offset more closely. In particular, the problem of air travel is addressed. The research objective of this paper is divided into two parts. First, to examine whether the willingness of Seychelles tourists to compensate for CO₂ emissions from air travel can be increased if compensation projects are linked with travel destinations, thus giving the individual an opportunity to support a climate project directly at the holiday destination (in this case Seychelles). Second, the question of whether tourists are interested in visiting their co-financed, climate protection projects in the holiday destination is explored. The underlying research question is therefore: how does the linking of carbon offset projects with the travel destination (Seychelles) influence the willingness of tourists to compensate?

For this purpose, students at the University of Seychelles (BSc (Honours) in Environmental Science) collected survey data from 90 tourists in Seychelles. Due to this rather small sample size the results are certainly not representative; in addition, the survey was conducted exclusively in English, and not all tourists necessarily speak English, so this might lead to a bias as well. The presented work is, therefore, simply a pilot survey to indicate what further work needs to be done. Despite these obvious constraints, the content of this work is, to date, definitely unique to the Seychelles.

In this paper, the data is first summarized and then presented visually. Based on the data, we analysed whether the willingness of these tourists to pay a voluntary carbon offset increases when the compensation contributions support climate-protection projects in Seychelles. It is also examined whether there is interest in visiting the co-financed project during the holiday. Other factors such as gender and nationality are also included in the analysis. The results are then discussed and a conclusion drawn.

Research methodology

The aim of this study is to determine whether tourists would voluntarily increase their offset payments if these payments flowed directly into climate protection projects at their travel destination and if there were an opportunity to visit the co-financed projects.

On this basis, a questionnaire was created, one which we hoped was as clear as possible. Closed-ended questions (which can be answered with a simple 'Yes' or 'No') were used so that the answer possibilities could be clearly distinguished from each other. This enabled us to make clear interpretations. Asking the interviewees questions about their individual behaviour guaranteed that the questions were objective and prevented the interviewer from influencing the answers. The questions were formulated as comprehensibly and precisely as possible in order to avoid misunderstandings. It can be assumed that a repetition of the survey, soon afterwards, would lead to the same results.

The tourist surveys were carried out by local UniSey students on the BSc Environmental Science programme. Courses in this programme include 'Global Environmental Change', 'Sustainable Development', 'Natural Resource Economics' and 'Managing Environmental Change in Small States'. The students interviewed a total of 90 tourists on the island of Mahé (including the capital Victoria and the popular tourist areas of Beau Vallon, and Anse Royale). The aim of the survey was to find out:

- (1) whether the survey participants knew about the possibility of offsetting the carbon emissions of their flight;
- (2) if they had offset their flight;
- (3) if they would want the compensation to support a project in Seychelles and if they were willing to visit the project.

In addition, the gender and nationality of the respondents were determined.

In order to increase the willingness of tourists to participate in the survey, the questionnaire was designed to be very simple. However, this then meant that other aspects (e.g. impressions, willingness to take part in the survey, or level of knowledge of the tourists) would not be included in the analysis.

The collected data provided the basis for a qualitative and quantitative evaluation to answer the research question. The Microsoft Excel spreadsheet program was used. This allows conclusions to be drawn regarding the respective proportions of interviewees and the various response patterns. Finally, the different answers were divided into categories which could be used to evaluate and assess the willingness to compensate for CO₂ emissions.

Presentation of the Data

The survey results of questions 1-3 of the questionnaire can be seen in Figure 1.

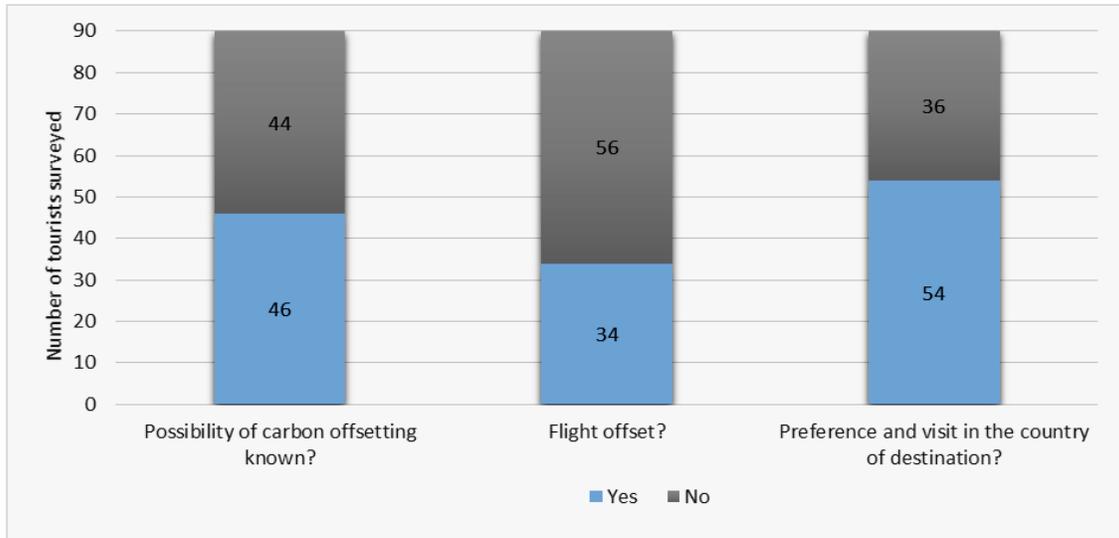


Figure 1: General results after analysis of survey questions 1-3
(Source: Own illustration)

The number of participants who were familiar with the instrument of CO₂ offsets for air travel was almost the same as those who were not. Among the 90 tourists surveyed on the island of Mahé, 46 tourists (51.1%) knew about CO₂ offsets; 44 (48.9%) of the 90 interviewees had never heard of it.

As far as the question of carbon compensation for one's own flight is concerned, it can be noted that 34 participants had offset their flights, while 56 tourists stated that they had not done so. This survey result shows that more than one third (37.8%) of the flights were compensated for. As a result, 62.2% of the flights were not compensated for.

The preference for supporting a project in the country of destination and the willingness to visit was affirmed by 54 respondents (60%). 36 interviewees (40%) stated that they neither preferred financing projects in the country of destination, nor were interested in visiting the project site.

Figure 2 shows the proportion of male and female participants and the proportion of voluntary carbon offsets paid.

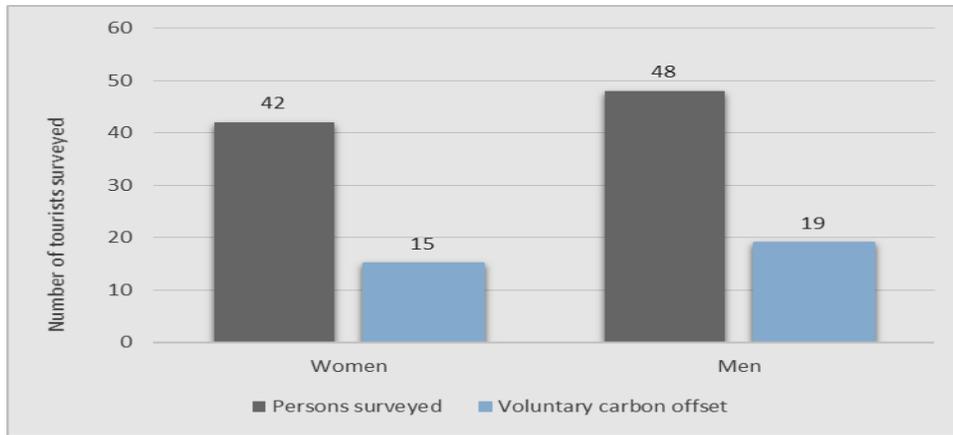


Figure 2: Proportion of female and male participants who paid offsets for flights
(Source: Own illustration)

As can be seen in the chart above, 42 of the 90 participants were women. Among the women, 15 (35.7%) reported having paid offsets for their flight. Among the 48 male participants, the number was 19 (39.58%). Couples were asked together.

The survey also collected information on the different nationalities of the interviewees. Figure 3 shows the percentage distribution and the respective number of tourists surveyed.

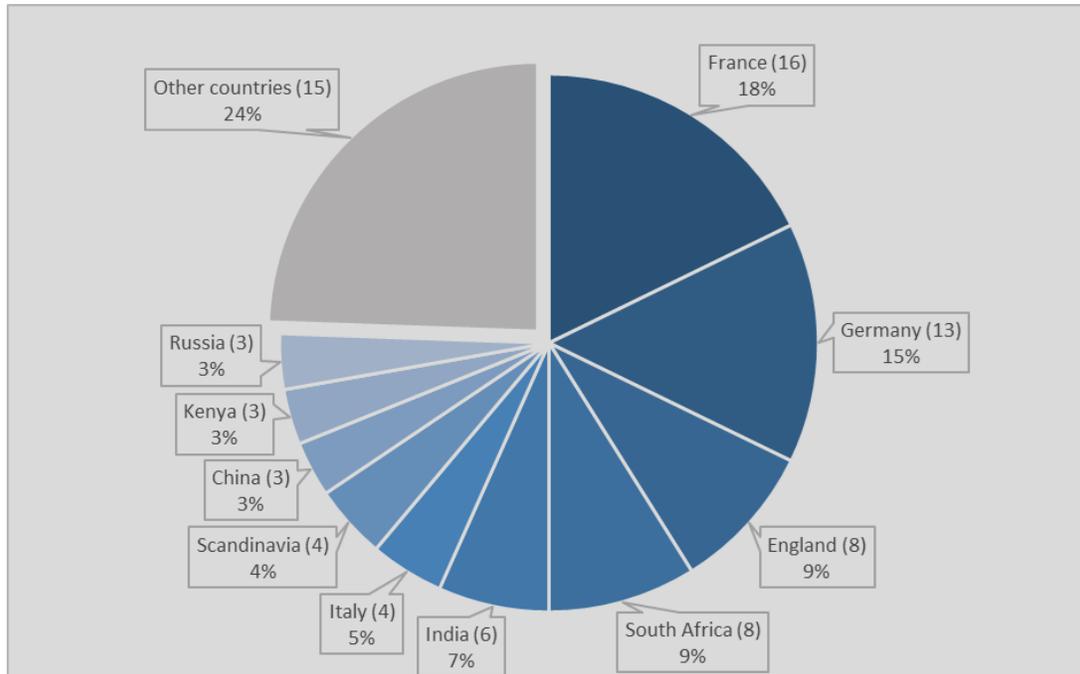


Figure 3: This shows the countries of origin of the tourists surveyed as a percentage
(the total number of tourists surveyed is in brackets)
(Source: Own illustration)

The Seychelles' poll consisted of tourists from 26 different nations. French tourists represented the largest group with a share of around 18%, followed by German visitors at around 15%. Then came English and South African travellers both at 9%. They were followed by India (7%), Italy (5%), Scandinavia (4%), China, Kenya and Russia with 3% each in descending order. The other 15 countries include between one and a maximum of two tourists, and make up a share of approx. 24%. A complete list of the countries can be found in Table 1.

Figure 4 provides information on the origin of tourists, grouped and summarized according to the respective continents. In addition, the number of tourists from the respective continents who answered 'Yes' to questions 1-3 is shown proportionately.

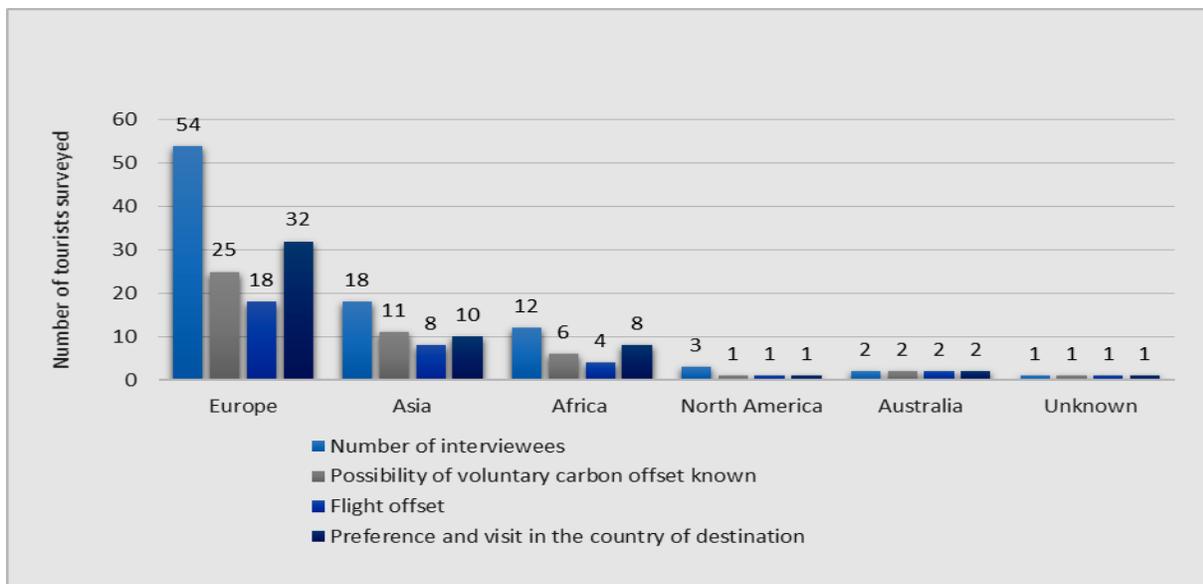


Figure 4: Number of tourists who know about the possibility of carbon offsetting, who have offset their flight to Seychelles, and who would prefer to support and visit climate projects in the country of destination (grouped according to continent of origin)

(Source: Own illustration)

54 of the 90 interviewees were European tourists, clearly representing the majority. 18 participants came from Asia. This group showed the highest level of knowledge about CO₂ compensation at 61.1%. The Asian tourists (who were individuals and not part of a group) also had the highest offset compensation rate (44.4%). 66.6% of the African participants were in favour of preferring to use offsets in the destination country and visiting the project there, ahead of both the European (59.3%) and Asian (55.5%) tourists. Additional data for North America and Australia can be found in Figure 4. Tourists from South America and Oceania were not listed in the survey. For one interviewee, no information about origin was noted (unknown). The fully summarized classification of the interviewees according to respective countries of origin with the respective answers is shown in Table 1 below.

Table 1: Participants according to respective countries of origin with indication of the answers given in each case

Interviewees		Knowledge about possibility of voluntary carbon offsets (Question 1)		Flight offset (Question 2)		Preference and visit in the country of destination (Question 3)	
Country of origin	Number	Yes	No	Yes	No	Yes	No
France	16	6	10	3	13	8	8
Germany	13	5	8	4	9	10	3
England	8	5	3	4	4	5	3
South Africa	8	4	4	3	5	6	2
India	6	2	4	1	5	4	2
Italy	4	2	2	2	2	2	2
Scandinavia *	4	1	3	2	2	2	2
China	3	3	0	3	0	1	2
Kenya	3	1	2	0	3	1	2
Russia	3	2	1	2	1	2	1
Australia	2	2	0	2	0	2	0
Bangladesh	2	2	0	1	1	1	1
Belgium	2	0	2	0	2	0	2
Ireland	2	2	0	2	0	2	0
Canada	2	1	1	1	1	1	1
Malaysia	2	1	1	0	2	2	0
Sri Lanka	2	1	1	1	1	0	2
Egypt	1	1	0	1	0	1	0
Netherlands	1	1	0	0	1	1	0
Portugal	1	1	0	0	1	1	0
Poland	1	1	0	0	1	1	0
Spain	1	1	0	1	0	0	1
Hungary	1	0	1	0	1	0	1
USA	1	0	1	0	1	0	1
Unknown**	1	1	0	1	0	1	0
Total	90	46	44	34	56	54	36

(Source: Own illustration)

*Scandinavia represents the countries: Sweden, Norway and Scandinavia as provided in the questionnaire

**Unknown: One person's nationality was unknown

Analysis of data

In order to analyse the data, the given answers were first divided into different categories (independent of gender or nationality). The number of categories was then added up. The aim was to find out how many tourists had not yet offset their flight, but might potentially do so in the future by linking the holiday destination with the climate project (Question 3 on the questionnaire). In addition, participants who had not compensated, and were not willing to offset air-travel carbon emissions, were classified in a specific category. The categorization was also used to classify the tourists who had already compensated and felt justified in their payment by the possible link between holiday resort and project. Then the various categories were evaluated on the basis of their given response patterns according to their potential for future compensation. The different categories are described in more detail in Table 2.

Table 2: Classification of the possible answers given by the questionnaire into different categories

Property	Category	Frequency
known / flight offset/ preference	1	22
known / no flight offset / preference	2	9
not known / no flight offset / preference	3	20
known / flight offset / no preference	4	9
known / no flight offset / no preference	5	6
not known / no flight offset / no preference	6	21
not known / flight offset / preference	7	3
		90

(Source: Own illustration)

Category 1 represents tourists who were aware of the possibility of carbon offsetting their own air travel (Question 1: 'Yes'), who have offset their flight (Question 2: 'Yes'), who would prefer to support climate projects in the destination country and who would consider a visit (Question 3: 'Yes'). 22 of the participants fit in this category. Categories 2-7 follow the same pattern.

Three people gave an implausible answer: they said they had never heard of the possibility of compensating their own flight. Nevertheless, they claimed to have compensated their flight. This answer could be the result of unintentionally checking the wrong box during the interview. Another possible explanation could be that the person mistakenly clicked on an offered field for flight compensation when booking their flight on the Internet (without having any background knowledge). These people are listed in category 7.

Since only a preference for the destination country was asked for, it is unclear whether a link

(CO₂ compensation project with destination country) is also a sufficient reason for them to compensate for a future flight. To this end, the different response patterns were evaluated (Fig. 5).

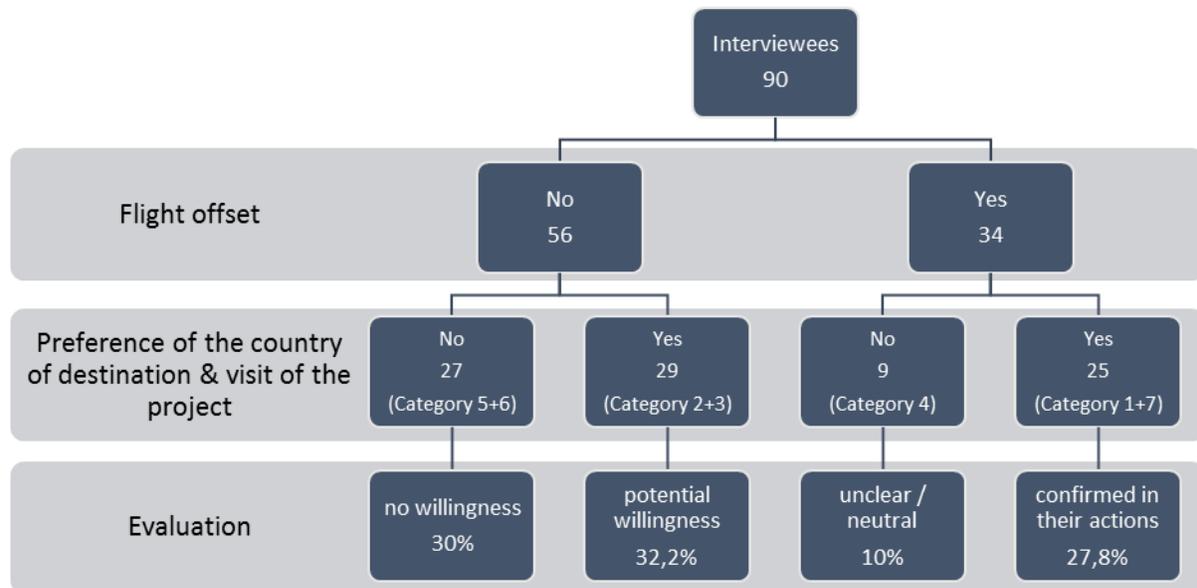


Figure 5: Evaluation of the answers given by the tourists surveyed
(Source: Own illustration)

In order to find out whether the willingness to offset future flights can be increased, all tourists who have not yet compensated a flight and would prefer to support climate projects in the country of destination were taken into consideration. This description applies to all persons in categories 2 and 3 (Fig. 5). The only difference in both categories is that nine people had already heard of the possibility of CO₂ offsetting, but 20 people had not. By confirming the third question, a general interest in the instrument is shown in both categories. It can therefore be assumed that the 20 persons in category 3 who were unaware of the possibility will decide in favour of voluntary carbon offsetting if they receive additional information on the subject.

Of the 90 tourists polled, 29 (32.2%) have the potential to compensate for future air travel if they are financially supporting a climate project in the destination country. Overall, 54 of the 90 respondents (categories 1,2,3 and 7) would support and visit climate projects in the destination country. However, the question does not allow a distinction to be made between preference and visiting the climate project. It is therefore supposed that the personal preference of a climate project in the destination country results in a visit and vice versa.

The 27 persons in categories 5 and 6 also decided not to pay offsets for their flights (Fig. 5). However, since these tourists do not prefer to support the funding of climate projects in the

destination country and show no interest in visiting the project, it can be assumed that these guests will not change their minds about offsetting their future flights by linking the compensation project and the destination country. For 30% of the people surveyed (27 persons), the connection of compensation projects with the destination country would have no influence on their compensation behaviour. However, since the 21 participants in category 6 had not yet heard of the possibility, it remains debatable whether a certain proportion would possibly change their mind after clarifying the mechanism to offset air-travel carbon emissions in the future.

25 of the 34 participants who had their flights compensated indicated that they would prefer to support climate projects in the destination country and would even visit them (Fig. 5). These people demonstrate a high level of environmentally-friendly behaviour and would feel confirmed in their actions by supporting climate projects in the destination country and possibly visiting the co-financed project. Including the three persons from category 7, it can be expected that they will continue to offset their air travel in the future.

The nine persons interviewed from category 4 compensated their air travel but did not agree with the third question (Fig. 5). These participants are regarded as neutral, as it is not possible to estimate how a connection between compensation projects and the destination country will affect their future carbon offset behaviour.

With regard to gender, it can be noted that the willingness of men and women to make voluntary compensation payments for air travel is about the same. Approximately 35.7% of the women and 39.6% of the men surveyed compensated for their flights (Fig. 2). The willingness to pay for voluntary carbon offset is therefore slightly higher among men than among women.

A closer look at the tourists reveals that half of the 90 people surveyed represent travellers from France (16), Germany (13), England (8) and South Africa (8). This high proportion may be due to the French and English colonial history as well as the high travel activity of Germans in general (STB, 2018a; Zeit online, 2019). The proximity of the islands to South Africa, along with the country's strong economy and political stability, explains the relatively high proportion of South African tourists (Auswärtiges Amt, 2018) (Fig. 3). Although the French make up the largest share, only three out of 16 flights were compensated. With 18.7%, they are thus below the overall average of 37.8%.

German tourists, who only bought offsets for four of 13 flights (30.8%), can also be regarded as 'unwilling to compensate'. Four of the eight (50%) English flights, on the other hand, were compensated. South African tourists had an average of 37.5% (three out of eight flights). The fact that 100% of the Chinese tourists offset their flights is of course not

relevant, because only three Chinese (individual travellers) were interviewed in this survey (Table 1).

A closer look at the various answers given according to continent reveals that only the results for the first question show a comparatively higher variation. Approximately 46.3% of the Europeans surveyed stated that they had already heard about the possibility of offsetting air-travel carbon emissions. Around 61.1% of Asian and 50% of African participants were familiar with offsetting. It should be noted here however that the proportion of Europeans, with 54 respondents, is significantly higher than that of Asians (18 participants) and Africans (12 participants) (Fig. 4). Questions 2 and 3 do not show any strikingly high or low values. The proportionate offset is around 33.3% for both the Europeans and Africans surveyed. Among the Asian participants, around 44.4% arranged for their flight to be offset. The majority of the participants expressed a high level of interest in the question of the preference for and visit to climate projects in the destination country. Approximately 59.6% of the European participants expressed their support. This share was 55.6% for Asians and 66.6% for Africans (Fig. 6). The American, Australian and unknown participants were not included in this figure due to their small proportion.

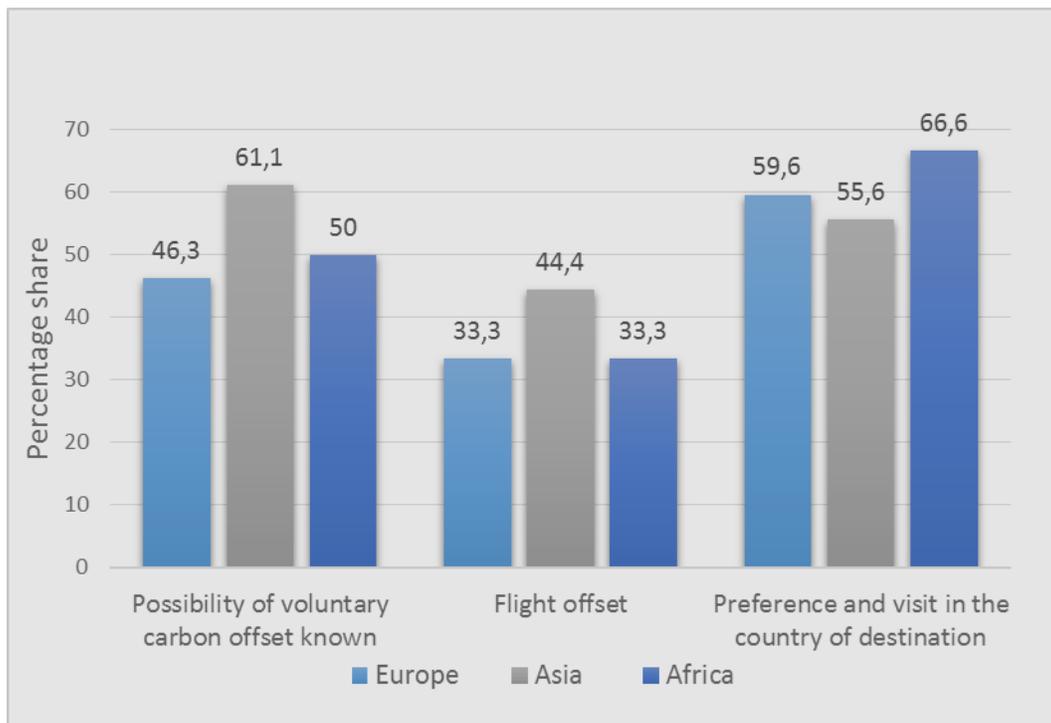


Figure 6: Percentage of European, Asian and African interviewees who are aware of the possibility of carbon offsetting, have offset their flight and would prefer to support and visit climate projects in the destination country (Source: Own illustration)

In summary, it can be concluded that, after evaluating the categories, the willingness to compensate for CO₂ can be increased by approx. 32% by linking compensation projects with the countries travelled to. Many of the tourists who have already offset their air travel may then feel justified in their actions. For 30%, the link would probably have no effect on voluntary carbon-offset behaviour. However, the majority of these people have not yet heard of the possibility of carbon offsetting.

Nevertheless, it remains unclear whether positive offsetting behaviour would develop with additional explanation. Since out of 46 respondents who heard of the possibility, 31 (67.4%) also had their flight offset (categories 1+4), the existing knowledge about the possibility of offsetting is an indicator of the increase in willingness to voluntarily offset carbon emissions. This result was also confirmed in a study conducted in 2014 (UBA, 2015b). A significant difference in compensation behaviour between men and women was not found. The proportion of compensation was slightly higher among men than among women.

On a national level, it is remarkable that although French and German tourists represent almost a third of the participants, with seven out of 29 compensated flights (24.1%), the compensation rate is comparatively low and thus below the average (37.8%). At the continental level, European tourists were also the least aware of the possibility of CO₂ compensation, at 46.3% (the general average was 33.3%). Preferring and visiting the project was of interest to the majority of all people surveyed in the study (60%).

Discussion

Based on the results and analyses presented above, the underlying research question was addressed. What was being examined was how the connection between the compensation projects with the travel destination (Seychelles in this case) affects voluntary carbon offset. And of the people surveyed, a significant number concurred with this. Out of the 90 Seychelles tourists surveyed, 54 preferred CO₂ offsetting in their country of destination. Among the 29 persons who did not offset their flights, a potential willingness to do so in the future was shown. However, since the survey only asked for preference, it remains questionable whether a connection is a sufficient reason for these tourists to offset their future air travel.

A striking feature of the results is the high proportion of tourists (approx. 37%) who did make an offset payment (although it is important to bear in mind the small sampling size of the study). A possible reason for this could be the comprehensive nature-conservation policy of Seychelles as well as the often high price level of the trip; as a result, most tourists who are

attracted to travelling here have an awareness of environmental issues and the necessary financial means (NBS, 2019; STB, 2018b).

It should also be noted that linking offset projects with destination countries either leads to a lower offset quantity at the same price or paying a higher price to maintain the same offset quantity. The reason for this is that climate-protection projects in countries with higher standards cannot be implemented at the same price level as in developing and emerging countries. In order to save the same amount of greenhouse gases, the costs are higher, making the offsets more expensive. Due to the higher project costs, compensation projects in industrialised countries contribute only to a minor extent to climate mitigation (with the same amount of money for the project). It is therefore debatable whether customers would be willing to pay higher offset amounts to support a climate project in those countries. A suggestion in this respect would be to let the customer decide directly when booking the flight or on the homepage of the flight offset provider. The tourist can thus choose whether their offset should support a climate project in a developing country or whether a project in the destination country should be financed by a previously calculated surcharge. The price increases would therefore have to be adapted to the country of destination.

The lack of representativeness of this survey becomes clear when considering, for instance, that only 13 German tourists in Seychelles were interviewed (out of a total of 90 tourists polled) out of about 244 million travellers from German airports alone in 2018 (Statista, 2019). In the same way, it is also debatable whether the data collected for African and Asian tourists, for example, can be projected to the entire population. Due to the large gaps between rich and poor in these countries, only very few can afford the privilege of air travel (WID.world, 2019; BMZ, 2019).

In spite of the difficulties discussed, the results of the survey are interesting in view of the willingness of tourists to voluntarily pay for offsets. For example, if offset projects are linked to destination countries, the majority of respondents are willing, under certain conditions, to make future offset payments and visit the project. Factors that have a positive effect on increasing offsets include informing people and transferring this knowledge, as well as a high level of transparency among flight offset providers. This matches the results of a similar survey of tourists at Frankfurt International Airport (Wernsdörfer, 2019). It would seem, therefore, that information campaigns (e.g. TV advertisements, advertising banners or advertisements in magazines) can be beneficial. In this way, the public becomes informed and instructed about the possibility of voluntarily offsetting their travels. As responsible organisations, airlines, travel agencies and even state institutions might feel obliged to provide such information. Interactive information pillars in airports are another possibility. Flight-offset providers can thus inform travellers directly about their flights and the amount of greenhouse gases they are emitting. In addition, the tourist could be given the opportunity

to make a voluntary carbon offset payment on the spot. Furthermore, travel agencies, but also airlines, should draw more attention to the possibility of offsetting when booking air travel. As the results of the survey in Seychelles have shown, an active nature-conservation policy could also create incentives to strengthen the traveller's environmental awareness and to initiate offsetting air travel.

Conclusion

The country or region in which CO₂ emission reduction measures are implemented is irrelevant for the climate system. Due to their economic profitability, offset projects are therefore mostly considered in emerging and developing countries. In view of the cost-benefit principle, it is there that the most efficient management and the greatest CO₂ savings can be achieved within a given financial means. In addition to these greenhouse gas reductions, such measures also contribute to improving the standard of living of the population through the far-reaching co-benefits of climate change mitigation.

Even though a comparatively high proportion of Seychelles tourists surveyed have carried out CO₂ offsetting, it should not be forgotten that the proportion is very low worldwide. In Germany, for example, less than 1% of flights were offset, on average, in 2012 – more recent data are unfortunately not available (Brockhagen, 2012 in TAZ, 2012). Under certain conditions, linking projects with destination countries (such as Seychelles) can significantly increase the willingness to compensate: this increase can be achieved through a high degree of transparency on the part of the flight-offset provider, comprehensive information on the use of the voluntary carbon-offset payment, or through the social stability of the destination. Particularly if the distance between the compensation project and the tourist's accommodation is not too far, tourists may be more interested in visiting a co-financed project. Interviewees were often not willing to accept a longer trip to the project location during a holiday which is already limited in terms of time. And, paradoxically, a longer trip would lead to additional CO₂ emissions due to the transport required, in addition to the increased time needed. The above-mentioned results were revealed by a survey of 100 travellers at Frankfurt Airport (Germany) in June 2019 (Rothstein and Wernsdörfer, 2019; Wernsdörfer, 2019).

Due to the small size of Seychelles, the reasonable bus connections on Mahé and Praslin, and the good cycling conditions on La Digue, it is possible that tourists could easily fulfil their own co-financed carbon offset project. In addition, the fact that, overall, Seychelles tourists already have environmental awareness and are, in general, financially well-off, means that tourism service providers could successfully advertise successful carbon-offset projects. Furthermore, beyond learning about recent progress, tourists can also find out

about the contribution they have made to reducing CO₂ emissions. And the hotel operator would gain a new tourist attraction and can demonstrate its efforts to protect the climate and use it as PR (provided we apply the case with the greenhouse effect as described in the section 'Introduction and Thematic Background' above). This then increases the hotel's authenticity in terms of environmental protection and helps to strengthen the customer relationship.

Above all, however, the principle of avoiding CO₂ emissions takes priority. Only when the emission-causing action is unavoidable should an offset be initiated. This is certainly the case for tourists in Seychelles, as the majority will have arrived by plane. Furthermore, universal awareness of all air travellers is important. It was shown that many travellers in our study still lacked the necessary background knowledge about carbon offsetting. However, this group showed a strong general interest in the topic and a growing awareness about environmental issues.

With regard to the research question, linking carbon offset projects with destination countries has a positive effect on voluntary carbon offsets. In any case, there is a need for further investigation as the sample size was very small and most likely not representative. Another round of surveys at different locations would add to the credibility of the statements made and could then be used as strong leverage for offsetting companies to start projects in Seychelles.

Acknowledgements

The authors would like to express their gratitude to the following students: Evita Delpech, Angelique Dine, Irvin Gopaul, Heather Lafleur, Tade Landry, Natasha Lucas, Ethel Magnan, Harini Naidu and Shamira Payet for conducting the survey.

References

- Auswärtiges Amt. (2018). *Südafrika: Wirtschaft*. Retrieved October 30 2019, from <https://www.auswaertiges-amt.de/de/aussenpolitik/laender/suedafrika-node/wirtschaft/208402>
- Deutsche Emissionshandelsstelle – DEHSt. (2008). *Leitfaden zur freiwilligen Kompensation von Treibhausen*. Berlin: UBA.
- National Bureau of Statistics – NBS. (2019). *Seychelles in figures*. 2019 edition. Retrieved June 02 2020, from <http://www.nbs.gov.sc>
- Radermacher, F.J. (2018). *Der Milliarden-Joker. Wie Deutschland und Europa den globalen Klimaschutz revolutionieren können*. Hamburg: Murmann Publishers.

- Rothstein, B. and Wernsdörfer, T. (2019). *Linking holiday locations with CO₂ compensation projects – Results of a survey of tourists at Frankfurt Airport (FRA)/Germany*. Sustainable Islands Tourism Conference. November 27th to November 29th 2019. Santo/Vanuatu. DOI: 10.13140/RG.2.2.34181.50400
- Statista. (2019). *Passagiere auf deutschen Flughäfen bis 2018*. Retrieved October 30 2019, from <https://de.statista.com/statistik/daten/studie/77928/umfrage/passagiere-auf-deutschen-flughafen/>
- Seychelles Tourism Board – STB. (2018a). *Geschichte der Seychellen*. Retrieved October 30 2019, from <https://www.seychelles.travel/de/discover/history>
- Seychelles Tourism Board – STB. (2018b). *Flora und Fauna*. Retrieved October 30 2019, from <https://www.seychelles.travel/de/discover/flora-and-fauna>
- TAZ (DIE TAGESZEITUNG). (2012). *Der klimaneutrale Bluff*. Retrieved October 30 2019, from <https://taz.de/!5102262/>
- Umweltbundesamt – UBA. (Ed.) (2015a). *Aktualisierte Analyse des deutschen Marktes zur freiwilligen Kompensation von Treibhausgasemissionen*. Dessau-Roßlau: UBA.
- Umweltbundesamt – UBA. (Ed.) (2015b). *Freiwillige Kompensationszahlungen und nachhaltige Lebensstile: Passt das zusammen?* Dessau-Roßlau: UBA.
- Umweltbundesamt – UBA. (Ed.) (2018). *Freiwillige CO₂-Kompensation durch Klimaschutzprojekte*. Dessau-Roßlau: UBA.
- Wernsdörfer, T. (2019). *Verknüpfung von CO₂-Kompensationsprojekten mit Reisedestinationen – Analyse der Bereitschaft von freiwilligen CO₂-Kompensationszahlungen von Touristen bei Verknüpfung der Kompensationsprojekte mit den Reisedestinationen*. Bachelor Thesis University of Würzburg. Unpublished.
- World Inequality Database – WID.world. (2019). *Country Graphs/ World View*. Retrieved October 30 2019, from <https://wid.world/>
- Bundeszentrale für wirtschaftliche Zusammenarbeit – BMZ. (Ed.) (2019). *Entwicklungszusammenarbeit mit Ländern*. Retrieved October 30 2019, from http://www.bmz.de/de/laender_regionen/index.html
- Zeit Online. (2019). *Reiselust der Deutschen ist ungebrochen*. Retrieved October 30 2019, from <https://www.zeit.de/news/2019-01/11/reiselust-der-deutschen-ist-ungebrochen-190111-99-519043>

Prof. Dr. rer. nat. habil. Benno Rothstein studied Applied Environmental Sciences and completed his Ph.D. (Dr. rerum naturalium) at the University of Trier, Germany in the area of agricultural soil protection. In 2008 he finished his postdoctoral lecture qualification (Habilitation) in Geography at the University of Würzburg, Germany in the field 'Adaptation to Climate Change'. From 2007 to 2012 he worked as a full Professor for Resource Economics at the University of Applied Forest Sciences in Rottenburg, Germany. Since 2012, he has been full Professor of Natural Resource Management at the University of Applied Sciences in Konstanz, Germany.

His research interests include sustainable energy concepts, adaptation to climate change, vulnerability of infrastructures, competition for water resources. He has written over 100 publications in books and journals and has presented his research results at numerous conferences around the world. Contact: rothstein@htwg-konstanz.de

Timo Wernsdörfer studied Geography (Bachelor of Science) at the University of Würzburg, Germany. In his bachelor thesis he analysed the willingness of voluntary CO₂ offsetting payments from tourists.

Part of the results of his thesis was presented at the Sustainable Islands Tourism Conference in November 2019 in Santo (Vanuatu). This conference was also organized by the Seychelles Sustainable Tourism Foundation. Further results of his thesis can be found in this paper. Contact: timo.wernsdoerfer@stud-mail.uni-wuerzburg.de