Exploring the potential of participation in citizen science, conservation tourism, and participatory environmental research tourism to lead to an environmental change in practices

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Picture front cover: Earthwatch volunteers helping with scientific research.

Source: Amanda Purcell (2013). Look out for Earthwatch: Environmental travelling never felt so good. http://jetsettimes.com/2013/10/27/earthwatch/. Visited 17-08-2014.

Summary

The world today is facing many environmental problems, which are proving to be the consequence of Western lifestyles. This makes them a part of the problem, but also offers scope for a possible solution; changing people's actions could make a positive impact. However, accomplishing this change is difficult because behaviour is influenced by many different factors. One of the theories looking at the activities people engage in is social practice theory, which combines internal factors like lifestyle, motivation, knowledge and emotions with external factors like structures, social norms, and culture. The unit of analysis in this theory is neither the individual nor the structure, but the practice itself, which is a routinised type of behaviour and exists of three elements: materials, meanings, and competences.

This thesis applies social practice theory to the cases of participation in citizen science, conservation tourism, and participatory environmental research tourism and explores how this perspective leads to new insights into how this participation can lead to an environment-related change in practices. These three sectors share some characteristics, most importantly their immersive and experiential educational approach, which has been claimed to influence behaviour (e.g. Bonney et al, 2009b; Brossard et al, 2005). They are also emerging sectors, expected to become more important in the future.

The **introduction** introduces the central research question: *What is the potential of participation in citizen science, conservation tourism, and participatory environmental research tourism to lead to an environment-related change in practices and what factors are most influential in this respect?*. It also describes the methods used to find an answer to this question, namely a literature review; articles about social, educational and behavioural outcomes of citizen science, conservation tourism, and participatory environmental research tourism have been analysed through a social practice perspective.

The **second chapter** presents an overview of two streams of behavioural theories, internal and external. It argues that both internal and external factors play a role in behaviour, and that therefore a model that includes both is needed. Social practice theory bridges this gap between internal and external approaches by looking at practices as the unit of analysis. A practice is a certain way of doing things, a routinised type of behaviour. It is composed of meanings, materials, and competences, thus including both structural and individual aspects. These three elements can spill from one practice to another, causing change within them. New links between elements can be formed, which equals the development of a new practice, and links can be broken, disintegrating a practice. The elements can change due to experiences or innovations, changing practices as well. Finally, a practice only exists because of its carriers (individuals who 'carry' a practice, who engage in the specific actions, share the understandings and skills as well as motivations and tools). Populations of carriers however can change because of new experiences and social networks. For activities to change, they have to be raised from practical to discursive consciousness; in the former activities take place without deliberative reasoning, and in the latter activities are engaged in intentionally. Chapter 2 also introduces the conceptual model for this thesis, which visualizes how spillover of elements from participation in citizen science, conservation tourism, or participatory environmental research tourism into other practices can occur.

Chapter 3 further introduces citizen science, conservation tourism, and participatory environmental research tourism. Citizen science projects are projects where citizens participate in scientific research, helping scientists collect data at a vast temporal and spatial scale. Conservation tourism is a sub sector of ecotourism and volunteer tourism and engages tourists in conservation work on location. Participatory environmental research tourism forms a combination of both; participants voluntary assist with ecological scientific research on location.

Chapter 4 analyses what social, educational, and behavioural outcomes of citizen science participation have been documented. It presents citizen science participation as a practice, consisting of routine behaviours like reading the required background information and collecting data according to a specific protocol. The three elements include research tools, forms, scientific research skills, understandings of the research, and motivations to contribute data. For citizens to be effectively engaged in scientific research, training and education is a necessity; many participants are not trained scientists. Educating citizens is also often one of the aims of citizen science projects. This happens in the form of experiential and informal education; participants learn by doing and application, and out of their own interest. A second aspect central for citizen science participation is scientific nature experience; participants go out in nature to observe their research objects. Nature experience, and specifically scientific nature experience, has been found to create emotional affinity towards nature, a bond or connection with nature, which is a powerful predictor for nature-protective behaviour intentions and interest in nature as well as engagement in conservation behaviour.

Newly acquired knowledge and understanding as well as motivations, which are examples of the elements that form citizen science participation, have been found to spill over into other practices. Participants gained new understandings and awareness of their surroundings and created a connection to nature. Through this several environment-related changes in practices can take place. Participants have increased their engagement in community development or have taken up engagement in governmental issues or local ecological management issues. They also made changes in existing practices they already carried; some participants for example changed the way they garden. Not all articles documented the same level of change in for example knowledge and attitudes, and also behavioural outcomes differed between them. This is suggested to be because several other project-specific characteristics further influence the social and behavioural outcomes of citizen science participation. Examples hereof are the level and way of interaction with staff, the level of engagement, and the project design. Especially communication and interaction with scientists is a returning topic when it comes to analysing the social outcomes of participation. From a social practice perspective this interaction can be emphasised as well; new carriers of the practice need examples, experienced carriers who can teach them the skills, knowledge and understanding necessary to successfully engage in citizen science.

In **chapter 5** a similar analysis is presented for conservation tourism. Central in this regard are interpretive activities, wildlife viewing, nature experience, and transformation of the self. Interpretive activities, just like training in citizen science, provide the tourist with information and practical knowledge. The role of interaction with staff is important here as well, following the same logic as in chapter 4. Environmental interpretation has been shown to have an impact on behaviour too. Wildlife

viewing plays a role in that it often leads to emotional responses, which have been linked to intentions to engage in conservation activities. Also, similar as citizen science, nature experience plays a role too. Conservation tourism offers a deep emotional encounter with nature since these projects often take place in 'pristine' natural areas, leading to a newly developed or stronger connection with nature.

Also central to conservation tourism is the volunteer tourist aspect. This experience can have a transformational effect on its participants, altering their sense of self as well as character traits like anxiety, trust, emotionality and adventurousness. The available studies suggest that this transformation is a result of interaction with fellow volunteer tourists, the host community, and the natural environment. These can raise activities to the level of discursive consciousness, and together with spillover of meanings and competences can lead to a change in practices. However, whether these changes stick remains a question; although meaning and competences elements can travel, practices are often linked to a place. The home situation contains other constraints, social norms, and systems of provision which enable or disable certain practices.

In **chapter 6** the influence of participation in participatory environmental research tourism is analysed. Both science participation and volunteer tourism play a role here, and the trip also often includes a scientific and social nature experience. Here, too, literature documented changes in attitudes, knowledge, connection and behaviour. Also the networks formed with fellow participants were emphasised in one of the articles, indicating that they can lead to social movement participation, which encompasses lobbying to politicians, writing letters to governments, joining demonstrations, voting, becoming involved in politics, and providing resources to organisations. Literature showed that through participation in scientific research and conservation work, (on-site) training, interaction with fellow participants as well as scientists, and formation of new networks and communities, participants of a participatory environmental research tourism project can gain many competences in terms of ecological and scientific understanding as well as practical knowledgeability, and obtain new values and ideas. These newly developed or changed meanings and competences sometimes spill over into other practices at home.

Chapter 7 compares these three cases, showing that in all three instances, there is an indication of an environment-related change in practices through two pathways; spillover of elements, causing existing practices to change, and people becoming carriers of other, related practices. Moreover, when comparing the findings, the behavioural outcomes are surprisingly similar despite the cases having different characteristics. All three have an impact on other practices, namely writing letters to politicians, joining and/or donating to environmental organisations, and becoming active in the local community. Also impacts on daily activities (e.g. gardening, purchasing decisions, and recycling) are found across all three cases, but the focus of these activities differs between the cases; citizen science leads to more conservation-related activities whereas the other two cases lead to activities related to the wider environment.

Chapter 8 starts with a discussion of the theory. It describes how using social practice theory led to new insights into how participation in citizen science, conservation tourism, and participatory environmental research tourism can influence its participants' behaviour. Especially in the field of citizen

science, where models focusing on attitude, intention and behaviour are prevalent and the focus is on education and educational outcomes, a new link has been found; nature experience also plays a large role. Social practice theory was also valuable in understanding why interaction with staff was so important; they serve as an example for the participants.

This chapter also discusses the limitations of this research. Due to the information coming from secondary data, certain links could not be explored which would have been possible with the use of an own questionnaire. Moreover, the various articles did not use the same standardised survey but the researchers all asked different questions, and some used open questions whereas others were multiple-choice. There is also a need for more research into actual behavioural outcomes instead of intentions, preferably not self-reported. Also more research into the long-term influence of participation in one or more of these experiences is recommended.

The **final chapter** brings together the most important conclusions, starting with summarising that these three sectors have an environment-related influence through elements that spill over and participants becoming carriers of new practices. In the case of citizen science these are political, community-related, scientific research-related and conservation-related practices, for conservation tourism these are political, community-related and environment-related practices, and for participatory environmental research tourism these are political, community-related, scientific research-related and environment-related practices. It then concludes that this is because of a combination of participation with education, interaction, and emotive nature experience. In citizen science this manifests itself as experiential education, training, and nature experience, in conservation tourism as environmental interpretation, wildlife encounters, nature experience, hands-on activities and experiential learning, and interaction with nature, fellow volunteers, and the host community, and in participatory environmental research tourism as experiential education, environmental interpretation, wildlife encounters, nature experience, hands-on conservation activities, and interaction with fellow volunteers.

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Foreword and acknowledgements

The report that you currently have in front of you marks the end of my six years at Wageningen University, years that provided me with the academic skills and knowledge necessary to complete this thesis. However, they did not quite prepare me for the head scratching that came with seven months of doing research; I naturally work obsessively on a thing and then quickly move on. Seven months, then, is a very long time. I looked for articles, read, pondered, wrote, reread, thought, adjusted, got stuck on details, ruminated, lost sight of the bigger picture, spent weeks preparing, developing and trying to get a questionnaire up and running, came up with a plan B, C and D when that did not go as planned, worried a lot, and finally had to settle for what I could still accomplish in the remaining time. It is therefore safe to say that working on this thesis was the most challenging part of my time as a student and that it tested my stamina and long-term motivation. However, I also had plenty of situations where I was, as they say, 'on a roll'; motivated, confident, writing a lot in a short period of time. I gathered, read and interpreted a lot of new information - and learned a lot from it. I had moments of getting that 'click' when different parts fell into place and things became clear. It was during moments like these that I sincerely enjoyed working on my thesis.

However, the biggest reason these seven months were not as dreadful as they could have been are the people around me. Therefore I would like to express my thanks to some people vital for keeping me on track and for keeping me motivated. First of all, Kris van Koppen, my supervisor. His way of supervising was very pleasant and motivating, and his enthusiastically shared advice, thoughts, and knowledge helped me a lot. I would also like to thank Jenny Cousins from Earthwatch, who actively thought with me about the questionnaire and ways to distribute it. Some more people from Earthwatch deserve to be mentioned here: Paul Baker, who helped by distributing the questionnaire; those who shared their ideas and suggestions with Jenny; and those who replied to a small exploring survey in preparation for the participant questionnaire. I am also grateful to the friends, family and helpful strangers who tested the questionnaire and gave useful feedback. A final word of thanks goes out to my family for their support and for never failing to inquire about my progress, and to my housemates for calmly listening to my probably confusing stories about the writing process, for sharing their ideas and insights, and for their willingness to help.

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1. Introduction

Environmental degradation, resource depletion, ocean acidification, climate change, and biodiversity decline are some of the threats the world is facing today. With these unsustainable consequences of Western lifestyles becoming more evident there is an increasing focus on changing people's behaviour, choices, consumption patterns and lifestyles not only as part of the problem, but also as part of the solution (Sanne, 2002). The importance of changing people's behaviour, choices and lifestyles is acknowledged in the fields of environmental policy and conservation biology, amongst others. In environmental policy a focus on consumers and lifestyles became apparent after the Rio Summit in 1992 and its main policy document, Agenda 21. This formed the start of a growing consensus that Western lifestyles and consumption patterns need to change if we want to solve environmental problems (Sanne, 2002; Roy and Pal, 2009). Conservation biology, a field of science integrating many biological disciplines and dedicated to the protection and management of biodiversity (Cooper et al, 2007), also recognises that changing behaviour is a part of conservation (Jordan et al, 2011). Various conservation biologists have stated that environmental and conservation problems are the result of our choices and lifestyles and that a change in behaviour is an important step to conserving biodiversity (Schultz, 2011). It may even be the only option, as Schultz (2011) argues.

Unfortunately, changing people's behaviour in order to reduce the negative impact we have on the planet or to even cause positive impacts is not easy since it is influenced by a complex combination of various factors. The variety of views, ideas and theories about how to influence behaviour also indicates this complexity and makes clear that there is not one single solution. Some schools of thought focus on informing people and changing their behaviour through a change in awareness and knowledge, others focus on e.g. emotions, empowerment, or providing the right infrastructures (Jackson, 2005). Social practice theory is one of those theories and focuses on practices instead of actual behaviour (Shove et al, 2012). Practices are routinised types of behaviour, that involve the actions themselves, mental activities and understanding of the action, things and structures and their use. Also skills, know-how and motivation play a role (Reckwitz, 2002 in Shove et al, 2012). With this, social practice theory combines two streams of behavioural theories and models, including both internal factors related to lifestyle and choice and external factors like infrastructures. It is a relatively new theory that has not been applied very often, and offers a lot of scope to analyse how certain factors influence the activities people engage in.

This thesis applies social practice theory to the cases of citizen science, conservation tourism, and participatory environmental research tourism. Citizen science is a form of research where non-scientists and scientists cooperate and together collect, share and analyse data for authentic scientific research (Jordan et al, 2012). Conservation tourism is a subsector of ecotourism, where people travel and participate in a conservation project (Cousins et al, 2009a). Participatory environmental research tourism (Ellis, 2003) combines citizen science with conservation tourism; participants travel to help scientists with their research on location. These three activities share several characteristics and are suggested to have an influence on the way people make choices and how they behave with respect to nature, conservation, and the environment due to their immersive and experiential educational

approach, which has been widely acknowledged to play an important role in achieving behavioural change (e.g. Bonney et al, 2009b; Brossard et al, 2005; Jordan et al, 2012). They are also emerging sectors, and expected to become more important in the future; in the past decade citizen science has been growing in number of participants and in number of projects (Jordan et al, 2011; Crall et al, 2012), conservation tourism is one of the fastest growing subsectors of the quickly expanding ecotourism sector (references in Cousins et al, 2009b), and participatory environmental research tourism, although still relatively small in size, also sees a growth of holiday operators and organisations offering these trips (Ellis, 2003).

However, links between citizen science, ecotourism participation, behavioural effects, knowledge gain, and attitude impact remain understudied (Powell and Ham, 2008) and also the influence of participatory environmental research tourism on people's actions has not been studied much. Most research related to citizen science focuses on the concept itself and its benefits (e.g. Wiggins and Crowston, 2011), on ways of ensuring or improving the quality of the data and on examples that citizen science data can really be used in professional research (e.g. Bird et al, 2013; Kaartinen et al, 2013; Jiguet et al, 2012; Kyba et al, 2013; Sullivan et al, 2014), on development of successful citizen science projects (Bonney et al, 2009b), and on motivations of participants (e.g. Raddick et al, 2013; Rotman et al, 2013). Research of conservation tourism and alternative forms of tourism focuses on a variety of topics, ranging from social and environmental impacts on the local community and nature (e.g. Shi et al, 2014; Lanfranchi, 2014; Banerjee, 2012), to the ecotourism market (e.g. Steven et al, 2014), to tourist satisfaction and motivations (e.g. Cong et al, 2014), and to management issues (e.g. Ferreira and Harmse, 2014). Therefore, several researchers have expressed the need for more research into how partipation in scientific (ecological) research influences behaviour (Price and Lee, 2013; Brossard et al, 2005; Crall et al, 2012). Social practice theory has not been used before for analysing the potential influence of citizen science, conservation tourism, or participatory environmental research tourism participation, and using this perspective is likely to lead to new insights.

Initially, the aim of this thesis was to contribute insights to this topic by gathering new data from participants of participatory environmental research tourism projects and from literature on citizen science and conservation tourism. It was focused on how participants' experience had influenced their day-to-day activities as well as their environmental and conservation-related behaviour. A questionnaire was developed, but due to organisational circumstances it was not possible to gather an adequate response. Therefore, an alternative aim was developed: to contribute insights regarding the potential of citizen science, conservation tourism, and participatory environmental research tourism participation to lead to an environment-related change in practices. Citizen science participation, conservation tourism participation, and participatory environmental research tourism participation are approached as practices, which implies that they are analysed as entities including lifestyles, people's motives and choices, routines, social structures, institutions etc. An environment-related change in practices includes two types of changes; a change or evolution within an existing practice which makes it more conservation-, nature-, or environmentally friendly, or the development or growth of an environment-related practice. This latter is a practice that is conservation-, nature-, or environmentally friendly. The main research question this thesis aims to answer is:

What is the potential of participation in citizen science, conservation tourism, and participatory environmental research tourism to lead to an environment-related change in practices and what factors are most influential in this respect?

This following sub questions have been developed to help finding an answer to the main research question:

- How do existing theories, and particularly social practice theory, explain behavioural change?
- Which influences have been documented on behaviour and practices by participation in citizen science, conservation tourism, and participatory environmental research tourism?
- What can we learn about the mechanisms of this influence from a social practice perspective?

The answers to these questions will be found by means of reviewing the current literature on citizen science, conservation tourism, and participatory environmental resource tourism through a social practices perspective. The articles reviewed in this report were sourced from Scopus and Google Scholar in January and February 2014, using terms as *citizen science* and *ecotourism AND behaviour*. Additional searches were conducted throughout the course of working on this thesis. The original methodology and the questionnaire that was developed, as well as a note on the circumstances that obstructed data collection, can be found in the appendix. The next chapter gives a more detailed explanation of social practice theory and presents the conceptual model. It is followed by a chapter which further introduces citizen science, conservation tourism, and participatory environmental research tourism. Chapters 4, 5 and 6 review behavioural influences of participation in citizen science, conservation tourism, and participatory environmental research tourism respectively, and link these outcomes to social practices. Chapter 7 is discusses the limitations, and the last chapter presents an answer to the research questions.

2. Theories on behaviour

Behaviour is influenced by a variety of factors, which makes it very difficult to change and to create a model that fully captures behaviour and behavioural change. In this chapter I will argue why it is important to adopt a broad perspective in order to understand what influences behaviour. It will introduce two groups of behavioural theories, internalist and externalist, and outline some basic concepts of behavioural change models. This will build up to an explanation of social practice theory in the section thereafter, which forms the basis of the conceptual model presented in the third section of this chapter. The information in this chapter, unless otherwise stated, comes from Jackson's book *Motivating sustainable consumption* (2005), in which he describes an overview of the various behavioural models.

2.1 Internalist and externalist approaches to behaviour change

There are various approaches to modelling behaviour that are based on internal elements like attitudes, values, habits, and personal norms. These look at the individual as the unit of analysis, at characteristics that are internal to the individual. An example are rational choice models, in which choices are assumed to be made based on a cost-benefit analysis. Humans in these models are seen as economic actors optimising their personal benefit; the option with the maximum benefits is the one that gets chosen (Jackson, 2005). Without structural constraints, social norms, or regulations, this can lead to problems for society as a whole. Resource depletion is an example, as illustrated in the famous *The tragedy of the commons* by Hardin. He explained how without regulations a pasture ecosystem would collapse due to shepherds maximising their own benefit; they would add more and more personal sheep to the communal grounds, eventually introducing more sheep than the system could carry (Spaargaren and Van Koppen, 2013). However, this idea has been criticised. One argument is that choice is not always rational. People do not always deliberatively engage in certain actions, but often perform behaviours out of habits and routines. Behaviour is also often based on emotional responses and not on deliberative cognitive processes. Moreover, people also engage in moral behaviour and not always act out of self-interest, which is not shown in these models (Jackson, 2005).

Two other, widely applied theories looking at the individual are those developed by Fishbein and Ajzen: the Theory of Reasoned Action and the Theory of Planned Behaviour (Figures 1 and 2). Unlike rational choice models, which view behaviour as the result of a cost-benefit analysis, behaviour in their models is described as strongly influenced by norms and values. The Theory of Reasoned Action describes someone's intention as the antecedent of behaviour, which in its turn is influenced someone's attitude towards the behaviour. Intention is also linked to beliefs about the outcomes of their behaviour and the evaluation of the outcomes of this behaviour. Also linked to the intention is someone's subjective norm, which is the perception or beliefs about what others think about performing the behaviour. This model thus not only describes someone's own attitude, but also includes the social influence on personal behaviour. The Theory of Planned Behaviour adds the perceived behavioural control to this model as an indicator of intention and behaviour. Perceived behavioural control is

described as 'the person's belief as to how easy or difficult performance of the behaviour is likely to be' (Jackson, 2005:48).

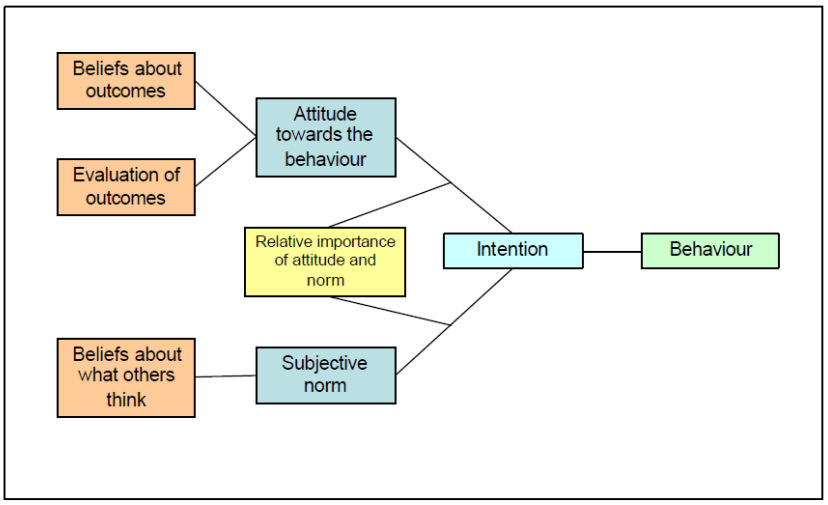

Figure 1: Theory of Reasoned Action (as presented in Jackson, 2005:46)

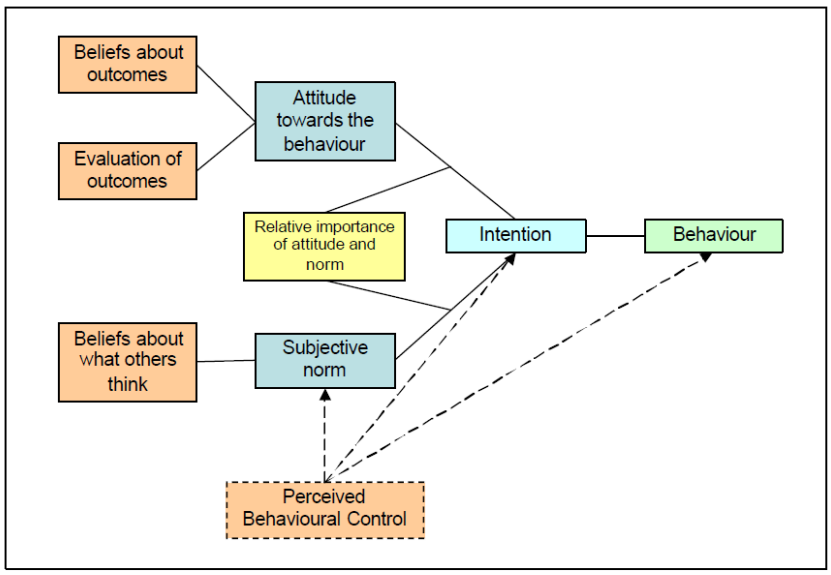

Figure 2: Theory of Planned Behaviour (as presented in Jackson, 2005:49)

These theories thus try to include psychological factors in their models. These models and theories call for approaches like awareness raising, information provisioning, and advertising campaigns to motivate pro-environmental attitudes (Jackson, 2005). They are based on the assumption that increasing environmental knowledge through education will lead to environmental awareness and concern (environmental attitudes), which in its turn will lead to pro-environmental behaviour. However, it is not the case that the public is indifferent towards and unaware of the state of the environment; in 2000 a survey found that 83 percent of respondents, who were from 11 developed and 23 developing countries, were concerned 'a fair amount' to 'a great deal' about the environment (Leiserowitz et al,

2005:26). Raising awareness is thus not always enough to change behaviour. Moreover, studies consistently show that education and increasing knowledge alone does not change behaviour and that intentions are not always good predictors of behaviour (Schultz, 2011). An explanation for this is that these models leave out moral as well as affective or emotional factors. Also habitual factors are not included, whereas in reality people often act based on routines. Moreover, those models are also criticised for leaving out external influences like incentives, social norms (e.g. respectability and appropriateness), and institutional constraints. Thøgersen (2005), amongst others, describes how these play an important role when it comes to behaviour; although individuals can have good intentions, their actions can still be otherwise due to external factors. There are various constraining factors that lie outside of consumer's control but that do affect the choices one makes when it comes to consumption. Examples are infrastructure, price and availability of environmentally friendly products and service alternatives, presence or absence of eco-labelling schemes, and scientific uncertainty about what the most sustainable option is. Many pro-environmental behaviours can only take place if the necessary infrastructure is provided (e.g. recycling, taking public transportation). There are personal constraints and limitations as well; resources like finances, time, and cognitive capacity are limited and influence which behaviours people engage in.

External approaches take these issues into account and focus on external and structural elements like incentives and institutional constraints (Thøgersen, 2005). They see a change in behaviour and consumption patterns as strongly influenced by these external conditions. Externalist models approach consumers as being subject to those external conditions; they are 'locked in' to consumption choices. Obstacles to behaviour change in external models are issues like this consumer lock-in, but also like old habits which need to be broken and new habits that need to be formed, as well as additional external obstacles that have to be overcome (Thøgersen, 2005). Besides these factors, the social context plays an important role; people also perform certain actions as a result of the cultural atmosphere, social norms, lifestyle choices and social interaction (Jackson, 2005). External approaches call for a combination of incentives and changes in the regulatory structure to create the right conditions for pro-environmental behaviour (Thøgersen, 2005).

However, just as internalist models fall short on external factors, so do externalist models fall short on internal factors. They underestimate the influence of human actors to make choices. Also, attempting to change behaviour through altering external conditions, even when it has an effect, might not be lasting. Providing certain products or services, economic incentives and other external provisions can motivate people to act pro-environmentally without it being out of environmental concern. Some scholars warn that such unconscious pro-environmental behaviour can easily be reversed or changed to a more unsustainable pattern because it is not based on fundamental values (e.g. Kollmuss and Agyeman, 2002) and because it is important that people are self-determined and internally motivated to perform a new behaviour for the maintenance of that behaviour (e.g. Cooke and Fielding, 2010). Therefore, a broad perspective combining internal and external approaches should be adopted when analysing behavioural change.

2.2 Social practice theory

Social practice theory is built on Giddens' structuration theory, which is an attempt to bridge the gap between internalist and externalist approaches to behaviour (Jackson, 2005). According to Giddens' theory human activity is shaped and enabled by the social structures of rules and meanings (including cultural norms and views as well as systems of provision), which in their turn can only exist in the flow of human action; actors also act out of beliefs, lifestyles and routines. This interplay between social arrangements that are the result of millions of individual decisions, and the flow of human activity which is based on practical know-how and social systems, rules and resources, combines internalist and externalist ideas (Shove et al, 2012).

Social practice theory is based on this same notion. It does not place attitude or personal norms and values central and does not look at behaviour as an individual action, nor does it solely look at structures. Instead, it looks at behavioural practices that an individual shares with other human agents. Practices can only exist when they are performed, and individuals form the hosts or carriers of a practice. This means that not the individual, but the practice itself is the central unit of analysis (Shove et al, 2012). Practices shape and are shaped by cultural factors, by social norms and lifestyle choices as well as by the institutions and structures of society (Spaargaren, 2003). A visualisation of the social practices approach as depicting the interplay between actors and structure can be found in Figure 3.

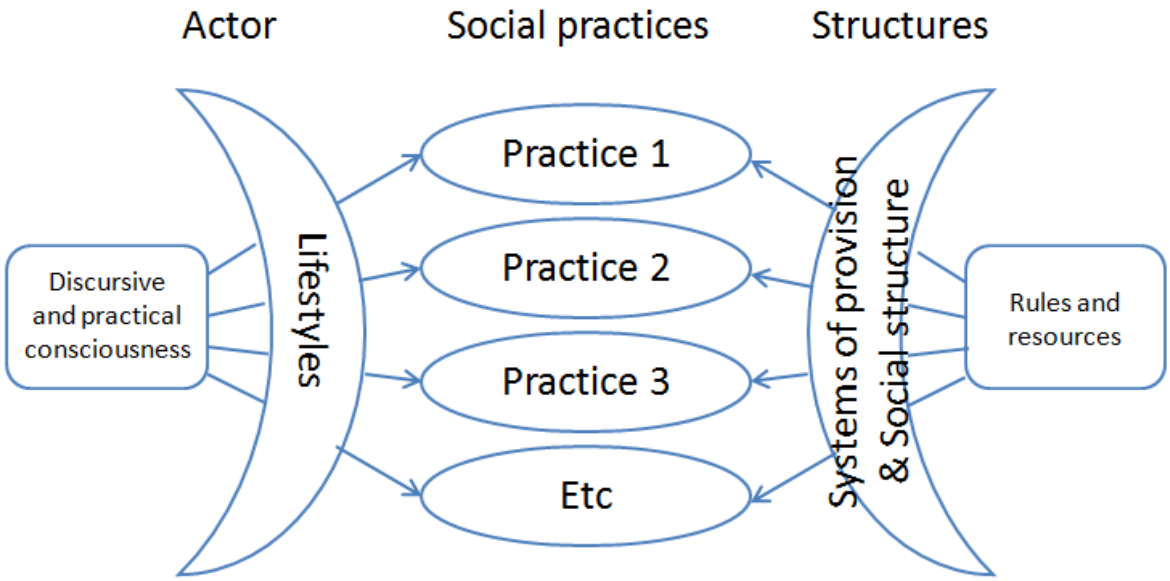

Figure 3: Social practices model (based on Spaargaren and Van Vliet, 2000:53)

Practices have been described as 'routinised type[s] of behaviour', and as 'temporally and spatially dispersed nexus of doings and sayings' (Schatzki, 1996 as cited in Shove et al, 2012:7), as shared understandings and modes of action between people. A practice exists of a 'multitude of single and often unique actions' and includes 'forms of bodily activities, forms of mental activities, "things" and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge' (Reckwitz, 2002 as cited in Shove et al, 2012:7). Shove et al (2012) simplify this description by approaching practices as consisting of three elements: materials, meanings, and competences. With this they add a new material dimension to the more established idea that shared understandings, meanings, practical consciousness and purposes are central when it comes to analysing practices. Materials include objects, infrastructures, tools, hardware, and the body itself, which are necessary requirements for engaging in a certain practice. For example, for cooking you will need items like a kitchen and cooking utensils. Meanings are mental activities, symbolic meanings, ideas, aspirations, emotions, and motivational knowledge, for example liking a certain dish very much. Competences are composed of multiple forms of understanding and practical knowledgeability, like having the skills and knowing how to prepare that dish.

Shove et al (2012) argue that practices exist when elements are linked, and that practices develop and disintegrate when links are not yet made and no longer made, respectively. New practices involve novel combinations of new or existing elements. Moreover, elements can change over time, thus altering practices as well. An example is the introduction of new tools which influence how people cook, or new information about food and health which influence how people think about certain products. Elements, Shove et al describe, are thus both the 'ingredients' of a practice, and the points of connection between them. Although this idea of three elements making up a practice is, as mentioned here and as emphasised in their book, a simplification, it serves well when it comes to analysing practices and how they change over time.

Elements can also influence each other. As a consequence, practices can also feed back into someone's lifestyle; people can 'become that which they do' (Becker, 1977 in Shove et al, 2012: 70). A similar statement is made by Thøgersen and Crompton (2009), who have studied the concept of spillover in relation to behaviour. They state that performing pro-environmental behaviour may influence one's beliefs, attitudes, values, and self-identity, causing them to see themselves as the kind of person who cares for the environment. This in turn could influence future behaviour, thus spilling over from one behaviour to another. Thøgersen and Crompton (2009) argue that an underlying mechanism for this could lay in cognitive dissonance theory. According to this theory, people do not like internally inconsistent beliefs and values and they feel uncomfortable and inconsistent to engage in pro-environmental behaviour in one area (or practice) and not in another. Furthermore, adopting pro-environmental behaviour could increase the skills and knowledge necessary to adopt another behaviour, or facilitate learning about environmental problems (Thøgersen and Crompton, 2009). This latter point has also been raised in practice theory, which emphasises the importance of procedural knowledge when it comes to adopting a new practice (Shove et al, 2012).

Shove et al (2012) propose that also changing populations of carriers (individuals that carry a practice) are central for changing practices. Individuals can become the carrier of a practice through a variety of factors, like birth, history and location, thus determining which practices exist and which do not. Besides these factors, also social networks play an important role in changing populations of carriers; communities and networks can be seen as places where new social arrangements, shared understandings and modes of action are formed; practices develop dynamically as the result of a vast number of individual decisions. These communities are often bound together by 'shared expertise and passion for a joint enterprise' (Wenger and Snyder, 2000 as cited in Shove et al, 2012:67) and through previous and present experience.

Social practice theory distinguishes between practical and discursive consciousness, which is described by Giddens (1984 in Jackson, 2005). Practical consciousness is explained as 'the everyday knowledge that people have about how to do things' (Jackson, 2005:90-91). This everyday knowledge is shared and commonly accepted, and these types of routine behaviour take place without deliberative reasoning. Goal-oriented or intentional behaviours on the other hand are performed in discursive consciousness, which 'consists in everything that actors are able to say about the social conditions of their action' (Jackson, 2005:91). Giddens suggests that this often occurs during or after performing the action. Shifting consumption patterns requires raising routine behaviours from the level of practical consciousness to discursive consciousness, for example through slowly introducing new elements that fit within a practice. It can also occur through deroutinising, forcing a change in routine, after which a new or altered practice becomes part of practical consciousness again (Jackson, 2005).

This suggests that there are several ways of changing practices, deliberately or otherwise. Firstly, meanings, materials and competences play a large role since a practice exists or seizes to exist when the links between these elements are made or broken. These elements can change; they are influenced by each other and by outside structures, cultural factors, and systems of provision. These elements can also be based in other practices and spill over into new practices due for example to cognitive dissonance or newly gained competences, meanings and materials which enable becoming the carrier of another practice. This is a second aspect of changing, developing and disintegrating practices: changing populations of carriers. Without carriers a practice does not exist. Individuals become carriers of a practice due to several reasons, like birth, past experiences, and present experiences. These experiences can provide them with the skills, understandings, motivation etc. which are necessary to successfully become a carrier of a certain practice. Together carriers form a community of practice, where they share these elements and, depending on their experiences and external innovations, change them. Experiences carriers can also form an example for new carriers, who learn how to perform the practice.

2.3 Conceptual model

Based on the theory set out in this chapter, a conceptual framework can be developed, visualising the potential influence of citizen science, conservation tourism, and participatory environmental research tourism participation on causing an environment-related change in practices, through spillover of elements, changing elements, and changing groups of carriers. Central in the model are the three sectors as practices, which can influence other practices. This influence is shown by the curved lines, which indicate a spillover of elements. In contrast to theories like those of Azjen and Fishbein, where spillover mostly occurs in the form of knowledge, social practice theory makes clear that spillover can also happen through a change in materials, meanings, or competences. Figure 4 is the model for participatory environmental research tourism ("PERT") as a practice, but the models for citizen science and conservation tourism are similar.

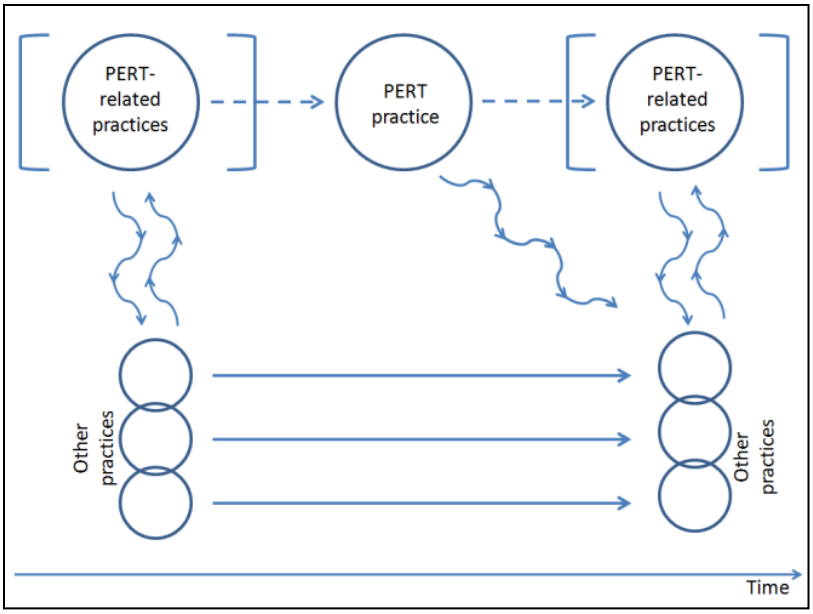

Figure 4: Conceptual model showing how participation in participatory environmental research tourism (PERT) projects can lead to spillover into other practices

The conceptual model also shows that before participation someone might already have participated in a practice related to the practice central in the model, in this example a PERT-related practice (e.g. like regular citizen science or another form of ecotourism). This can have influenced the decision to participate in a participatory environmental research tourism project and can also have already influenced other practices through spillover. In addition, the participatory environmental research tourism experience can lead to engagement in practices related to this practice, which can also influence other practices. Furthermore, the model includes a timeline; it shows that practices can change over time, caused by all sorts of reasons but also possibly as a result of spillover from participation in citizen science, conservation tourism, or participatory environmental research tourism.

In the next chapters I will apply this idea to citizen science, conservation tourism, and participatory environmental research tourism by reviewing existing literature on these three practices, exploring how performing these practices can influence other practices through, amongst others, new experiences, social networks, new competences and changed meanings. However, first I will further introduce citizen science, conservation tourism (and related forms of alternative tourism), and participatory environmental research tourism in the next chapter.

3. Citizen science, conservation tourism and participatory environmental research tourism

This chapter describes the three central topics in this thesis report; citizen science, conservation tourism, and participatory environmental research tourism. Each of the following sections discusses the definitions of these sectors and gives a short overview of them. The fourth section presents a comparison, highlighting some of the similarities and differences.

3.1 Citizen science

Citizen science, as described in the introduction, is a form of research where non-scientists and scientists cooperate and together collect, share and analyse data, and thus engages the public in authentic scientific research (Jordan et al, 2012; Crall et al, 2012). There are different levels of participation in citizen science projects. These have been described by Bonney et al (2009a), who distinguished contributory, collaborative, and co-created projects. Contributory projects are projects where participants only contribute data, collaborative projects are projects where participants also can refine project design, analyse data, and disseminate findings, and co-created projects are projects where participants also collaborate with scientists in project design and other steps of the research process. Citizen science projects can be found in various fields of research, for example in ecology, astronomy, meteorology and climatology (Wiggins and Crowston, 2011). In this thesis the focus will be on ecological citizen science projects.

There are other differences between different citizen science projects. One of the other distinctions that can be made between different types of projects is described by Wiggins and Crowston (2011). They discern five types of projects: action, conservation, virtual, education and investigation. Action citizen science projects encourage participants to use scientific research to support or intervene in local issues. Conservation citizen science projects engage citizens in nature conservation, and often focus on gathering data and educating participants. Virtual projects are mediated by ICT, and education projects aim at educating the public. Investigation projects are the most commonly known citizen science projects, and they aim at gathering data for scientific research. Education is often highly valued, but not a main goal.

One of the benefits of citizen science is that it makes it possible and affordable for researchers to obtain data collected at a vast geographical scale and over long periods of time (Dickinson et al, 2012; Tulloch et al, 2013; Bonney et al, 2009a). Ecological citizen science projects can be used to monitor populations, species, biodiversity, ecosystems, or taxonomic groups, and identify general patterns, monitor long-term processes, discover possible threats and unexpected events, and inform management actions (Dickinson et al, 2012; Tulloch et al, 2013). They are also valuable in collecting baseline data which can be used to respond to unsuspected situations or environmental disasters (Dickinson et al, 2012; Bonney et al, 2009a). In addition, they can be used for studies of (changes in) distribution, phenology and for discovering (locally) rare species and invasive species (Bonney et al,

2009a; Dickinson et al, 2010). Citizen science datasets are very valuable for conservation efforts, not only for scientific research but also for problem identification, making (management) decisions and for education (Coghlan, 2005).

An example, and one of the bigger organisations when it comes to citizen science, is the Cornell Laboratory of Ornithology (CLO). CLO runs various citizen science projects of various sizes, aimed at answering scientific research questions and at educating citizens about birds and scientific processes (Bonney et al, 2009b). In 2009, Bonney et al (2009b) reported that CLO's projects together gather tens of millions of observations annually. CLO was started in 1966 and nowadays uses online tools so citizen scientists can share and explore data. These long-term and spatially vast datasets are a valuable source for ornithologists investigating changes in for example bird phenology, distribution patterns and effects of climate change, and for advising managers (Cornell Laboratory of Ornithology, 2014a). Amongst its projects are the popular eBird and FeederWatch. eBird collects data on bird sightings since 2002. Participants fill out a checklist of which birds they observed while birding and submit these data online, thus providing insight in the presence, absence, and abundance of birds. They can also visualise their data with online maps, graphs and more. eBirds's website reports of citizens submitting 3.1 million bird observations in March 2012 alone (eBird, 2014). Project FeederWatch has a more specific scope and investigates the birds that visit feeders during the winter. This project is open for participants from all backgrounds, who can choose how many times they want to count. They receive a kit with instructions, bird identification material and more (Project FeederWatch, 2014). These two examples are large projects, but there are also many small and sometimes more specific and complicated projects from other organisations, sometimes requiring more scientific research skills.

3.2 Conservation tourism

In contrast to citizen science, it is more difficult to define what conservation tourism is. A clear and single definition of ecotourism, volunteer tourism and other alternative forms of tourism is still missing (Galley and Clifton, 2004; Wearing, 2001; Coghlan, 2005). Wearing (2001) presents a model (Figure 5) that is based on literature, in which he first separates tourism in mass tourism and alternative tourism. Alternative tourism is defined as 'a modality of tourism that pays special attention to environmental and social carrying capacity' (Wearing, 2001:31). It is split into cultural, educational, scientific, adventure, and agritourism forms, but Wearing mentions that there is overlap between those forms and gives the example that cultural tourism can also be educational.

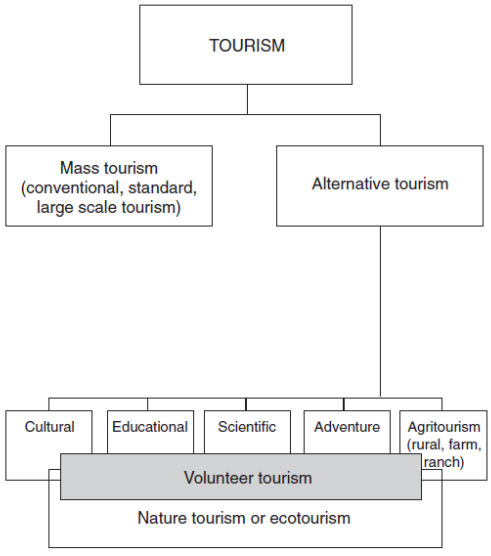

Figure 5: A conceptual scheme of alternative tourism as proposed in Wearing (2001:30)

In the model, ecotourism is synonymous with nature tourism (or green tourism) and is 'nature oriented and nature based but not always necessarily practiced in wilderness settings' (Wearing, 2001:31). It is referred to as 'tourist experiences that are environmentally sustainable, occur in natural areas, involve an interpretive element, contribute to the local community and involve local or indigenous peoples' (Wearing, 2001:24) and it overlaps with educational, scientific, adventure and agritourism forms of tourism. This definition includes the characteristics that are common in most descriptions of ecotourism, as described by Coghlan (2005): nature-based products, sustainable management, environmental education, and contribution to conservation. She also mentions cultural sustainability, interpretation and education, and conservation of the natural environment as recurring topics. Volunteer tourism overlaps with all these forms of tourism and is a term applied to 'tourists who, for various reasons, volunteer in an organized way to undertake holidays that might involve aiding or alleviating the material poverty of some groups in society, the restoration of certain environments or research into aspects of society or environment' (Wearing, 2001:1).

Conservation tourism is a subsector of ecotourism and volunteer tourism where participants travel to natural areas to 'actively take part in an organised in situ or ex situ conservation project' (Cousins et al, 2009a:1070). Participants can for example help with environmental monitoring, assist in weed control activities, take part in flora and fauna surveys, plant trees, assist with fencing, collect seeds, or help with trail maintenance. The conservation tourism sector includes charities and non-governmental organisations as well as private companies. There are differences between the holiday operators; for example, some are adventure-oriented whereas others are more scientifically oriented, using academic expertise, peer review processes, and/or review the conservation outcomes of the scientific research (Cousins et al, 2009b). Like citizen science, conservation tourism also has direct and indirect benefits for conservation, such as informing management through research findings, using the financial contributions of participants, or in the form of the direct conservation and restoration efforts undertaken by tourists. Tourists in this sector thus engage in the practice of actually 'doing' conservation instead of only financially contributing to support conservation (Cousins et al, 2009b).

3.3 Participatory environmental research tourism

Ellis (2003), who coined the term participatory environmental research tourism, or PERT, describes it as 'short-term travel by volunteers to undertake a hands-on role in flora or fauna field research' (Ellis 2003:76). She also set some criteria in order to create a workable definition. She describes these criteria as follows:

- overnight travel plus one-way travel of 40 km or more;
- active participation by members (hands-on role) in flora or fauna field research or data collection;
- advertised publicly;
- participants are volunteers;
- trips are less than 1 month in length, and use fixed dates; and
- participants make a financial contribution to the project.

Participatory environmental research tourism can thus be seen as a combination of citizen science and conservation tourism, or as a subsector of both. It actively engages citizens in scientific research, and requires participants to travel to natural areas to participate in a project that is often aimed at conservation. There are also some differences. Regular citizen science projects have participants monitor or observe nature relatively close to home over a longer period of time, and communication between participants and professionals mostly depends on electronic tools and often is not very intense (Bell et al, 2008). For participatory environmental research tourism projects, as already established, participants travel abroad to join scientists in the field for a short while and spend full days helping them with their research under continuous supervision. Participatory environmental research tourism projects also put the primary focus on helping in flora or fauna field research, whereas conservation tourism is more loosely defined and can also have a main focus on conservation work (e.g. trail maintenance or construction, habitat restoration, removal of invasive weeds).

In the article in which she introduces participatory environmental research tourism, Ellis (2003) further explores this subsector. She describes that according to her definition, 77% of the agencies in this area are not-for-profit, 13% are commercial operators, 5% are governmental, 3% universities and 3% was unstated. Ellis also found that the subsector is characterised by wildlife-based projects. Especially marine mammals (29%), terrestrial mammals (22%), and turtles (17%) are popular subjects. An example of one of the organisations that organises participatory environmental research tourism projects, or 'expeditions' as they call them, is the Earthwatch Institute (further referred to as Earthwatch). Earthwatch has been mentioned both in conservation tourism (or other alternative forms of tourism) (e.g. Wearing, 2001), and citizen science literature (e.g. Dickinson et al, 2012), and most expeditions meet the criteria for participatory environmental research tourism projects. Expeditions typically last between one and two weeks, go to all continents and range from collecting data on plants, butterflies and bees in the Himalayas to measuring evidence of global warming at the Arctic's edge to conserving koalas and their habitat in Australia. Participants are paying volunteers and are involved in various research tasks like tracking wildlife, setting up camera traps, entering data and sorting images, and capturing and tagging animals, but also sometimes help maintaining conservation-related infrastructure or assist in education centres. The main focus however is on contributing to scientific research.

3.4 Comparison of the sectors

After having discussed the three sectors apart, this section will present a comparison. As can be seen in Table 1, they can be differentiated by the social context, ways of interaction, the time frame, the locational context, and the activities undertaken. Citizen science projects invite participants to become part of a wide network of citizen scientists, but it is mostly an individual activity and communication mostly takes place digitally. Also communication with fellow participants often happens on online forums. Participants collect data for a long period of time, varying from months to years. However, this is dispersed in time; they make observations for, for example, half an hour per week. They mostly collect data in their own neighbourhood or surrounding nature areas, or even in their own backyard.

Conservation tourism projects on the other hand offer social experiences, where participants work together in a group with fellow volunteers and staff, allowing for a lot of personal, face-to-face communication. These projects can have a variety of time frames, ranging from a week to a couple of months. They take place on a holiday location in often unfamiliar natural environments. Activities focus on conservation, species protection, and management, and actively involve volunteers in hands-on activities. Participatory environmental research tourism shares its social contact and ways of communication and interaction with conservation tourism, but its timeframe is generally shorter; projects typically last between 1 and 2 weeks. However, just as with conservation tourism, these weeks provide a very intense and immersive nature experience on a location (far) from home. The central activities are related to the scientific research project (collecting data, analysing data, helping with research set-up etc) and are directed at a larger conservation goal. The influence of these activities on practices will be explored in the next three chapters.

Table 1: Comparison between citizen science, conservation tourism, and participatory environmental research tourism

	Social context	Communication and interaction	Time frame	Locational context	Activities
Citizen science	Network of scientists and fellow participants	Online, by phone	Long term, dispersed	Home, nature	Voluntary science participation (e.g. observing nature, training, following protocols, submitting data)
Conservation tourism	Group of fellow volunteers, locals, and staff	Personal, face-to-face	Short-term, concentrated	Holiday, nature	Voluntary conservation participation (e.g. planting trees, attending interpretive activities, trail maintenance)
Participatory environmental research tourism	Group of fellow volunteers and staff (including local staff)	Personal, face-to-face	1-2 weeks, concentrated	Holiday, nature	Voluntary science and conservation participation (e.g. observing animals, attending presentations, doing physical labour, analysing data)

4. Environment-related influences of citizen science participation on other practices

There are several characteristics of citizen science projects that make them promising when it comes to initiating an environment-related change in practices. Unfortunately, educational and social outcomes of citizen science participation have not been documented much. It has been suggested that this is because the field is relatively new, because it is interdisciplinary, and/or because most citizen science projects do not conduct evaluations that look at impacts on attitude and behaviour (Philips et al, 2012 in Toomey and Domroese, 2013). This chapter presents a review of the available literature on the influence of citizen science on environmental behaviour as well as a discussion of these results from a social practice perspective, at the same time analysing what aspects of citizen science participation play a role in this influence.

4.1 Experiential education

Citizen science is a prime example of experiential and informal education (Crall et al, 2012; Price and Lee, 2013). Experiential education engages the student in problem solving and requires them to generate solutions by themselves, and to apply their knowledge. Knowledge gained through experience can provide the contextual background necessary for understanding information that comes from other, indirect sources (Tuss, 1996 in Brossard et al, 2005). Experiential education also encourages curiosity and developing one's own view (Price and Lee, 2013). Informal science education is all education outside of school (other examples are science museums, zoos and aquaria) (Crall et al, 2012), and is available for a much wider public, supporting lifelong learning (references in Price and Lee, 2013). Participants often join out of personal interest or curiosity, which has been suggested to be crucial to successful education (Aikenhead, 2005 in Price and Lee, 2013). By participating in citizen science projects people thus experience first-hand what it is like to engage in doing scientific research, rather than seeing or hearing it. They have to read and understand the educational materials about the background of the research, they have to follow protocols, make observations, and submit their data. They also have to use research tools like binoculars or identification cards, and understand their observation forms.

As the following paragraphs will show, this form of experiential education can increase ecological and scientific literacy. When people are ecologically literate, this means that they are able to: understand key concepts and ecological connectivity, think scientifically about ecological issues, and appreciate the links between human action and the environment (Jordan et al, 2009 in Reynolds and Lowmann, 2013). Scientific literacy has been described as 'both an understanding of scientific content and ways of thinking such that citizens can make better sense of our increasingly technical and scientific world. Skills of a scientifically literate citizen include critical and independent thinking, ability to interpret evidence and data, and understanding the role of uncertainty' (AAAS 1993 in Evans et al, 2005:589). When people are scientifically literate they are also able to understand the social impact of science on the individual and society (Miller, 2004).

Bonney et al (2009a) reviewed ten different citizen science projects with different levels of participation and found that all of them had an influence on awareness, knowledge, and/or understanding of key scientific concepts related to the citizen science project. For example, they found that citizen scientists from The Birdhouse Network, a project about birds, learned about bird biology, and that participants of Spotting the Weedy Invasives learned about invasive plant biology. Similarly, a citizen science project about acid rain taught participants about acid deposition. Often an increase in knowledge about scientific processes was reported as well. This was mostly the case with collaborative and co-created projects, in which participants are more part of the development of the research. Bonney et al refer to two such citizen science projects (Reclam the Bay and the Shermans Creek Watershed study) where participants even started to revise study methods and conducted independent research. However, also in contributory projects understandings of scientific processes increased. For example, in the Monarch Larvae Monitoring project volunteers started to think of their own research questions. Another example is formed by participants from The Birdhouse Network, who asked and answered their own questions by using the database of the project. Some even designed their own projects. Besides these new skills, also skills regarding reading and interpreting graphs, drawing conclusions from data and observations, and raising additional questions as a basis for new study designs are reported. Furthermore, participants also become capable of identifying and selecting study sites and evaluating research designs and methods for collecting data.

Besides an increase in knowledge, Bonney et al also found that participants made changes in their behaviour. For example, participants from Reclam the Bay started raising money for their project. Other started improving habitat for wildlife, taking environmental concerns into account when purchasing plants, and increased involvement in the project and in the community. Again others, like the participants of an acid rain project (ALLARM), used their new knowledge to write letters to or engage in discussion with editors, government representatives, and communities about acid rain. Others put their new knowledge about community structure and environmental regulation to practice to communicate with forest managers, to stop hog farms being located in their communities, and to try to influence land use planning decisions. This increased engagement in community development and local issues like management of local ecosystems, as well as an increased interest and engagement in governmental issues has been noted by more authors (references in Martin, 2013 and Jordan et al, 2012). Participants can even become involved in the policy process, also when a citizen science project does not have policy engagement or involvement as a goal (references in Jordan et al, 2012).

Whereas this overview by Bonney et al (2009a) presents an overview of several projects, assessments of single projects have been done as well. One of them is conducted by Brossard et al (2005). They analysed the impact of an informal science education project, The Birdhouse Network (TBN) of the Cornell Laboratory of Ornithology (CLO), on participant's attitudes toward science and the environment, on their knowledge of bird biology, and on their understanding of the scientific process. CLO, as introduced in the previous chapter, runs several citizen science projects. TBN project, just like most citizen science projects, was designed as an experiential education project (Palmer, 1992 and Messmore, 1996 in Brossard et al, 2005) and engaged participants in authentic scientific research. Participants studied bird biology and followed scientific protocols to answer scientific questions. TBN is

currently no longer active, but is merged with other nest-monitoring programmes into NestWatch, which focuses on reproductive success of all breeding birds in the United States. TBN focused on cavity-nesting birds, which depend on dead trees and dead wood to build their nests. Based on concerns following European studies which suggested that global warming was changing the timing of nesting and leading to a decline in populations, scientists wanted to know whether the same was happening in North America (Cornell Laboratory of Ornithology, 2014b). Moreover, the amount of dead trees in the United States has declined drastically, which makes it difficult for those birds to nest (Brossard et al, 2005). Artificial nest boxes can provide a substitute to build nests in. Participants of the TBN project put up one or more of these boxes in their surroundings and submitted data on the animals that visited them. They did this according to one or more of four different protocols, which focused on different topics: the clutch size of the nests, the calcium intake by the birds, the feathers used in the nests, and the nest site selection. TBN staff provided participants with a field worksheet, explanations of the protocols, information about the birds, and information about the nest boxes. Participants could access a special website and an e-mail discussion group, and were encouraged to interact with staff by phone, email, or through a mailing list (Cornell Laboratory of Ornithology, 2014b; Brossard et al, 2005).

Brossard et al used a pre-test-post-test research design. The pre-test was done before the participants had received the informational materials and protocols, and the post-test took place at the end of the field season. For the pre-test Brossard et al contacted 300 of the 798 new participants and a control group of 400 CLO-members who were not participating in CLO citizen science projects. 67% of the treatment group responded (about a quarter of the total new participants), as did 29% of the control group. For the post-test 200 participants who had not received the pre-test were contacted, as well as 400 CLO-members for the control group (who had also not received the pre-test). For the treatment group a response of 55% was recorded, and for the control group this was 53%. Results showed a statistical increase in participants' knowledge of bird biology, but not in participants' attitudes toward science or the environment, or in participants' understanding of the scientific process. A possible reason for this is that participants were motivated to join by an interest in birds and not by an interest in science, which limited their scientific literacy to develop, and that they were already highly concerned about environmental conservation, which led to no increase on the environmental attitude scale the researchers used.

A third study, conducted by Thody et al (2009), shows how participation can influence practices like community engagement and participation in policy and conservation issues. They researched the influence of participation in a citizen science project of the Tern and Plover Conservation Partnership, which started a citizen science project in 2000, called the Adopt-a-Colony programme. The goal of this project was to get some helping hands with monitoring and research but also with outreach activities, and to engage local people in management issues related to the endangered Interior Least Terns and Piping Plovers. These birds nowadays nest on sand spoil piles around the lakes at sand and gravel mines because their natural nesting habitat has been reduced by human activity. This leads to social and political conflicts because these areas, after the mines are taken out of production, often become lakeshore housing communities. In this part of America, both the sand and gravel industry and the real estate sector are important economical sectors, and since the presence of these bird species leads to

delays in economic activities many citizens develop negative attitudes towards their conservation and protection (references in Thody et al, 2009).

The Adopt-a-Colony programme includes training sessions about monitoring techniques and other scientific research aspects, but also about natural history and nesting biology of the birds, about the local area, the sand and gravel mining industries, housing development, and conflict avoidance. The authors wanted to evaluate volunteer experiences and obtained results from new participants from 2000 to 2004 using a four-page survey. They received 81 completed surveys, and found that knowledge increased; 91% of the respondents stated that the project had taught them a great deal about the birds and further results also indicated a significant increase in knowledge about not only the birds but also about policy issues and issues surrounding threatened and endangered species. Moreover, 93% had a significantly increased appreciation of the birds as well as river ecosystems, and many respondents indicated a more positive attitude towards threatened and endangered species issues. Participants also talked to people about the programme and the issues, and wrote letters to policy makers about management issues surrounding terns and plovers. With this they demonstrate how becoming successful carriers of the practice of participating in this citizen science project can lead to them also becoming carriers of other environment-related practices.

However, there are some factors influencing the extent of these educational and behavioural outcomes. Firstly, the role of interaction with staff and scientists, especially face-to-face interaction, has been emphasised in various articles. Evans et al (2005) note that the personal communication between staff and participants was a vital aspect for these successful social and educational results. They describe that also in other studies intense interaction has been found to be important, especially when it is face-to-face. This personal way of communication improved participants' knowledge about birds through shared observation and data collection, and promoted discussions where scientists can better address questions. Moreover, this allows participants to observe how scientists make observations so they can copy. It also seemed to empower participants because they felt like they were important partners. This more close interaction with experienced carriers of a practice allows new carriers to learn and copy actions and to gain skills, talk about difficulties, and discuss the broader implications of the research. For practices to recruit new practitioners, they will need someone they can copy and learn from, which is why scientists are important in this regard. Unfortunately, often the projects larger in terms of scale and area do not have the possibility to offer this more personalised training and interaction reduces to communication over the internet.

A similar observation has been made by Dickinson et al (2012), who described that it is not always the case that participation in citizen science leads to an increase in scientific and ecological literacy and that this depends on the levels of interaction and on how contact between professionals and participants is established. They also mention that the level of engagement plays role; the breath and amount of participation influences how much learning and behavioural influence takes place (Bonney et al, 2009a in Dicksinson et al, 2012). Dickinson et al furthermore emphasise the importance of providing educational materials and protocols that are understandable and clear, as well as the importance of providing background information that allows participants to understand the research questions and the theory and ideas behind the research.

Another influencing aspect for the extent of the educational and behavioural outcomes of the projects is the focus of the study. Donnelly et al (2013) suggest that phenology networks, for which citizens record the timing of natural events and document changes influenced by events like raising temperatures, have the opportunity to make climate change visible and show the local impacts. This, they suggest, might play a large role in increasing participants' awareness of climate change. Studies focusing on for example invasive species on the other hand are less likely to make the consequences of climate change visible, but can educate citizen scientists about the effect of invasives on the local environment and are likely to lead to other behavioural outcomes. Similarly, it depends on whether a project is an action, conservation, education, virtual, or investigation project. For example, action citizen science projects are more likely to encourage policy involvement than virtual projects.

4.2 Training

Besides experiential education, citizen science also contains another educational component; training. A consequence of engaging citizens in authentic scientific research is that many people with different backgrounds and knowledge levels, and who are not professionally trained scientists, will become data collectors for a scientific project. In order to reduce the risk of obtaining low-quality data, project developers have to pay a lot of attention to training participants so they have some basic research skills (Dickinson et al, 2010; Dickinson et al, 2012). Moreover, projects partially depend on providing training and education about the research subject, scientific research methods, and ecological backgrounds for gaining (and retaining) participants, since one of the motivations of people to participate in citizen science is a desire to learn (Bonney et al, 2009a).

Whereas the articles reviewed so far looked at the result that the overall participation in citizen science projects had on participants, Jordan et al (2011) look solely at the results of a training session in a citizen science programme focused on invasive species. For two years the authors studied 82 participants in a three-day programme that included education about non-native invasive plants and collection of data on the occurrence of those plants. Participants received background knowledge about invasive plant ecology and were trained on a specific protocol for collecting invasive plant data, and received hands-on training in identifying a set of non-native invasive plants. The training programme also actively tried to promote behavioural change and encouraged volunteers to make action plans for personal behaviour related to invasive plants. Jordan et al collected pre- and post-treatment data and did a focus group session to analyse data and discuss responsible environmental behaviour regarding invasive plants. Their results can be found in Figures 6-8.

Construct	*Question*	*Mean pretest (n = 82)*	*Mean follow-up (n = 33)*
Foundational knowledge (e.g., environmental science, ecology)	To what extent are you knowledgeable about environmental science?	2.29	2.66
Foundational knowledge (invasive plant issue)	How much do you know about the problem of invasive plants?	2.6	2.3
Environmental sensitivity (empathy toward the environment)	To what extent do you feel a sense of empathy toward the natural environment?	1.30	1.22
Locus of control (personal effect on an environmental issue)	To what extent do you believe you can influence how environmental problems and issues are resolved?	2.83	3.06
Locus of control (personal effect on invasive plant issue)	To what extent do you feel personally that you can help control the spread of invasive plants?	2.5	2.2
Civic and regulatory awareness (awareness of how issues are resolved)	To what extent are you knowledgeable about the research and regulatory infrastructure as they relate to environmental issues?	3.54	3.39

For the first 3 questions, response options were 1, a lot; 2, a fair amount; 3, only a little; 4, nothing. For the last 3 questions, response options were 1, great extent; 2, considerable extent; 3, moderate extent; 4, slight extent; 5, no extent. Response options were different to allow for comparison with other studies that obtained answers to similar questions.

Figure 6: Questionnaire results related to foundational knowledge of general ecology and invasive plant ecology, environmental sensitivity, and sense of locus of control (as presented in Jordan et al, 2011:1151)

As showed in the figures and as described in their article, Jordan et al found that participants already reported to be fairly knowledgeable about environmental issues, and changes were only moderate over the course of the project. Knowledge of invasive plants however, measured by content-related questions, increased on average 24%. Participants reported increased ability to recognise invasive plants and reported increased awareness of the impact of invasive plants on the environment. The largest increases were in knowledge of the mechanisms of ecological effects of invasive species and the potential for native species to cause environmental problems. 71% of the participants reported a substantial increase in their content knowledge about invasive species. In addition, there was a decrease in reported knowledge about environmental issues (2.3 to 2.7) and locus of control with respect to environmental issues in general (2.8 to 3.1). Understanding of how scientific research is conducted did not increase.

Question	*Pretest*	*Follow-up*
What is an invasive species?	75	88
What is an exotic species?	72	88
What is a native species?	81	90
How do invasive species cause problems?	60	92
How do we control invasive plants?	80	92
Do all introduced species become invasive?	68	100
T/F: Invasive plants always cause environmental problems.	68	100
T/F: Exotic plants always cause environmental problems.	94	97
T/F: Native plants can cause environmental problems.	12	71
T/F: Invasive plants are a serious problem in New York and New Jersey.	68	100

Figure 7: Correct responses (%) to questions about invasive plants in pretest (n = 82) and follow-up questionnaire (n = 33) (T/F, true or false) (as presented in Jordan et al, 2011:1152)

Question	*Pretest*	*Follow-up*
Nature of science (2006 and 2007)[a]		
To what extent must scientific theories be based on data that are visible (to the naked eye or using devices)?	2.23	2.23
How certain are scientific claims?	2.66	2.62
How often do the bulk of scientific claims change?	2.70	2.52
To what extent do scientists rely only on experiments to generate data?	1.99	2.26
To what extent should scientists share data with the public?	1.65	1.67
Scientific inquiry (2006)[b]		
Separating causation from correlation (2 essay questions)	27.6%	28.7%
Experimental controls (2 essay questions)	58.5%	56.0%

[a] *Means of responses range from 1 (great extent) to 5 (no extent) (n = 82 pretest; n = 32 follow-up).*
[b] *Percentage of responses considered sophisticated (n = 39 pretest; n = 18 follow-up).*

Figure 8: Results from the questions assessing nature of science knowledge and scientific inquiry in pre-test and follow-up questionnaires (as presented in Jordan et al, 2011:1152)

Jordan et al also reported some changes in behaviour. Before participation 78% of the participants said that they considered whether plants were non-native invasive species when purchasing plants and 30% stated to consider the issue of invasive plants when voting. The follow-up questionnaire found an increase to 86% for the former statement, but the latter did not change. In addition, in the follow-up questionnaire, 70% of participants reported that their behaviour had changed in at least one way as a result of participation. Two people changed their planting habits, one joined an invasive plant removal project, and one did both. Most change however was passive: 39% said they now noticed invasive plants and 43% reported talking to others about them. 28% said they had not changed their behaviour as planned, most often because of a lack of time. Many individuals reported a sense of futility (e.g. "My making a change wouldn't really matter given how widespread the problem is."). In their discussion Jordan et al therefore describe the importance of motivation and empowerment for encouraging participants to take direct action. Their research is illustrative of how citizen science participation can cause its carriers to start wondering about other practices. This raises these practices from practical to discursive consciousness, which happened when people started thinking about the plants they purchased through newly adopted meanings. Their beliefs, attitude, values and self-identity were changing as the result of performing citizen science. Besides this example of cognitive dissonance, also an increase in competences, knowledge and skills had an influence; they understood the impact their own purchasing action had.

4.3 Nature experience

Another aspect of citizen science is that participants are required to go outside and visit nature, or to observe nature in their own garden. This scientific nature experience potentially plays a role in the further influence of citizen science participation on other environmental practices. Unfortunately, this relation between nature experience, citizen science, and behaviour or practices has not been researched specifically thus far. There are however some articles that have looked at the influence of nature experience in general on environmental attitude and behaviour. These found that nature experience can indeed create emotional affinity towards nature. Kals et al (1999) describe this as a positive feeling of inclination towards nature and includes a love of nature, feeling good in nature, and experiencing a bond or connection with nature. Emotional affinity is a powerful predictor for nature-protective behaviour intentions and interest in nature (Kals et al, 1999). Some scholars, for example Schultz (2011), describe that individuals tend to view themselves as separate from nature, but that when they perceive a higher connectedness to nature they are more likely to engage in conservation behaviour.

Bögeholz (2006) also researched this topic, and reviewed several studies on the importance of nature experience on knowledge, values and behaviour. She describes that 'scientific, aesthetic and ecological nature experiences are the most powerful predictors' for general intention of environmental action (Bögeholz, 2006:75). Direct contact with nature, she suggests, is the most critical influence on later attitude toward the environment, especially for children. It can also create a 'foundation for environmental knowledge and perception' (Bögeholz, 2006:79). Its effect on environmental actions with low complexity is larger than on actions with higher complexity, because the latter require more

knowledge and more assessment and judgment competences. Furthermore, for nature-conservation intentions its effect is larger than for intentions to reduce household waste and energy use, and to change traffic behaviour. Interestingly, Bögeholz describes that especially scientific nature experience plays a large role in behavioural intentions. In other studies, doing scientific ecology- or conservation-related research has been linked to the emotional responses which encourage other conservation- or environment-related behaviours. Cousins et al (2009a) describe a study in which ornithologists expressed feelings of affection, enchantment, euphoria, frustration and disappointment when doing a corncrakes census, which formed a motivation for counting the birds (Lorimer, 2008 in Cousins et al, 2009a). The next paragraphs will look at some articles about outcomes of citizen science, which include a new-found connection with nature.

Evans et al (2005) assessed the impact of the Neighborhood Nestwatch (NN) programme on participants' sense of place and scientific and ecological literacy. NN is designed to teach people living in urban/suburban settings about bird ecology and to foster their connection to place. It is aimed at collecting data that can help researchers understand the ecology and population dynamics of eight species of birds. Part of the focus of Evans et al is to research how engaging in ecological research in one's own surroundings can foster a sense of place, and how this can lead to more awareness of the local environment and action on a local scale. They argue that this sense of place and understanding of their local environment are vital for taking local action and active participation in the community. Through surveys, interviews, and the 57 participant-initiated email contacts they characterised the typical NN participant and gained an understanding of the influence of NN on participant's sense of place and science literacy related to bird ecology. The surveys were done during visits by interns and resulted in responses from nearly all participants. The interviews were open-ended and were held with 45 people.

They found that contributing to a scientific study was the most-used reason to be involved for participants, and also a desire to learn more about birds and the local environment scored high (Figure 9). As presented in Figure 10, 87% of the participants reported an increase in knowledge about bird biology and behaviour. Also knowledge of non-bird wildlife increased, although less strongly (20%). Furthermore, 83% of respondents reported increased awareness of their local surroundings. Moreover, interview results suggested that observing birds made participants feel more connected to their backyard birds. Also their concern for the welfare of birds and their nestlings rose. The awareness of birds and the link between the birds and the backyard habitats increased. Evans et al quote a participant as illustration (Evans et al, 2005:592):

"I've been here 12 years and I never really heard the birds the way I hear them now. I don't know what that is—what happened. The light switch went on."

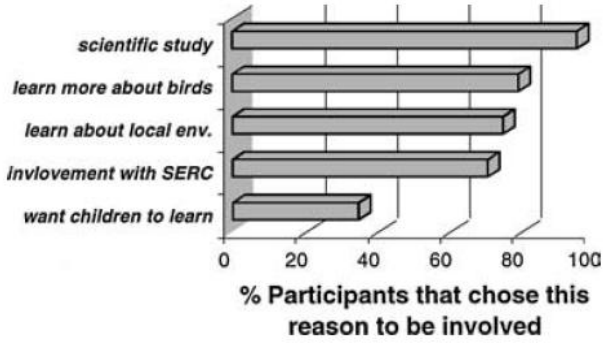

Figure 9: Reasons participants became involved in the Neighborhood Nestwatch programme (as presented in Evans et al, 2005:590)

Outcome	*Knowledge area*	*Increased knowledge (%)*
Science literacy	bird biology and behavior	87
	identify a new bird species	43
	wildlife knowledge (nonbird)	20
Sense of place	increased awareness	83
	perception of property	59
	changed behavior	56

**Because participants may have reported multiple areas of learning, values add to >100%.*

Figure 10: Percentage of participants in Neighborhood Nestwatch that reported increasing their knowledge in particular aspects of ecology (as presented in Evans et al, 2005:591)

56% of the respondents reported a change in behaviour related to their yard. This ranged from building special bird houses, to planting shrubberies for providing nesting habitat or shelter, to planting food sources for the birds, to not cutting trees where birds were nesting, and to keeping their cats inside when birds were fledging. Furthermore, respondents mentioned talking about birds with their neighbours, friends, family and community, and actively recruited new volunteers. A few (7%) were inspired to study further on a subject of interest, others suggested that they were planning on changing behaviour (also 7%). Furthermore, email analyses showed that respondents also started to become aware of the scientific process. They noted that they were concerned about the quantity and quality of their data, or expressed concern about how birdfeeders could influence the study findings. Moreover, some respondents commented on the issues related to research methods and were drawing conclusions themselves. Respondents were also making observations that went beyond the aim of the project, like observations about predation and nesting activities, also during recreational nature walks. This shows citizen science participation can influence other practices; elements from citizen science participation can spill over into other practices, leading to a change in how these are done and what they can mean for their carriers and other involved stakeholders and institutions.

Toomey and Domroese (2013) look at the behavioural and educational outcomes of a citizen science project focused on bees. They discuss two projects in the New York metropolitan area: the Great Pollinator Project (GPP) and the Earthwatch Coyote Project (ECP). The latter is an example of a participatory environmental research tourism project and will be described in chapter 6; the former will be analysed here. The GPP aims to identify areas of New York City which are good for pollinators and to increase understanding of bee distribution in the city, raise public awareness of native bees, and make

recommendations for improving park management practices to benefit native bees. Participants, called 'Bee Watchers', collect data of bee visitation on flowers. At the start of the season an orientation session was organised, led by a scientist. Also online instructions were published, which provided information about the importance of native pollinators and an introduction to the project's aims and the data collection protocol, including bee and flower identification guides. Data were submitted online, where also additional information related to bees, pollination service, and managing habitat for bees was published. Project coordinators sent out weekly emails encouraging participants to submit data and highlighting seasonal phenomena to watch for as well as pollinator-related stories in the news.

Toomey and Domroese documented participants' experiences through surveys and two focus group sessions. 125 people were contacted for the survey, and 61 responded. The focus groups existed of 13 of the 22 participants most active with submitting data and/or communicating with staff. Nearly 90% of survey respondents reported an increase in appreciation for bees and the natural world, 74% indicated an increase in confidence in telling others about native bees, and 55% reported an increase in interest in environmental issues in the community. The rest indicated no change (see also Figures 11-12).

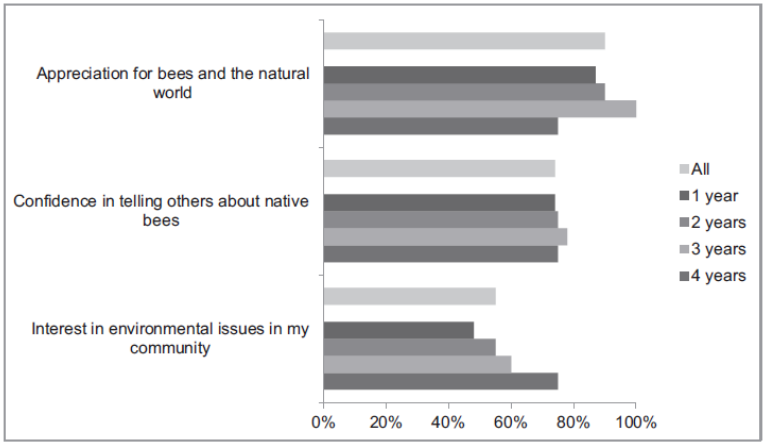

Figure 11: Percentage of Great Pollinator Project participants who cited an increase in appreciation for bees and the natural environment, by number of years of participation (N = 57) (as presented in Toomey and Domroese, 2012:55)

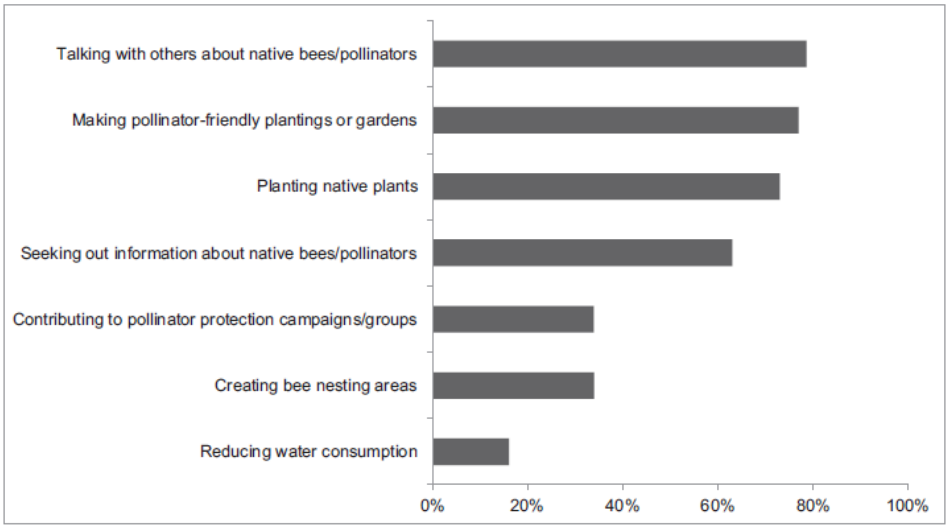

Figure 12: Great Pollinator Project participants' responses to the question: As a result of my participation as a bee watcher, my interest in doing the following increased (N = 56) (as presented in Toomey and Domroese, 2012:55)

Researchers also asked respondents 'what was something interesting or unexpected that you saw when observing bees?' to evaluate what participants had learned and how they interpreted their observations. At the same time, the question indicated participants' attitudes about bees. The most common responses dealt with being impressed by the diversity of bees, with how participants noticed that bees prefer some flowers over others, with a new-found fascination with seeing collected pollen on bees, with seeing flying bees, and with observing bees interacting with other insects. Moreover, some of them reported to be surprised that the bees were not aggressive. Toomey and Domroese interpret this as a positive attitude resulting from close observation and learning about bees. During the focus group, participants showed positive attitudes and appreciation of bees and nature in the city. They also described how the project influenced their behaviour, documented as the following quotes by Toomey and Domroese (2013:55):

"...everywhere I go now I look for bees ... I look at plants and the bees on those flowers. Out of curiosity."

"Once you're sensitized you can't not watch them. You can't not be more sensitive to movement ... more aware of subtle distinctions between bees."

"I used to garden for vegetables or pretty flowers, and now I garden for the bees."

"I've left my herbs to go down to seeds ... ever since I let everything flower it has been like a little city out there."

Participants further indicated that they were talking with others about native bees/pollinators (79%), making pollinator-friendly plantings or gardens (77%), planting native trees (73%), and seeking out information about native bees/pollinators (62.5%). Some reported increased interest in contributing to pollinator protection campaigns or invertebrate conservation groups (34%), and creating bee nesting areas. These results, just like those of Evans et al (2005) thus also point towards an environment-related change in other practices as well as other environment-related practices recruiting new practitioners. In line with Bögeholz (2006) and Kals et al (1999), Evans et al (2005), Thody et al (2009), and Toomey and Domroese (2013) all documented that participants' new-found connection to the research subject and to nature led to such a change in other practices; Evans et al describe that observing birds made participants experience a connection with the birds in their yards, Toomey and Domroese mentioned an increase in participants' emotional connection to bees, and both reported that this led to respondents changing their gardening practice so birds and bees can find food and shelter. Also Thody et al reported that their respondents showed a greater willingness to protect the terns and plovers.

4.4 Citizen science in a social practice perspective

These findings, when analysed from a social practice perspective, show that becoming a successful carrier of citizen science participation leads to opportunities for spillover from elements of citizen science to other practices. These elements include understandings of scientific processes, nature, ecology and biology, know-how regarding doing scientific research and making observations, understandings of the importance of submitting data, and motivations to contribute to (local) conservation issues and to protect the research subject. The articles reviewed in the previous paragraphs support the claims that citizen science can influence this knowledge, skill, and understanding, through experiential education, training, and nature experience. Factors that influence this success are the project design, research topic, level of engagement and interaction with staff. As a result, other practices can recruit citizen science participants as new carriers; their newly gained species-specific knowledge, understanding of policy, management and ecology, practical know-how, and motivation to get involved have been shown to lead to them adopting practices like engagement in community development and local ecological political issues.

As depicted in the conceptual model in chapter 2, the elements can spill over into related practices. The spillover is content-related to the citizen science project, leading to a change within practices, as becomes clear from the instances where participants changed their gardening routine. The influences of participation on politics-related practices and local community engagement practices are an example of participants starting to carry related practices; they are not related as a practice in terms of similar activities, but are related in the sense that the motivation for becoming a carrier of that new practice is linked with protecting the research subject or environment.

The model also indicates that previous experiences could have led to participation in citizen science. Indeed, an analysis of the participant's profile further shows that they are often already more informed about environmental issues and more scientifically literate than the general public, that they have stronger environmental values, and that they are motivated by a desire to contribute to scientific research and to conservation initiatives (Crall et al, 2012; Brossard et al, 2005). Pandya (2012) confirms the importance of the existence of this initial knowledge, motivation and values; she writes that reasons to not participate can stem from existing feelings of discomfort in nature, not being familiar with science, and from a disconnection between one's own norms and values and those of science. There are also some structural elements, like a lack of access to natural areas, family resources and engagement, or other responsibilities. These findings indicate that participants of citizen science already have certain skills, understandings, values, motivations and materials which appear necessary for them to be able to become carriers of the practice of citizen science participation.

5. Environment-related influences of conservation tourism participation on other practices

The practice of conservation tourism, just as citizen science, involves its community of carriers with its own culture of meanings, competences, materials and shared understandings, doings and sayings. It also involves many different activities; tourists receive training and interpretive talks, they converse with staff, and they actively help in conservation projects. This chapter will analyse how conservation tourism can influence environmental practices. Articles dealing specifically with conservation tourism are scarce, which is why this chapter will borrow from literature on those components of related forms of tourism which are also found in conservation tourism, like interpretive talks, volunteer tourism, and ecotourism more generally.

5.1 Environmental interpretation

The first aspect of conservation tourism which will be looked at is environmental interpretation. Whereas education and training in citizen science is directed at educating its participants so they can become valuable citizen scientists gathering accurate and useful data, interpretation holds a strong emotional component, appealing to people's emotions and motivations. Conservation tourism has been described as an environmental educational tool (Cousins et al, 2009a), and interpretation forms an important part of this learning and education (Galley and Clifton, 2004). Most instances of nature-based tourism as well as wildlife tourism provide interpretation, in which various forms of communication are used to increase tourists' understanding of what they are observing (Walker and Moscardo, 2014). Examples are signs, presentations, and special activities (Hughes, 2013). Interpretation can be used to enhance the experience of the tourists, and to influence on-site (behaviour on location) as well as off-site (behaviour at home) behaviour (references in Walker and Moscardo, 2014). Literature suggests that environmental interpretation can be effective when it comes to reducing negative on-site behaviours like littering, feeding wildlife, and going of the paths (references in Hughes, 2013). Influences on off-site behaviour however remain understudied (Hughes, 2013). Often the role of interpretation is to raise awareness of environmental issues related to the natural area or wildlife they are viewing, and to inform them of how wildlife and their habitats interrelate and what impact humans have on the area and its wildlife (references in Hughes, 2013). This makes normally distant problems closer and can even make environmental issues visible depending on the location. Wearing (2001) describes that learning about issues far away does not make environmental problems really pressing, but that seeing and experiencing it leads to a stronger emotional response and has a bigger chance of influencing behaviour. In addition, he describes that participants of conservation tourism can see for themselves what happens with funds contributed to for example wildlife conservation, which can encourage them to also donate money (Wearing, 2001).

Both Walker and Moscardo (2014) and Powell and Ham (2008) investigated the effects of such an interpretation programme on tourists' awareness and intended behaviour. They both researched tourists joining an expedition cruise; Walker and Moscardo in Alaska and Powell and Ham in Galapagos National Park. Such cruises employ expedition staff with knowledge of the ecological and cultural settings of the area (Walker and Moscardo, 2014) and take tourists on a one to two-week journey where they offer a variety of activities including guided and interpretive activities, like guided nature walks, bus trips with locally based guides, and on-board lectures and demonstrations provide by expedition staff. Also, at least Walker and Moscardo mention also daily recapitulations of thoughts and observation of the activities and opportunities to informally chat and discuss issues with expedition staff. Furthermore, the trips offer the possibility to tourists to explore on their own terms, to make nature and wildlife observations, and to experience immersion in the environment (Walker and Moscardo, 2014).

Walker and Moscardo distributed an open-ended questionnaire towards the end of the trip, asking about what tourists' experienced as the best interpretive activity or activities and why they chose that specific activity. Some further questions about the features that contributed to why that activity was the best one and about the most important lesson taken away from that activity were also posed, as well as questions about the overall journey. Over 70% of the tourists of four trips (which had in total 257 passengers) responded. They mentioned the importance of staff expertise and staff dedication, as well as experiential activities and the facilitation of the tour operators (Figure 13). Respondents linked these four attributes to increased environmental awareness, experiential enhancement, environmental immersion, learning, and enjoyment (see Figure 14 for definitions and examples).

Attribute	Definition and examples
Staff expertise	Recognition of the expedition guides' knowledge and/or competence in their area of expertise: • The lectures were very informative, entertaining and knowledgeable about their subjects. • I learned so much from the leaders and am continually amazed at the wealth of knowledge they have.
Staff dedication	Recognition of the enthusiasm and/or dedication of the expedition guides and their role in assisting passengers to participate, learn or understand: • Really great speaker – enthusiastic, energetic, knowledgeable. • The enthusiastic participation by the staff.
Experiential activities	Recognition of activities that provide first-hand experience: • My actual exposure to the unspoiled and under-populated land coupled with the remarks of the naturalists. The zodiacs were extremely important. They forced me to see the world in close-up. • The interaction with the real (versus the perceived) environment.
Facilitation	Recognition of the facilitation of participation in an activity in a manner with which the passenger desires, enjoys and/or feels comfortable: • Going on the zodiacs helped us to live with the animals and nature and see things much closer than we could any other way. • A chance to feel Alaska whether rain, wind, cold, sun.

Figure 13: Definitions and examples of key experience attributes (as presented in Walker and Moscardo, 2014:1183)

Benefit	Definition and examples
Environmental awareness	Recognition or understanding of environmental or cultural issues, concerns, balances, connections or concepts: • Glaciers are receding rapidly; animal populations are being threatened. • The importance of balanced use of the land to ensure that plants and animals are not overly harmed by man.
Learning	Recognition of the personal importance or salience of having learnt or increased knowledge: • They allowed you to experience and learn things first hand. • I learned a lot by listening and observing – things that affect my personal life.
Enjoyment	Recognition of gaining enjoyment from the experience, particularly in ways that are personally important or rewarding: • It touched on my particular interests and kept me focused and excited. • Excitement of exploring and learning using zodiacs, walks, guides, lectures. Combination of all.
Experiential enhancement	Recognition of the enhancement of the experience in making it more rewarding with regard to learning, understanding or enjoyment: • Zodiac tours, lectures. Because they reinforced each other. We had been close to the topic being discussed or lectured about. • Opportunity to get out and actually experience nature, opportunity to learn about environment through lectures, and then to apply what we learned by further visit, etc.
Environmental immersion	Recognition of the opportunity and/or importance of being able to immerse oneself in the real or natural environment and the use of the senses to create unique experiences: • The opportunity to experience the shore more intimately, at the same time feeling the vastness as we floated in the little zodiac surrounded by expanse of water and towering glaciers, forest and mountains. • Actually retracing the steps of the explorers on the island which today remains unspoiled was very important.

Figure 14: Definitions and examples of the benefits associated with experience attributes (as presented in Walker and Moscardo, 2014:1184)

Walker and Moscardo also asked tourists about an intended change in behaviour. They found that as a result of the expedition experiences, some tourists intended to consider and/or change certain decision they make, like food (especially fish) and holiday choices (Figure 15). Also the intention to look for more information on environmental issues was reported. However, almost a third of the tourists indicated no intended change because they already behave with environmental concern, and a little over a quarter mentioned that the expedition confirmed of validated activities they already engaged in. Only 13% indicated to be more likely to support environmental groups and to be more active.

Intended behaviour change	% of respondents
No intended change because already behave with environmental concern	31
Ecotourism experience confirms or validates existing responsible actions	26
Consider and change sources of food, especially fish	29
Consider or change holiday choices	20
Give greater consideration to and seek more information on environmental issues	20
More likely to support environmental groups and be more active	13

Note: % of respondents presented here is greater than 100% as respondents indicated multiple intentional actions.

Figure 15: Summary of behavioural intentions (as presented in Walker and Moscardo, 2014:1188)

The interpretation programme Powell and Ham investigated was specifically designed to involve tourists directly in the conservation of the area. It utilises communication strategies using a range of oral and visual media, intended to increase philanthropic support by influencing tourists' beliefs about financial contributions for conservation. Powell and Ham wanted to know whether the programme could lead to an increase in tourists' knowledge and whether tourists would increase their financial support of environmental conservation. The interpretation programme can take up to 80 tourists on an all-inclusive cruise during which seven islands are visited in seven days time. Powell and Ham documented that there were about fifteen interpretive sessions during these days, both informal and formal. These took place on the ship and on excursions. Furthermore, tourists left the ship twenty times for activities like wildlife viewing, snorkelling, or hiking. The authors handed 61 tourists from one tour a multiple-choice questionnaire of six pages on the first and last day of the trip, thus using a pre-trip-post-trip research design. 59 tourists responded to the pre-trip and 57 to the post-trip questionnaire. Findings showed only a 10% increase in correct answers on objective knowledge tests about the area visited and even is a decline in percentage of good answers to the first question about the species of seals in the area (Figure 16). Several other questions only show a very small increase in correct answers. Still, 87% of the respondents reported learning a moderate amount to a great deal about the general environment and about 85% said to have learned a moderate amount to a great deal about content-specific topics like marine biology, natural history, and environmental conservation.

Item	*Question type*	*Pre*	*Post*
The two species of seal found in the Galapagos are:	Multiple choice	36	22
The Galapagos have a high level of endemism because of the islands':	Multiple choice	67	80
Maximum sustainable yield refers to:	Multiple choice	66	67
Which one of the following species is considered non-native and invasive to the Galapagos Islands ecosystem?	Multiple choice	15	38
The El Nino phenomenon:	Multiple choice	63	64
Although some suggest that the Incas may have first discovered the Galapagos, who made the first confirmed discovery of the Galapagos Islands?	Multiple choice	37	66
The predominant current that supplies the colder nutrient-rich water to the Galapagos is called:	Multiple choice	66	79
What is the world's largest species of turtle?	Multiple choice	19	45
The Galapagos Islands are made up of primarily what type of rock?	Multiple choice	59	66
'Taxonomic Disharmony' refers to:	Multiple choice	5	5
Non-native species introduced into the Galapagos Islands environment will not harm the existing wildlife.	True or false	95	95
'Evolutionary Radiation' refers to one colonising species giving rise to several endemic species.	True or false	41	50
100% of the native reptile and terrestrial mammal species are unique to the Galapagos.	True or false	15	18
Biodiversity conservation generally refers to protecting the different genes, species, and ecosystems found on earth.	True or false	80	88
The Galapagos Penguin is the only species of penguin found north of the equator.	True or false	63	88
Mean%		48	58

Figure 16: Knowledge of GNP: percent answering questions correctly (as presented in Powell and Ham, 2008:479)

Tourists' attitudes and awareness of conservation issues in the area significantly increased. Participants were also more in favour of measures aimed at conserving or protecting the Galapagos area. Furthermore, before the trip, 40% strongly agreed and 59% agreed with the idea of paying an additional $50 fee for the protection and conservation of the Galapagos Islands. Afterwards this rose to 54% who strongly agreed and 46% who agreed. Powell and Ham also asked about tourists' intentions to engage in a range of general environmental behaviours as well as their attitudes and intentions regarding specific philanthropic activities. Most of these increased. For example, before the trip 74% never or rarely donated money to Galapagos environmental organisations, and after 70% indicated a moderate or strong intention to do so. Another significant behavioural intention change was to start writing letters to government officials and also to join environmental organisations and local meetings about the environment (Figure 17). Also, tourists expressed the intention to start avoiding the use of harmful products. In terms of actual measured behaviour, 78% of the independent financial groups (defined as couples, families, or individuals travelling alone) donated to the Galapagos Conservation Fund (GCF) before disembarking on the last day. An evaluation of the interpretation programme in terms of overall contributions to the GCF showed an increase of 400%. These results are in line with what Wearing (2001) found as outcomes of ecotourism trip; he mentions intentions to start writing to politicians, talking with friends, or contributing financially to conservation programmes.

Statement Items	*Mean (SD) Pre*	*Mean (SD) Post*	*df*	*t*	*p*
Donating money to organisations concerned with the protection and improvement of the Galapagos	0.98 (1.30)	2.87 (.82)	53	−11.491	<.0001
Writing letters to government officials about the environment	1.15 (1.19)	2.11 (1.04)	51	−6.889	<.0001
Joining organisations concerned with the environment	1.90 (1.42)	2.48 (1.02)	53	−3.451	.001
Avoiding the use or purchase of certain products because of their environmental impact	2.59 (1.19)	3.13 (.93)	53	−3.038	.004
Recycling products at home	3.62 (0.83)	3.70 (0.64)	53	−0.704	.485
Reading about the environment	2.81 (1.01)	3.09 (0.90)	52	−1.674	.100
Voting for elected officials that support environmental protection	2.94 (1.22)	3.23 (0.88)	53	−1.939	.058
Attending meetings in the community about the environment	1.42 (1.24)	2.20 (1.07)	53	−5.808	<.0001

Figure 17: Environmental behaviours and intentions: paired samples means comparison by item (as presented in Powell and Ham, 2008: 480)

Both Walker and Moscardo (2013) and Powell and Ham (2008) show that the provision of environmental interpretation on trips to natural areas can play a large role in increasing tourists' knowledge and understanding of the area as well as environmental issues and the role humans play in them. Also, both articles show an increase in intention to engage in various environment- and

conservation-related behaviours, like writing to politicians, reading about the environment, and donating money. Some conflicting results are also found; Powell and Ham found that intentions to change everyday activities like recycling products at home (Figure 17) are not as much changed whereas Walker and Moscardo found that tourists intended to change food choices, which is also a day-to-day activity. Furthermore, Walker and Moscardo found only a small increase in intention to support environmental groups. On the other hand, Powell and Ham noted an increase in intention to join environmental organisations and reported an increase in donations to the environmental organisation in the visited area. This can be the result of the interpretation programme Powell and Ham researched being more oriented at influencing tourists' beliefs about how financial contributions can play a role in conservation in the area. This emphasises that the design of the interpretation programmes can make a large difference. What also becomes clear from these articles is that, similar to citizen science projects, the role of staff is crucial for the success of an interpretation programme. There is evidence from interviews that people are highly susceptible to the messages received from (NGO) staff, and many people in that study prefaced their own statements about a variety of issues by attributing their views to something a staff member had told them (Smith, 2002 in Campbell and Smith, 2006). Also the respondents of a study on conservation learning, conducted by Ballantyne et al (2007), considered the interpretation aspects of the experience as highly important. They particularly mentioned the opportunity for informative and pleasant interactions with staff. Wearing (2001) also emphasised that staff and guides function as the link between tourist and environment and that they therefore should be aware of insensitivity, problems with communication, and their style of communicating and guiding, which should not be too authoritarian.

Unfortunately, both Walker and Moscardo (2014) and Powell and Ham (2008) only (mostly) look at behavioural intentions, as do many other studies in this field. As described in chapter 2 and as emphasised by Hughes (2013), there is a discrepancy between intentions and actual behaviour. Tourists can easily fall back into old routines and habits upon return. This has been more widely acknowledged in literature on ecotourism and related alternative forms of tourism (references in Hughes, 2013) and will also be discussed in section 3 of this chapter. Hughes (2013) therefore wanted to know whether intentions formed on a wildlife viewing experience can lead to a change in actual behaviour. She researched the intentions and the actual behaviour three months later of 100 Australian families who visited Mon Repos Conservation Park in Australia. This park offers groups of about 60 people at a time wildlife viewing experiences in the form of nightly turtle watching expeditions, accompanied by interpretation in the form of an interpretive centre as well as presentations, both via video and by staff. The interpretive activities aim to influence visitors' emotions, attitudes, and behaviour and have an emphasis on conservation. It also pays attention to activities which can reduce human impact on the marine environment. Hughes lists the 13 behaviours which are mentioned in the interpretive materials: recycling, picking up other people's litter, using green (non-plastic) shopping bags, talking to others about conservation issues, looking for environmental information on TV, in print or on the Internet, purchasing goods with minimal packaging, conserving energy in the home, using public transport, participating in land/water clean-up activities, donating money to a conservation organisation, doing volunteer work for a group that helps the environment, reusing containers, and composting.

The author asked respondents to fill out one survey before the visit, one directly after, and one three months later. She found similar results to Walker and Moscardo (2013) and Powell and Ham (2008); intentions to change behaviour related to environment and conservation increased during the visit. According to 91% of the respondents, this increase was to some degree influenced by the wildlife viewing experience. 27% of them reported minimal changes in their intentions, 43% reported moderate changes, and 30% said that they felt substantial changes in their intentions. Figure 18 shows the intentions for the specific behaviours (rated on a scale of 1-5 with 5 strongly agree). Families could also respond that they already felt like they were doing the maximum they could.

Conservation behaviour	Mean	*SD*	Families already doing the maximum (*n*)
Recycle	4.09	0.830	42
Pick up other people's litter	4.11	0.935	14
Use green (non-plastic) shopping bags	4.29	0.756	28
Talk to others about environmental issues	3.86	0.952	6
Look for environmental information on TV, in print or on the Internet	3.67	0.968	12
Purchase products with minimal packaging	3.94	0.874	15
Conserve energy at home	3.86	0.926	35
Use public transport	2.65	1.096	17
Participate in land/water clean-up activities	3.44	0.948	5
Donate money to a conservation organisation	3.46	0.964	16
Do volunteer work for a group that helps the environment	3.42	0.986	7
Reuse containers	4.08	0.882	43
Compost	3.26	1.129	42

Figure 18: Intentions to engage in specific conservation behaviours (as presented in Hughes, 2013:51)

Figure 19 shows the percentage from the people who had indicated an intention to change their behaviour that had actually changed their behaviour three months later. For 3 of the 13 behaviours investigated the majority of the respondents who said they would change ('agree' and 'strongly agree') had changed (measured as engagement in behaviour, ranging from 1 – 'never' to 5 – 'always', and coded as 'increased participation' and 'same or decreased participation'). These three behaviours were purchasing products with minimal packaging, reusing containers, and composting. For 7 other behaviours this was over 30% (picking up people's litter, using green shopping bags, looking for more environmental information, conserving energy at home, using public transport, participating in clean-up activities, donating money to a conservation organisation, and volunteering for a group that helps the environment). As for the rest, all saw at least a small percentage of people who changed. Interestingly, also for the category who indicated that they were did not intend to change anything ('neutral', 'disagree' or 'strongly disagree') there are increases for every action. In 10 of the cases there was a change reported in 30% of respondents. To further limit the gap between attitude and behaviour, Hughes (2013) proposes using post-visit activities including provision of localised examples, petitions, and activities to help visitors convert their intentions into behaviour.

Action	Intention	Percentage of who changed	
		No	Yes
Recycle	No ($n = 56$)	96	4
	Yes ($n = 35$)	88	12
	$\chi^2 (1, n = 91) = 2.16, p = 0.142$		
Pick up other people's litter	No ($n = 38$)	92	8
	Yes ($n = 59$)	68	32
	$\chi^2 (1, n = 97) = 7.79, p = 0.003^{**}$		
Use green (non-plastic) shopping bags	No ($n = 39$)	64	36
	Yes ($n = 59$)	51	49
	$\chi^2 (1, n = 98) = 1.68\ p = 0.098$		
Talk to others about environmental issues	No ($n = 26$)	96	4
	Yes ($n = 39$)	90	10
	$\chi^2 (1, n = 65) = 0.903, p = 0.342$		
Look for environmental information on TV, in print or on the Internet	No ($n = 49$)	65	35
	Yes ($n = 48$)	54	46
	$\chi^2 (1, n = 97) = 1.25, p = 0.132$		
Purchase products with minimal packaging	No ($n = 39$)	64	36
	Yes ($n = 59$)	47	53
	$\chi^2 (1, n = 98) = 2.62, p = 0.053$		
Conserve energy at home	No ($n = 56$)	63	37
	Yes ($n = 42$)	71	29
	$\chi^2 (1, n = 98) = 0.8572, p = 0.178$		
Use public transport	No ($n = 71$)	66	34
	Yes ($n = 17$)	70	30
	$\chi^2 (1, n = 88) = 0.120, p = 0.365$		
Participate in land/water clean-up activities	No ($n = 51$)	65	35
	Yes ($n = 47$)	55	45
	$\chi^2 (1, n = 98) = 0.900, p = 0.172$		
Donate money to a conservation organisation	No ($n = 59$)	63	37
	Yes ($n = 39$)	64	36
	$\chi^2 (1, n = 98) = 0.195\text{E-}01, p = 0.445$		
Do volunteer work for a group that helps the environment	No ($n = 58$)	67	33
	Yes ($n = 39$)	77	23
	$\chi^2 (1, n = 97) = 1.06, p = 0.151$		
Reuse containers	No ($n = 57$)	68	32
	Yes ($n = 41$)	49	51
	$\chi^2 (1, n = 98) = 3.84, p = 0.025^{*}$		
Compost	No ($n = 72$)	69	31
	Yes ($n = 23$)	43	57
	$\chi^2 (1, n = 95) = 5.05, p = 0.013^{*}$		

Note: $^{*}p < 0.05$; $^{**}p < 0.01$.

Figure 19: Relationship between behavioural intentions and subsequent actions (as presented in Hughes, 2013:52)

5.2 Wildlife encounters and nature experience

Besides researching the actual behavioural change, Hughes (2013) also wanted to know how people's responses to the wildlife viewing experience related to the perceived changes in behavioural intentions. She found that several emotional responses, both positive and negative, played a role in this. Her findings are listed in Figure 20, and show that if people felt an emotional connection with the turtles viewed, if people experienced something surprising, if people had an enjoyable experience, if people experience was exciting, if people felt a sense of wonder or awe, if people experienced something that made them sad or angry about environmental problems, or if they reflected upon new ideas about animals and their habitats, they intended to change their behaviour. Especially this last factor showed a significant correlation.

Statement	Correlations
We felt an emotional connection with one or more of the animals we saw.	$r\ (n = 97) = 0.293,\ p = 0.004^{**}$
We experienced something surprising or unexpected.	$r\ (n = 98) = 0.243,\ p = 0.016^{*}$
Something we saw or heard made us feel sad or angry about environmental problems.	$r\ (n = 98) = 0.308,\ p = 0.002^{**}$
The experience was engaging.	$r\ (n = 97) = 0.195,\ p = 0.055$
It was exciting to see live animals.	$r\ (n = 94) = 0.262,\ p = 0.011^{*}$
We felt a sense of wonder or awe.	$r\ (n = 95) = 0.228,\ p = 0.027^{*}$
We had an enjoyable experience.	$r\ (n = 98) = 0.200,\ p = 0.048^{*}$
We found ourselves reflecting on new ideas about animals and their habitats.	$r\ (n = 98) = 0.330,\ p = 0.001^{***}$

Note: $^{*}p \leq 0.05$; $^{**}p \leq 0.01$; $^{***}p \leq 0.001$.

Figure 20: Relationship between "reactions to the wildlife experience" and "perceived changes in behavioural intentions" (as presented in Hughes et al, 2013:51)

The role that viewing wildlife can have on behavioural intentions has been researched by more scholars, who suggest that an emotional response and a feeling of wonder and respect can lead to intentions for engagement in conservation activities (Gates and Ellis, 1999 in Hughes, 2013) and a willingness to protect the observed animals (Meyers et al, 2004 in Hughes, 2013). People's changing mental activities, emotions, values, and motivational knowledge are thus highly relevant when it comes to evaluating the role of conservation tourism in influencing other practices. Ballantyne et al (2007) looked at conservation learning in wildlife tourism settings (defined as 'tourism activities that provide encounters with non-domesticated animals in wild (in situ) or captive (ex situ) settings' (Skibins et al, 2013:960)), focusing on zoos and aquariums, and could relate this to emotions associated with viewing and/or interacting with animals. However, results were not the same in all cases; Ballantyne et al (2007) also noted that emotions experienced vary depending on, amongst others, the animal, its activity level, and the experienced connection or empathy as well as rarity, infancy, size, symbolic status and endangered status (references in Ballantyne et al, 2007).

An example of the role that specifically charismatic megafauna (CMF) like bears, big cats and elephants play in how tourists in wildlife tourism connect to wildlife, what aspects of the experience influenced this, and how this influenced behavioural intentions can be found in Skibins et al (2013). Many wildlife tourism-related education and conservation initiatives rely on these animals for attracting tourists and for raising awareness of threats to these species and their habitats (references in Skibins et al, 2013). Tourists encountering these animals have been found to develop a strong connection to them, to their species, and to nature. They also report feelings of satisfaction, understanding, concern and awareness (references in Skibins et al, 2013). Skibins et al asked tourists who visited sites in the northern circuit of Tanzania (including Mt. Kilimanjaro, Serengeti, and the Ngorongoro Crater) to self-describe the animals they connected with. They thus gave tourists complete freedom to choose and did not limit them to a predefined list. The study sites featured a large diversity of wildlife as well as charismatic megafauna. They used the factor Conservation Caring to operationalise the affective and cognitive connection tourists experienced to a specific species, and used the factors Species Oriented Behaviour and Biodiversity Oriented Behaviour to represent pro-conservation behaviour. Species Oriented Behaviour includes behaviour related to philanthropy, volunteerism and activist, and Biodiversity Oriented Behaviour include voting behaviour and consumer behaviour. The authors found that viewing CMF had significantly positive effects on Conservation Caring and intentions to change overall pro-conservation behaviour. Individual item responses however were relatively low. Conservation Caring in itself was found to be the only significant predictor of Species Oriented Behaviour, and a slightly weaker but still significant predictor of Biodiversity Oriented Behaviour. The other factors, namely tourists' existing connection to wildlife, characteristics of the species, and trip characteristics, only played a moderate role in predicting Conservation Caring and did not predict behavioural intent.

Besides wildlife viewing, also other encounters with nature take place. It has been described that conservation tourism offers an 'emotive experience', a 'deep emotional encounter with nature', and that it 'combines the moral achievement of "making a difference" with the emotional reward of close, corporeal encounters with nature' (Cousins et al, 2009a:1070). This is also illustrated by the study of Walker and Moscardo (2012); their findings show how exposure to unspoiled and under-populated land in combination with interpretation, as well as getting close to nature, made a large impression. There are various emotional responses documented in conservation tourism literature, related to both nature experience and wildlife encounters, for example awe (e.g. when being in a relatively pristine and remote environment (Fredrickson and Anderson, 1999)), compassion (coming from an emotional attachment to the monitored animals), and exhilaration (e.g. from catching giraffe, helicopter flights, finding radio-tracked animals, unexpected glimpses of rarely-seen species, close encounters, viewing young animals, hearing the sound of the bush at night etc) (Cousins et al, 2009a). Participants in a study of the emotional responses of a wilderness experience conducted by Fredrickson and Anderson (1999) also commented on how different the setting was in comparison to their everyday lives. In addition, participants mentioned the 'thrill of being exposed to the sheer powers of nature'. They felt enlivened and mystified by the untamed and 'wild' landscape. Phrases like peaceful, whole, refreshed, joyful, in tune, connected to nature, and enraptured were also documented. Negative emotions can be experienced too, like frustration (from not being able to spend enough time for feeling the desired

emotions) or disappointment (when reality does not stroke with expectations, or coming from e.g. too few predators, litter, rubble and old farm machinery on ranches, poor visibility of animals due to habitat type) (Cousins et al, 2009a). Conservation tourism can thus lead to a deep emotional experience and, just as with citizen science, increase participants' connection to nature and/or to observed wildlife, which has been found to influence conservation behaviour.

5.3 Volunteer tourism and interactionism

Another aspect of conservation tourism, next to interpretation and wildlife viewing, is the central role of volunteering in a new environment. Alexander (2012), Wearing (2001) and Wearing and McGehee (2013) wrote an overview of some of the most important findings in the field of research that looks at the impact of volunteer tourism, but they also strongly emphasise the need for additional research. They describe that volunteer tourists have two roles; that of a volunteer and that of a tourist. The combination of these aspects is likely to have a role in influencing the volunteers. As a tourist, participants find themselves away from home. The question of how tourism can influence the home situation has been asked before. For example, Coghlan (2005:3 and 23) writes: 'a question that arises in volunteer tourism is whether this experience is a holiday experience that transcends into their normal routines, or whether it is stored as memories of an alternative holiday with little impact on daily life' and 'it must be acknowledged that there has been little follow-up to determine whether past volunteer tourists seek out more information about conservation issues once they have left the project, or whether they are able to translate the understanding they have gained to other environmental concerns'. Also Wearing describes that holidays serve as 'an escape from the constraints and stresses of everyday life' (as cited in Wearing, 2001:3), or perhaps as a reward for hard work, but do not ultimately alter a person's everyday life in terms of the way they think, feel or act. The traditional tourism literature suggests that while the individuals may have enjoyed themselves, it is not long before that holiday is a memory in the day-to-day life that they return to' (Wearing, 2001).

Volunteer tourism however is different. Wearing (2001) argues that through volunteer tourism experiences, one's identity can be fundamentally influenced; the self is 'enlarged or expanded, challenged, renewed or reinforced', which implies that a volunteer tourism experience is not only limited to the actual tourist visit (Wearing, 2001:3). Tourism is more than a step out of daily life; it can be seen as a 'means of self-development, a way to broaden the mind, experience the new and different and to come away in some way enriched' (Wearing, 2001:8). Participants 'are at liberty and are encouraged to make judgements and respond to totally new environments, lifestyles and experiences which are usually outside their domain of concern in their home environment' (Wearing, 2001:109). A nice illustration can be found in Alexander (2012), who quotes a volunteer's comment documented in Lough et al (2009:33):

"I am who I am today because of that time. I have never looked at my life the same way I did before I volunteered. It changed my life in virtually every way. It's difficult to explain the change, but it has had a lasting impact."

There are several issues playing a role in this change. First of all, as a volunteer, participants collaborate in a team of fellow volunteers, working towards a common and often noble cause and developing strong bonds with fellow participants as well as the project leaders (Alexander, 2012). For example, Lepp (2008 in Alexander, 2012) documented the influence of working on a common cause, and doing meaningful work. Most projects also include interaction with the host community. Zahra (2006 and Zahra and McIntosh, 2007 in Alexander, 2012) claim that this interaction, both in terms of culture (absence of materialism), social issues (suffering and poverty), mindsets (cheerful communities despite these issues), and the combination thereof, enables tourists to reflect and that it can then lead to behavioural changes as well as changes in attitudes and values. Also Lepp (2008 in Wearing and McGehee, 2013) mentions that due to the personal reflection on the trip significant personal development took place. Broad (2003 in Wearing and McGehee, 2013) on the other hand found that personal growth and an altered world view resulted from interactions with and engagement in the local community. Wearing (2001:124 in Alexander, 2012) describes this social interaction of volunteers with the participant group, the community, and the natural environment as 'interactionism' and suggests that this is what influences the change in volunteers. This change often manifests itself as a change in volunteers' environmental awareness and how they view their role in the community (Wearing, 2001). Wearing and McGehee (2013) described some more research that found that volunteers changed their behaviours at home in terms of purchasing decisions, relationships with friends, family, and co-workers, and their involvement in social movement participation (this latter research will be described in chapter 6) (references in Wearing and McGehee, 2013).

Alexander (2012) explored the impact that volunteer tourism can have on participants in South Africa in terms of volunteers' personality traits. She defines personality traits as characteristics which tell what a person will do when placed in a given situation. Through a standardised questionnaire and 36 personal interviews she measured the changes in personality traits and the causes and consequences of this change. Participants filled out the questionnaire for the personality traits before and six months after their trip. In the questionnaire, fifteen traits are measured: anxiety, depression, vulnerability, assertiveness, action, artistic interests, emotionality, adventurousness, intellect, liberalism, trust, altruism, self-efficacy, dutifulness, and cautiousness. 60 volunteer tourists participated, and a control group of 35 people who went on normal vacation also filled out the questionnaire. For the volunteer group, most were female (50 out of 60) and between 16 and 29 years (73%). They stayed for an average of ten weeks and volunteered during 59% of the time, in projects ranging from wildlife and conservation to children and community. Whereas in the control group only one personality trait changed (assertiveness increased), for the volunteer group nine of the fifteen traits were significantly different after their experience. Their starting scores were the same for all traits apart from vulnerability, which was lower in the control group. Figure 21 shows the median scores. Leaving out assertiveness and vulnerability, this means that anxiety, trust, artistic interests, depression, emotionality, activity levels, and adventurousness were changed after the experience. The interviews further analysed why this change in seven personality traits took place. Figure 22 presents the 'master categories' that lead to this transformation that the author identified from the responses. Alexander also looked at how this experience and changed personality traits manifested themselves in the volunteers' daily lives. She

found that they were present in their attitudes, confidence, behaviour, emotions, values, personal circumstances, and knowledge or skills (Figure 23).

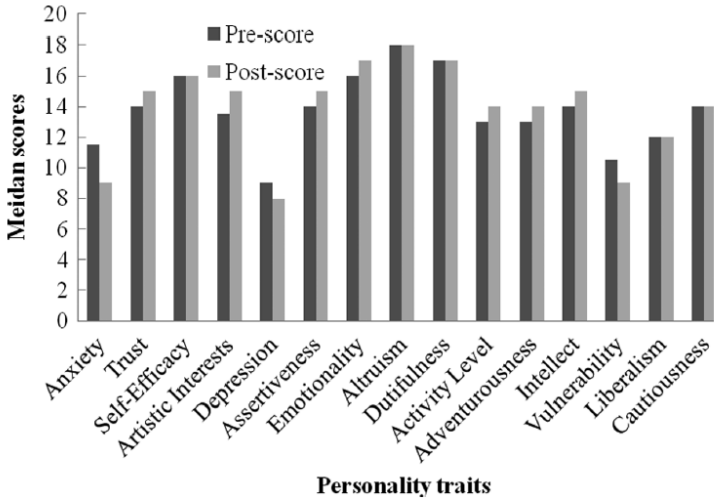

Figure 21: The pre-test and post-test scores of the volunteers (as [resented in Alexander, 2012: 788)

Master category	Definitions for coding purposes	Frequency
Responsibility	Looking after oneself, others or a task	16
Participation	Observation whilst sharing in activities	14
Action	Doing something	10
Involvement	To become connected or associated with	8
Immersion	To engross oneself and get absorbed in	4
Interaction	To have an effect on each other/exchange	3
Expectations/satisfaction levels	What one hopes for/fulfillment of that hope	2

Figure 22: Master experience categories identified from interviewing volunteer tourists (as presented in Alexander, 2012:798)

Master category	Definitions for coding purposes	Frequency
Attitudes	Our response tendency toward a person, object or situation	14
Confidence	Belief in ones personal worth and likelihood of succeeding	9
Behavior	Acting in a particular way as a result of biological functions, perceptions, unconscious forces, attitudes, beliefs and feelings	9
Emotions	Feelings based on our appraisal of the situation and the possible actions we might take in relation to it	6
Values	Ideas about what people should do	4
Personal circumstances	Conditions that influence a person	4
Knowledge or skills	Learning	3

Figure 23: Master impact/change categories identified from interviewing volunteer tourists (as presented in Alexander, 2012:790)

Coghlan and Gooch (2011) studied the effects of volunteer tourism on its participants as well. They used a transformative learning framework. This theory describes a process that leads to a 'radical shift in consciousness' which involves a shift in understanding ourselves and our place in the human and natural world and which leads to an altered idea of the self, similar to what Wearing (2001) claims happens during volunteer tourism. Coghlan and Gooch draw parallels between the theory and findings from volunteer tourism and argue that the steps of transformative learning are present in volunteer tourism (see Figure 24), thus making it a possible transformative experience.

Transformative learning	Volunteer tourism
Step 1: Experiencing a disorienting dilemma	Motivation to travel, discover a new environment and/or make a contribution to a social or natural environment (e.g. Brown & Lehto, 2005; Tomazos & Butler, 2010) Culture shock and experiencing an unfamiliar cultural/social/natural environment (e.g. Cousins et al. 2009b; Sin 2009)
Step 2: Undergoing self-examination & Step 3: Conducting a critical assessment of internalised role assumptions from usual social context	Opportunities for reflection, expressed in volunteer diaries as descriptions of challenging experiences and emotions (e.g. Coghlan, 2005; McIntosh & Zahra, 2007; Raymond & Hall, 2008)
Step 4: Relating to other people's experiences, commonly through dialogue	Informal sharing of experiences (e.g. Broad, 2003; Zahra & McIntosh, 2007; Raymond & Hall 2008)
Step 5: Exploring options for new behaviours & Step 6: Building competence and self-confidence in new roles	Familiarisation with new tasks, locals habits, etc. and opportunities to contribute knowledge, ideas and skills (e.g. Foster-Smith & Evans, 2003; Newman, Bueschin, & Macdonald, 2003; Wearing, 2002)
Step 7: Developing a plan of action	*Limited opportunities in existing volunteer tourism programmes (e.g. Palacios, 2010)*
Step 8: Acquisition of knowledge and skills for implementing the plan	Volunteer self-actualisation, including new values, skills and a sense of agency (e.g. Bailey & Russel, 2010; Wearing, 2002)
Step 9. Provisional efforts to try out new roles and gain feedback	*Limited opportunities in existing volunteer tourism programmes (e.g. Leigh, 2006; Sin, 2009)*
Step 10: Reintegration into society	Formation of new social networks and engagement (Leigh, 2006; McGehee, 2002)

Figure 24: Steps involved in transformative learning and volunteer tourism (as presented in Coghlan and Gooch, 2011:718)

5.4 Conservation tourism in a social practice perspective

Similar to citizen science, becoming a successful carrier of participation in conservation tourism can lead to an environment-related change in other practices. Through environmental interpretation, encountering wildlife, nature experience and transformative hands-on volunteer experiences elements can spill over. Furthermore, just as with participating in scientific research, participating in conservation projects also includes experiential education; it involves active hands-on participation, teaching people new skills and forms of understanding. The outcomes depend on several factors; the project topic, the link that is made between one's own behaviour at home and the visited area as well as the local environment, the animals encountered, and interaction with staff. This interaction can also be viewed from a social practice perspective; it can enable participants to engage in what Shove et al (2012) refer to as 'mimetic apprenticeship', where potential new carriers of a practice learn new skills and competences through copying others. In conservation tourism participants work together with conservation staff and sometimes scientists, and thus have a lot of opportunity to learn skills by imitating their actions. Through that they can learn, develop and use different skills and understandings. This can lead to tourists becoming carriers of other practices too. The articles reviewed showed an impact on environment-related practices like making donations for environmental causes, writing letters to politicians, and several everyday activities like recycling, purchasing decisions, and waste reduction.

Social practice theory also points out a possible barrier; returning to someone's familiar environment includes the return of routines and habits. Practices are often linked to place (Spaargaren, 2003), and the home situation is restrained by other constraints than is the tourist location, like systems of provision, social norms, and resources like finances and time. However, although practices often do not travel, elements certainly do. Materials (like tools and landscapes) are often bound to a place, but meanings and competences can be transferred with the carriers (Shove et al, 2012). It depends on the home situation whether they can be put into practice. Indeed, several articles note that after a transformative experience during a participant's time as a volunteer tourist, it can be difficult to return to the home situation or to hold on to this newly acquired sense of self. Whereas Zahra and McIntosh (2007 in Coghlan and Gooch, 2011) believe that volunteers can reorientate their life and values, other scholars mention terms like 'deculturation' and 'reverse culture shock' (references in Coghlan and Gooch, 2011). This occurs when volunteers cannot reconcile their old culture with their new skills, values and attitudes, failing to change existing or adopt new practices. It has been found that adaptation, unlearning old cultural habits, and remaining in contact with other volunteers are important (references in Coghlan and Gooch, 2011). Also support through the change process at home is important (Dierking et al, 2005 in Hughes, 2013).

6. Environment-related influences of participatory environmental research tourism participation on other practices

The practice of participation in a participatory environmental research tourism project can include various activities, like learning fieldwork skills, handling animals or plants, collecting data, attending lectures, presenting results to others, inputting data, doing physical labour, and analysing data (based on Coghlan, 2005). They take place in remote and pristine locations, bringing together intense experiences abroad in nature with scientific nature experiences, ecological nature experiences, and social nature experiences. Moreover, many participatory environmental research tourism projects include observing or even working with animals (Cousins et al, 2009a). Carriers of the practice share an ecocentric attitude (the idea that all things on earth have an equal right to exist, and that natural resources should be protected), are aware of and concerned about environmental issues, and share a willingness to learn more (Galley and Clifton, 2004; Ballantyne et al, 2009). Participatory environmental research tourism thus shares several characteristics like science participation, nature experience, the tourism experience, and hands-on conservation activities with citizen science and conservation tourism. This presents various opportunities for participants to gain competences and alter meanings and thus to influence other practices. Although there is very little research done to this sector and its influence, this chapter will explore its opportunities for changing practices by reviewing the literature available.

6.1 Experiential education and environmental interpretation

The next paragraphs will discuss some findings related to the influence of participation in participatory environmental research tourism on behaviour. These projects include science participation and its associated experiential learning as well as environmental interpretation, and can lead to the change described in chapter 4 and 5. The in chapter 4 discussed article by Toomey and Domroese (2013) also assesses the outcomes of a project that resembles a participatory environmental research tourism project; the Earthwatch Coyote Project (ECP). The ECP was a 10-month study belonging to a longer research. Its aim was to determine whether coyotes were present or absent in parks in New York City and Westchester County. Whereas most Earthwatch projects meet the criteria for participatory environmental research tourism projects as described in chapter 3, the ECP does not. This project only lasted for three days instead of the regular one to two weeks. Also, volunteers had to take care of their own lodging and most of their food and transport, which normally is taken care of by Earthwatch. Although the article does not mention it, it is reasonable to assume that many participants were often locals or living in the vicinity. Still, many aspects of a regular Earthwatch expedition are part of this project, so it is valuable to consider its social outcomes.

The ECP expedition featured a nature walk and educational sessions on coyote biology and local flora, fauna, and natural history, and on what the presence of a new top predator means for the management of an urban area and what was being done to restore the ecological balance in the parks. Participants were taught to set up and to bait camera traps, and to identify coyote scats, prints, and

other markings. These skills were also immediately put to practice in field work; participants spent the first two days setting up cameras and looking for signs of coyotes in the park. The last day was spent inside, where the participants analysed the camera trap images.

The authors spread a survey amongst the 24 people that joined the expedition, of which 19 responded. The survey was used to identify and describe the participants' perceptions of the impacts of the project on their conservation attitudes and behaviours. 70% of the respondents said that their attitudes towards coyotes had changed in a positive way, and 30% did not indicate a change. The 70% was asked how their attitudes had changed, and 86% of them selected 'they are smarter, more interesting animals than I realised'. Also open answers were documented. Two examples are (Toomey and Domroese, 2013:57):

"I had never given much thought to coyotes before, but now I realize how much human activities have encroached on their territory, I realize that we have a responsibility to protect them."

"I am more aware of biases against coyotes (danger, etc.), feel more connected with coyotes, and am more willing to defend them."

These quotes indicate a new feeling of connection with the research subjects and new insights into the impact humans have on them. Respondents indicated that the major contributing factors to their change in attitude were 'learning more about them from a scientific perspective', 'being in their environment', and 'seeing them on cameras'.

Furthermore, respondents were asked about environmental and nature-based activities that they had engaged in, or planned to engage in, since the project (Figure 25). Many of them (58%) intended to engage in additional citizen science project and 32% did engage (Figure 26). 78% increased their environmental awareness and 79% undertook recreational nature/wildlife activities. 82% raised environmental awareness of others, 33% engaged in conservation stewardship and 53% in environmental advocacy. 40% of the respondents indicated that the project had had a strong influence on their decision to engage in other citizen science projects. The ECP also had an influence on respondents' engagement or intention to engage in coyote-related excursions and to raise environmental awareness of others.

Type of activity	Percentage of respondents who have engaged in activity	Percentage of respondents who have not engaged in activity, but intend to do so	Total percentage of respondents who have engaged or plan to engage in activity
Coyote-related excursions	24	35	59
Additional citizen science	32	58	90
Conservation stewardship	33	56	89
Environmental advocacy	53	16	69
Reducing ecological footprint	78	11	89
Increasing own environmental awareness	78	17	95
Recreational nature/wildlife activities	79	11	90
Raising environmental awareness of others	82	6	88

Figure 25: Post-Earthwatch Coyote Project engagement in conservation activities as reported by respondents (as presented in Toomey and Domroese, 2013:57)

When asked about the influence of the ECP on more general activities (Figure 26), 39% responded that it had a strong influence on their commitment of taking action towards a sustainable environment or community. Less than 25% accredited the activities they engaged in to reduced their ecological footprint to the project's influence, and everyday decision-making and activities were least influenced by the project although there was still a little under 30% that reported to be strongly influenced by the project in this regard (Figure 27).

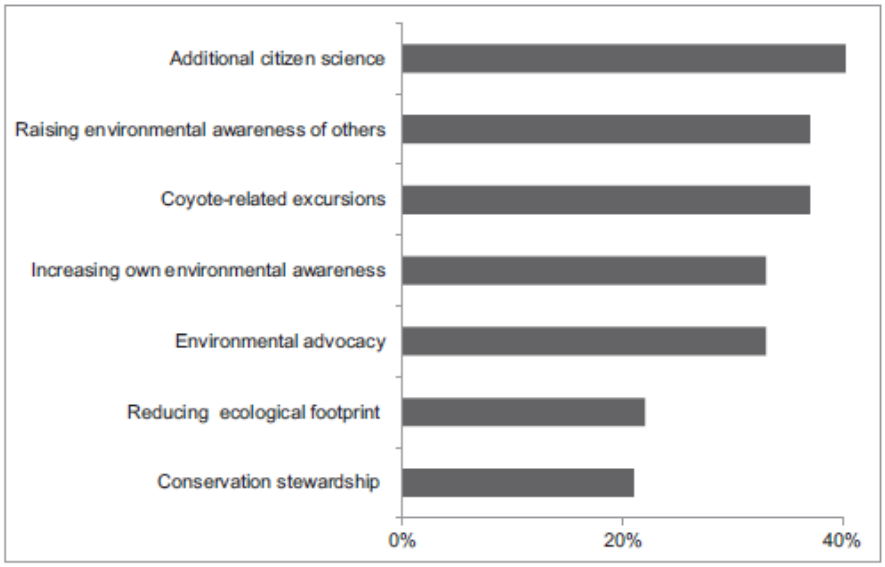

Figure 26: Percentage of Earthwatch Coyote Project respondents who selected the option "very much" to the question: To what extent do you think that your engagement in (or intention to engage in) the following activities was influenced by your Earthwatch Coyote experience? (N = 19)) (as presented in Toomey and Domroese, 2013:58)

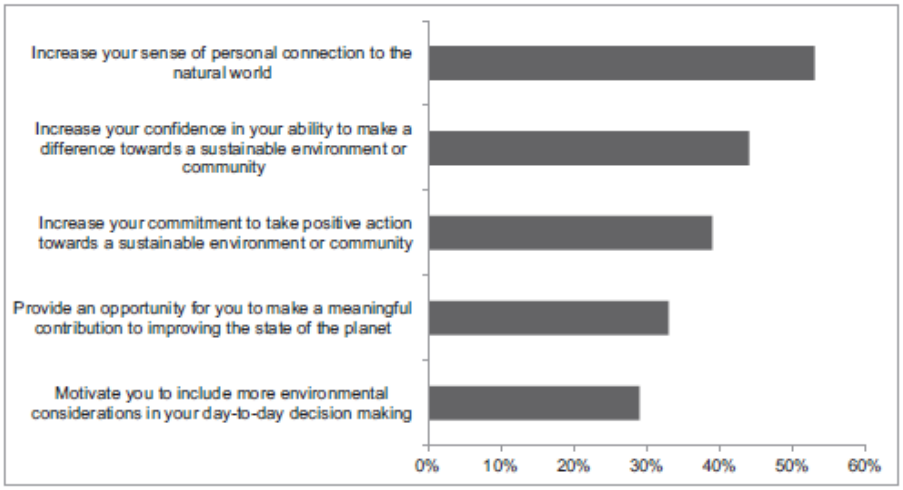

Figure 27: Percentage of Earthwatch Coyote Project respondents who selected the option "very much" to the question: To what extent did participation in the project:... (N = 18) (as presented in Toomey and Domroese, 2013:58)

53% of the respondents stated that they felt a new or increased connection to nature, especially to local nature and coyotes. An open-ended question about the ECP's influence on participant's feeling of connectedness to nature resulted in these quotes (Toomey and Domroese, 2013:59):

"Participating in the project made me feel energised and excited about conservation in the NYC area. I learned a lot about coyotes and native plant species, which has influenced my curriculum and decisions I make in teaching. We have a planting program at school and since participating in the coyote project I have advocated for planting indigenous species of plants to support wildlife in the area. On our yearly 5th grade overnight in the Catskills I was able to point out coyote and other mammal tracks and share my learning about coyotes and their role in the food chain and their history and behaviour in the New York area. The three day project made a big impact on me."

"I think the reason I was inclined to apply for an Earthwatch expedition initially was because I already do feel an interconnectedness towards the natural environment. I'm generally not a huge fan of animals, but respect the adaptations they've had to make based on a large human impact on their habitats. This expedition have me a little more empathy and interest towards coyotes specifically."

"It made me feel that both the coyotes and I belong to the same community and we need to accommodate each other."

"A coyote passed by me, running, while I was playing on a golf course. This expedition gave me the knowledge and proof of the need for their protection in an urban area. Talking to people about the project has surprisingly made them excited about coyotes."

"It really opened my eyes towards the need for conservation and things of that nature for these animals."

These quotes indicate that participants gained knowledge about the research location and research subject, and that they are more convinced of the importance of protection and conservation. Also, the first quote clearly shows how the project influenced the respondent's actions; he has taken on a more pro-active role in environmental decisions and is sharing his new knowledge. Moreover, they also show that respondents feel a new connection to the research subject. What Toomey and Domroese also remark is that some ECP participants continued to be involved with the scientists and project coordinators, contacting them about local science and nature opportunities. A final observation from the authors is that, although respondents were not specifically asked about it, they did comment on the commitment and responsiveness of staff and coordinators. This suggests that also in these projects the relationship between project scientists or coordinators and participants is very influential.

This article shows the potential of participatory environmental research tourism projects to influence which practices people become carriers of. Through participation in scientific research and conservation work, (on-site) training, interaction with fellow participants as well as scientists, forming new networks and communities, and through environmental interpretation, participants of a participatory environmental research tourism project can gain many competences in terms of ecological and scientific understanding as well as practical knowledgeability, and obtain new values and ideas.

These newly developed or changed meanings and competences might spill over into other practices at home. Indeed, participants started to engage in citizen science as well as other practices related to the research subject or research itself. People do however not change their everyday activities.

6.2 Wildlife encounters and nature experience

Another aspect of participatory environmental research tourism is that it often takes place in remote locations, with small groups (Coghlan, 2005). Galbraith (2013) describes that being in small groups and having a high chance of observing iconic species can lead to a very special experience, often leading to donations to support the area. As describes at the end of 5.2, also Cousins et al (2009a) documented various emotional reactions to working with animals (e.g. compassion, exhilaration and awe, but also anguish). This is also related to nature experience, connection with nature, and change in values. Campbell and Smith (2006) qualitatively examined the ways in which tourists' and volunteers' values of sea turtles was influenced by their participation in a research conservation project. They conducted research at the CCC Experience Seas turtle research in Tortuguero, which is dedicated to the conservation of sea turtles through research, training, advocacy, natural education, and protection of natural habitats (CCC, 2004 in Campbell and Smith, 2006). They run a programme, the Turtles of Tortuguero Research Participant Program, which provides an opportunity for the public to witness, be involved in, and provide financial support to the organisation's research activities. They host research assistants (RAs), who stay for 3-4 months and are trained in various tasks like data collection, tagging, measuring, counting eggs, marking nests, and recording all data, as well as participant researchers (Ps) who assist during the green turtle season, stay 1-3 weeks, and assist research assistants with everything except tagging. Through interviews Campbell and Smith found that participants expressed various different values, like conservation value, scientific value, aesthetic value, humanistic value, and experiential value. Other, less often expressed values were intrinsic, existence, and spiritual values. In a table (Figure 28) the authors describe what they mean by each.

Value	Criteria
Conservation	Reference to: increases/decreases in sea turtle populations, turtles as endangered species, threat of extinction, loss of habitat/nesting ground, contributing to conservation
Scientific	Reference to: sea turtle migrations, reproductive habits, nesting habits, use of habitat, life history, turtles' ecological roles, doing science (collecting data, tagging)
Aesthetic	Reference to: turtles as cute, beautiful, amazing, graceful
Humanistic	Reference to: emotional attachments to turtles (e.g., loving turtles), emoting with turtles while interacting with them, and childhood memories of turtles
Experiential	Reference to: specific exciting or moving experiences with turtles on the beach, detailed description of interactions with turtles
Intrinsic	Reference to: turtles having distinct qualities separate from their relation to humans (i.e., they have feelings, purpose, etc.)
Existence	Reference to: never having seen turtles, or never having had any direct experience with them (prior to the CCC experience)
Spiritual	Reference to: spiritual connection to turtles, or expressions of humans' role as stewards of nature, links between nature and God

Figure 28: Indicators of value types in analysis of volunteer interviews (as presented in Campbell and Smith, 2006:98)

Campbell and Smith also use many quotes to illustrate the values they identified. Some quotes are presented here.

"So it was just me and [another RA] and a big leatherback — and we were just like, ''Wow, God, you're so beautiful....'' And just watching, and just being in awe of this ancient creature. " (MRA3, aesthetic value)

"Um, the other day, we saw one [turtle] on the beach, and I mentioned to someone that she's the largest one I've ever seen. And just to think that she's you know, possibly between fifty and a hundred years old, and that she's been coming to Tortuguero for that long. That really fascinates me. And they're very graceful." (FRA5, scientific value)

"And I mean, I got to watch her give birth to little eggs, you know, lay these eggs and I got to hold them in my hands, and I bonded with her then. (...)." (FP9, humanistic)

"I'm really connected with the sea turtles, and I think it was nature that decided that for me. And nature comes to us in funny ways. Some people may be brought to work with hawks, or turtles, or eagles. And I believe that on a nature level inside of us, we are connected to nature, and it's all part of a circle. That's part of life. And a turtle is part of my nature. " (FP7, spiritual value)

The first and third quotes illustrate Galbraith's (2013) claim at the beginning of this section, that observing special events with a limited amount of people can lead to emotional responses. Counting eggs was more often mentioned by the participants, especially in relation to feeling a new connection. Furthermore, the second quote demonstrates that a scientific nature experience, the combination of seeing the turtle and having learned about them, can also have a large impact, as described in chapter 4. The last quote illustrates spiritual values and a feeling of connection.

Campbell and Smith thus showed that a participatory environmental research project can lead to the development of various values, most notably conservation value, scientific value, aesthetic value, humanistic value, and experiential value. Some of the quotes illustrate how the practice and the to the practice belonging shared experiences, observations and increase in knowledge caused participants to develop a feeling of connection with the research subject and with nature. This indicates that participatory environmental research tourism can lead to a change in meanings, which in its turn might influence other practices an individual carries.

6.3 Interactionism and networks

As explained in chapter 4 and 5, interaction with scientists and staff also plays a role. Dickinson et al (2012) even describe the levels and mechanisms of interaction between the scientists and participants in participatory environmental research tourism projects are similar to that of undergraduates in a university lab. McGehee (2002) studied the formation of networks during an Earthwatch expedition and their influence on social movement participation. She defines social movements according to Marshall's (1994:489) definition: 'an organised effort by a significant number of people to change (or resist change

in) some major aspects of society'. Taking part in social movement activities includes a wide range of activities, like lobbying to politicians, writing them letters, joining demonstrations, voting, becoming involved in politics, providing resources to organisations and donating money. McGehee did not measure post-trip behaviour, but intentions. She looked at it from two sides; one was self-efficacy, which she expected to increase due to the expedition, and the other came from resource-mobilisation theories, focusing on the development of new networks. She sent surveys to 848 people and received 619 pre-trip responses, of which 582 could be used, and for the post-trip survey she received 363 completed surveys.

Results from these surveys suggest that although changes in self-efficacy did not have any significant effect, the networks established during an expedition did have a significantly positive effect on social movement activities. Unfortunately, data on which activities were influenced most were not described. Overall, the most frequent types of social movement participation did not change between the pre- and post-trip measures, but the new network ties developed during an Earthwatch expedition served as a catalyst for future social movement participation. McGehee found that especially those participants that formed relationships with others in the sense of meeting people with similar values and goals, those that kept contact after the expedition, or those that found people who helped them in their social movement efforts increased social movement participation. One of her test subjects wrote that they "met wonderful volunteers who shared my views". Others write that "it was a good feeling to discuss issues with formerly [sic] strangers", and that "without these expeditions, I probably would not have an adequate forum… to discuss my values with others". Discussion, dialogue and reflection has been mentioned more often (Wearing and McGehee, 2013) to be an important factor. Besides several respondents indicating plans to become involved in social movements for the first time, there were also others who planned to become active in protecting the species they researched, or said that they wanted to be more involved in their teaching and wanted to show young people how they may be more involved in their communities.

McGehee's research illustrates how besides interaction with scientists and staff, also interaction with fellow participants plays a large role in influencing practices. This is part of interactionism, as described in the previous chapter. People who join an expedition find themselves in a group which often consists of mostly strangers, but observations of participants joining a wilderness expedition show that people can quickly bond (Fredrickson and Anderson, 1999). Participants share emotional highs and lows, talk about their experiences, and share a unique experience, meals, sleeping areas, and training. Moreover, expeditions can be expected to attract likeminded people who can exchange ideas, possibly leading to new insights or motivation to make a change (McGehee, 2002). McGehee found that the new social ties influenced social movement participation, but these social ties could also possibly influence other (environmental) practices. Studies have shown that social ties between people are important when it comes to recruiting them for new practices (Shove et al, 2012). Mimetic apprenticeship is thus not limited to scientists, who can help participants become successful carriers of in this case participation in environmental research tourism; fellow participants can introduce people to other practices, which they can perform at home.

6.4 Participatory environmental research tourism in a social practice perspective

When viewing these results from a social practice perspective, it becomes clear that participatory environmental research tourism participation can lead to a change in practices through spillover as the result of science participation and education, interpretation, wildlife encounters, observing and handling wildlife, and nature experience. Moreover, participatory environmental research tourism is also a form of volunteer tourism, and the information described in chapter 5 can also be applied here, both in terms of transformational impact and in terms of obstacles to follow up on intentions at home due to structural constraints. The same influencing factors are important as well; the interaction with staff, fellow volunteers, research topic, level of participation, and information provided influence the success and degree of change.

Whereas participation in citizen science or conservation tourism is often translated into an environment-related change in other practices, participatory environmental research tourism also leads to participation in a participatory environmental research tourism-related practice, namely citizen science, as Toomey and Domroese (2013) found. They did however find a lesser direct impact on day-to-day activities related to reducing one's ecological footprint. The left side of the conceptual model in chapter 2 can also be analysed; meanings and competences elements of other (related) practices could play a role in the recruitment of new practitioners for participatory environmental research tourism. A possible pathway that led to people participating in participatory environmental research tourism is a spillover of these elements; participants are often already motivated to some degree to do 'something meaningful' and to do field research and conservation work. They are also motivated by an interest in the research subject and by a desire to do something challenging and new (Weiler and Richins, 1995 in Galley and Clifton, 2004). Besides these motivations, also a willingness to meet new people or people with similar values plays a role, just as a desire to develop practical skills, engage in cultural exchanges and go sightseeing (Coghlan, 2005). An obstacle for participation is a lack of financial resources; it can be costly to join these trips.

7. Comparison between the influences of citizen science, conservation tourism, and participatory environmental research tourism

This chapter presents a comparison between the findings, linking the three cases to each other and assessing their similarities and differences. When comparing the findings, the behavioural outcomes are surprisingly similar despite the cases having different characteristics (see Table 1 chapter 3). All three have an impact on other practices, namely writing letters to politicians, joining and/or donating to environmental organisations, and becoming active in the local community. Also impacts on daily activities (e.g. gardening, purchasing decisions, and recycling) are found across all three cases, but when looking closer some differences are found. The effects of citizen science participation on daily life are more directly related to conservation and the research subject (e.g. not cutting down trees for the birds or planting flowers for bees) whereas the effects of conservation tourism and participatory environmental research tourism are linked to conservation as well as the environment (e.g. recycling, reducing ecological footprint). It has to be noted however that there is still conflict in literature about the influence on daily life; some studies find that these behaviours change, but others do not. In all three instances, there is an indication of an environment-related change in practices occurring through the two pathways depicted in the conceptual model presented in chapter 2. The first is elements spilling over in existing practices, changing the way people execute them, and the second is that participants of citizen science, conservation tourism, and participatory environmental research tourism start carrying other, related practices.

Another similarity across the three cases is the emphasis on the role of social influences; the role of staff is found to be important in all cases, and in the cases of conservation tourism and participatory environmental research tourism also social networks and interaction with fellow volunteers is emphasised. In conservation tourism the importance of interaction with the host community is deemed important. This interaction influences both competences and meanings; they allow for copying of behaviour, gaining procedural knowledge and learning new skills, as well as dialogue and reflection of one's emotions and motivations.

There are also differences in outcomes, just as there as differences in characteristics. For example, conservation tourism and participatory environmental research tourism offer nature experience far from home, whereas citizen science mostly takes place in the local community. This could lead to differences in results; tourists can develop a connection to the visited area or to the wildlife they encountered on their trip, but the connection citizen scientists develop is to their local environment and the local wildlife. Therefore, tourists can for example be more motivated to donate money to environmental organisations focused on the area they visited, and for citizen scientists the change in meanings can motivate them to contribute resources to local environmental organisations. This distinction was not found in the results, but the aforementioned difference that citizen scientists start engaging in direct conservation practices at home (e.g. not cutting down trees for birds) whereas tourists seem to focus more on the environment could be a consequence of this. Interestingly, also

tourists started engaging in their community and joining local meetings about the environment as a result of a spillover of meanings and competences.

Citizen science projects also often have less interaction with staff and are more solitary activities, although there can be a very active online community or network of citizen scientists who discuss observations and findings. Citizen science also takes place over a longer period of time; whereas conservation tourism and participatory environmental research tourism projects typically last between a week and a couple of months, citizen science projects can run for years. This gives participants more time to ease into the practice, to build up competences and build a social network, and to routine their new practices. Conservation tourism and participatory environmental research tourism on the other hand offer a very intense and emotive experience, where participants are completely immersed in the project, which is likely to have a bigger influence on meanings. They are away from home and from their daily routines. Citizen scientists only collect data for e.g. a couple of minutes a day or 30 minutes a week, and remain in their own surroundings. There are more similarities between conservation tourism and participatory environmental research tourism that are not shared by citizen science. For example, in the tourist cases, there is room for reflection and dialogue, which have been linked to transformation and subsequent behaviour change. Social practice theory offers a possible explanation for this behaviour change; reflection, dialogue, and new experiences can lead to deroutinising, bringing practices to the level of discursive consciousness. They also share interaction with the local community, possible encounters with iconic species, and can make distant problems visible. Furthermore, some project offer close interaction with animals, sometimes even the opportunity to handle them.

An important difference between conservation tourism and both citizen science and participatory environmental research tourism is that conservation tourism has a strong conservation and management focus whereas the other two have a scientific research focus. Participatory environmental research tourism is thus more likely to reap the benefits in terms of an increase in scientific literacy and a further interest in science, leading to participants to start carrying more science-related practices. Conservation tourism on the other hand often leads to greater interaction with the host community or to greater understandings of management issues and how to become involved in them. However, there was only one article mentioning that participants of a participatory environmental research tourism project started doing citizen science; other findings did not confirm nor contest this. It also depends on the focus of the various conservation tourism and participatory environmental research tourism projects. These latter also often have a clear conservation goal and can be related to management; research findings from these projects often feed into local or international management.

8. Discussion

After looking at the various behavioural outcomes of participation in citizen science, conservation tourism, and participatory environmental research tourism, and after having made a comparison, I will now present a discussion of the theory in this chapter, followed by a discussion of the limitations of this research.

8.1 Discussion of theory

Using social practice theory as a theoretical framework for analysing the behavioural outcomes of these three cases proved to be a valuable addition to the existing literature. Most studies focusing on the impact of citizen science on its participants use models like those of Fishbein and Ajzen. Whereas some make this use of theory explicit, it is mostly implied in the articles. They are based on the assumption that knowledge, attitude and intention are indicators or even predictors for behaviour, whereas, as explained in chapter 2, there are other factors that also have a large influence. By using a social practice approach, by analysing participation in citizen science as practice and focusing on the elements that make it, some missing links were found. Besides increases in knowledge, ecological literacy and science literacy due to experiential education and training, also social bonds and nature experience play a role. The educational emphasis was the main focus of looking at the outcomes of participation, but this thesis shows that the meanings element, the emotional responses to the work, the staff and being in nature as well as observing nature should also be taken into account in future research. Also the cases of conservation tourism and participatory environmental research tourism benefitted from using a social practice approach; whereas these activities are often analysed in terms of either emotional responses, transformational outcomes, or educational outcomes, this thesis shows that they all link together and that in order to fully understand their impact a more holistic view should be adopted. Furthermore, for all three cases, the importance of staff can also be explained by looking at social practice theory; new carriers need experienced carriers as an example, to learn from, and to discuss problems or insights with.

This topic remains, however, a field where more research is needed. This has been emphasised in most articles, and not without reason; there are only a few articles reviewing the educational and behavioural outcomes of participation in citizen science. The so-far unstudied link between citizen science, nature experience, connection to nature and the research subject, and behavioural outcomes would also be interesting to further investigate, since emotional affinity and nature connection have been found to be powerful predictors for conservation behaviour. Outcomes of conservation tourism are dispersed throughout different articles and often use different terms for the sector, making it difficult to find them. Participatory environmental research tourism is even more a niche. Also, the different studies found different results; whereas some found little to impact on participants' everyday behaviour, others indicated that this, too, does change. A standardised analysis could further look into this, and would enable a comparison between the different sectors, identifying which aspects or combination of aspects of the experience have the most influence.

A reflection on social practice theory shows its value for analysing the mechanisms by which people can change their (routine) behaviours. It includes the actor and the structure, allowing for a more complete perspective. Furthermore, Shove et al's (2012) notion of practices as existing out of meanings, materials and competences was, as just described, very valuable. Although it is a simplification, it helped analysing these three cases from a social practice perspective. The theory's notion that social networks and experiences that lead to an increase in procedural knowledge are important for influencing practices was also confirmed in these three cases.

8.2 Discussion of research limitations

Most of the limitations of this research are the consequence of having to use secondary instead of original data. For example, because these articles did not have social practices as a starting point, certain links and specific questions in relation to the elements have not been asked, nor has a question been included about previous citizen science experience or about other environmental practices and how that influenced people's decision to join e.g. a participatory environmental research tourism project. Moreover, the different articles have used different surveys. Questions asked in one survey might not have been present in another. This makes it difficult to compare the articles; if an aspect was not mentioned in research findings of one study but it was in another, then it is not clear if this is because of project characteristics or the surveys. Also the different question formats can lead to different results; multiple-choice questions steer people more to certain answers than open questions do. This further obstructs clear comparisons.

Another point of discussion is that the findings and successes with respect to changed behaviour differ per project. These results can be dependent on many different factors. In citizen science, issues like research subject, research type (action-, conservation-, virtual-, education- or investigation-oriented), interaction with staff, and level of engagement (contributing data, collaborating with scientists or co-creating scientific research) can lead to large differences in social and educational outcomes. For conservation tourism it is important to realise that the surroundings, research subjects, staff, activities, and the frequency and goals of interpretive talks can influence the results. All these items also play a role in participatory environmental research tourism, just like issues like the focus of the research project. Projects focused on wildlife are likely to have a different effect on participants' environmental and conservation behaviour than projects focused on climate change. Also previous experiences, enabling structures, and support of one's family and friends are factors that can play a role. A tailor-made questionnaire could have allowed for links and comparisons, but reviewing literature does not give enough data to find the different influences of these factors and does not enable controlling for them.

Also, as several other authors have already mentioned and as has been discussed in chapter 5, data on actual behaviour instead of intentions is lacking. There is also a need for more research to the long-term influence of people's citizen science, conservation tourism, or participatory environmental research tourism experience. It is unknown what the effects of the experience are in 6 months time, after 1 year, or after 5 or more years, and whether the effects are lasting or not, and in how much time this becomes visible.

Finally, many of the articles used surveys and self-reported behaviour and were based on intentions and short-term results. This brings some risks with them. According to Smit et al (2006), measuring actual behaviour is preferred over measuring self-reported behaviour because it is difficult to make a clear distinction between values and actual behaviour with self-reported data. Also, people like to present a consistent image of their behaviour and attitude, which could also influence the findings (Smit et al, 2006). Furthermore, respondents tend to over-estimate intended activities, or are inclined to give a more positive reply when it is socially desirable or makes them look good (McGehee, 2002). Lastly, the issue with obtaining mostly short-term results is that it is unclear whether these new behaviours will stick. For practices to become part of practical consciousness they have to become part of a routine, which takes some time.

9. Conclusions

The aim of this thesis was to contribute insights regarding the potential of citizen science, conservation tourism, and participatory environmental research tourism participation to lead to an environment-related change in practices. By reviewing literature and looking at findings from a social practice perspective, an answer to the main and sub research questions was found.

The first sub question inquires how existing theories, in particular social practice theory, explain behavioural change. According to social practice theory, a practice is characterised by three interrelated elements. These elements, meanings, materials, and competences, include everything that makes a practice; cultural norms, motivations, emotions, tools, people, know-how, etc. These elements can also spill over into other practices. The elements of a practice can thus change over time, changing practices with them. Besides linked elements, also the action of performing a practice is vital; a practice only exists when it is performed. This makes individuals the hosts or carriers of a practice, which they can become through factors like birth, history, location, social networks and communities, and past and present experiences with other practices. Through these factors, people can thus also start engaging in new practices. This means that for analysing the influence of carrying a specific practice, in this case citizen science, conservation tourism, and participatory environmental research tourism, this practice has to be put central. The three elements can spill over into other practices that the participant already carried, or can lead to carrying other, related practices because individuals are being introduced to or are becoming capable of carrying another practice.

The second sub question is about the documented change in behaviour and practices by participation in citizen science projects, conservation tourism, and participatory environmental research tourism. All of these experiences have been found have an influence on their participants; results showed that people start writing letters related to the project or research subject to government officials or editors, take on a more active role in the local community, raise the awareness of others or talk to them about the project, raise money for the project or research subject or donate money to conservation organisations dedicated to the project topic, or change their current gardening and purchasing practices out of concerns related to the research subject or topic. Participants of participatory environmental research tourism also started participating in other citizen science projects and undertook more recreational nature and wildlife activities. However, the influence on everyday environmental, nature-related or conservation-related behaviour is still contested; some articles report an impact on daily activities, but others do not. Findings do, however, suggest that citizen science leads to different outcomes in terms of daily activities; citizen scientists make direct conservation-related changes in gardening or plant purchasing practices whereas tourists seem to focus more on environmental practices, like recycling or conserving electricity.

The final sub question looked at the mechanisms of this influence from a social practice perspective. For citizen science, spillover of elements and engaging in new practices could occur due to experiential education, training, and scientific nature experience. These aspects of citizen science led to a change in people's understandings, knowledge, nature connection, willingness to protect or help the research subject, and ultimately a change in behaviour cause by a spillover of these competences and meanings. For the success of this influence, some aspects play a role; the amount of, preferably face-to-face, interaction with staff, the study topic, study design, and level of engagement. Spillover and becoming the carrier of other practices in the case of conservation tourism were the result environmental interpretation, social and aesthetic nature experience, wildlife encounters, hands-on activities and experience, and interactionism, which led to an increase in understanding, a connection to nature, and transformation of the self, and ultimately a spillover of these meanings. Also here some other factors influenced this success; interaction with staff, witnessing conservation- and environment-related problems and what happens on the ground to mitigate these problems, explanation of the link between the local area, one's own actions, and the wider environment, time for reflection and dialogue, and structural constraints at home. Participatory environmental research tourism shares its characteristics with the other two experiences, namely experiential education, environmental interpretation, wildlife encounters, nature experience, hands-on activities, and interactionism.

These findings lead to an answer to the main research question, 'What is the potential of participation in citizen science, conservation tourism, and participatory environmental research tourism to lead to an environment-related change in practices and what factors are most influential in this respect?'. Research findings show that citizen science, conservation tourism, and participatory environmental research tourism not only have a beneficial impact on conservation, but that they can also have an impact on the participants in terms of the practices they carry; as a result of participation in citizen science, participants start engaging in political and community-related practices as well as daily conservation-related and more scientific research-related practices. Participation in conservation tourism also led to engagement in political and community-related practices, and to a change in environment-related practices. Participatory environmental research tourism again leads to political and community-related practices and environment-related practices, but also to engagement in science-related practices. All three activities share some elements that lead to this change; the combination of participation, educational activities, interaction with fellow participants, interaction with staff, and an emotive nature experience. These aspects are represented in citizen science as experiential education, training, and nature experience. In conservation tourism those are environmental interpretation, wildlife encounters, nature experience, hands-on activities and experiential learning, and interaction with nature, fellow volunteers, and the host community. For participatory environmental research tourism these aspects are present as experiential education, environmental interpretation, wildlife encounters, nature experience, hands-on conservation activities, and interaction with fellow volunteers and nature. The success of these aspects on leading to a change in practices however is dependent on additional factors. For citizen science this is the level and mode of interacting with staff, the level of engagement in the research process, the topic of the project, and the design of the project; for conservation tourism these factors are interaction with staff, topic, and the link to the environment and to one's own actions that is made; and for participatory environmental research tourism it is interaction

with staff, the topic of the project, whether a link to the environment and to one's own actions is made, and the level of engagement in the research process. Furthermore, both in the cases of conservation tourism and participatory environmental research tourism, structural constraints at home, like culture and systems of provision, play a role. It is therefore important that in these cases, the social network that has been built up during the trip remains in place.

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Appendix

This appendix presents the original methodology aimed at investigating the former main research question 'what changes in environmental behaviour occur when people participate in conservation PERT projects and how does the project experience influence this?' (part A). It also includes a discussion of lessons learned from not being able to gather an adequate response (part B) as well as a description the development of the questionnaire (part C) and the questionnaire itself (part D).

Part A - Old methodology

In order to empirically test how participation in participatory environmental research tourism projects, further referred to as PERT projects, influences behaviour, an online questionnaire was developed and follow-up calls were planned to be conducted. This appendix will describe why I chose for this research method and introduce the intended target group. It will also shortly describe the questionnaire development, and briefly discuss the use of the chosen method.

A1. Quantitative and qualitative research

By using a questionnaire and in-depth follow-up calls, a combination of quantitative and qualitative research was opted for. I chose to use a quantitative research method because, although some research shows an increase in literacy and pro-environmental behaviour due to citizen science participation or participation in volunteer tourism, there are no data on how effective conservation PERT project participation is in increasing pro-environmental behaviour. Quantitative research, as opposed to qualitative, looks for regularities instead of specifics, focuses on numbers and is more objective.

Using a questionnaire as a quantitative research tool has several benefits. Firstly, it makes it possible to collect information from a large number of respondents within a reasonable short time. Second, it makes sure that questions are asked in the same way to each respondent and that a potential source of bias, the presence of an interviewer, is removed. Also, it makes it easier for respondents to be honest about sensitive subjects (Brace, 2008). Contacting a small group of respondents for a follow-up call enables further analysis of the questionnaire results and a further, more detailed exploration of the influence of participation on behaviour and practices.

A2. Target group

The target audience of the questionnaire existed of participants of expeditions organised by Earthwatch. Earthwatch engages individuals as citizen scientists in scientific research and has the mission to 'engage people worldwide in scientific field research and education to promote the understanding and action necessary for a sustainable environment' (Earthwatch, 2014a). Earthwatch projects are PERT projects and do not only benefit scientific research, they also benefit conservation, inform international policy and help creating national parks and protected areas (Earthwatch, 2014b).

Earthwatch has been mentioned both in literature on citizen science (e.g. Dickinson et al, 2012) and conservation tourism (or other alternative forms of tourism) (e.g. Wearing, 2001). Its projects are referred to as 'personalised research experiences' (Dickinson et al, 2012:291), and typically last between one and two weeks. They go to all continents and range from collecting data on plants, butterflies and bees in the Himalayas to measuring evidence of global warming at the Arctic's edge to conserving koalas and their habitat in Australia. Volunteers are involved in various research tasks like tracking wildlife, setting up camera traps, entering data and sorting images, and capturing and tagging animals, but also help maintaining conservation-related infrastructure, and helping in education centres.

Through their activities, Earthwatch seeks 'to inspire people, businesses, and communities with experiences, knowledge and tools that enable them to take action' (Earthwatch, 2014c). They believe that by letting people participate in inspirational, immersive scientific field research experiences, participants can be empowered, challenged and transform their mindsets (Earthwatch, 2014d). This makes participants of Earthwatch expeditions an interesting group for this research; do they indeed take action or change their behaviour upon return?

A3. Questionnaire development

The aim of the questionnaire was to find out what the difference is in behaviour before and after participation in a PERT project and what factors and conservation PERT project characteristics influence this difference. Findings from literature were translated into variables, from which statements and questions were formulated. In order to explore if the variables found in literature about citizen science and conservation tourism were also applicable and relevant to conservation PERT projects, a short survey was spread under employees of Earthwatch. Employees occasionally join an expedition to test or evaluate it and often deal with participants on a day-to-day basis, read their evaluations and hear their stories. The survey asked them about their ideas about what influences participants, and requested them to rate several influences according to their expected importance. Besides validating the variables found in literature, the employee survey was also used to identify possible additional variables through questions about their own ideas on the topic.

The employee survey consisted of four open questions and one closed question and was send to employees in the Oxford office, where approximately 50 people work. The four people who responded had experience with different programmes within the organisation; therefore, expeditions from the public programme, the corporate programme, and the teen programme were all present in the results. From this survey, it became apparent that the variables found in literature were indeed relevant. Especially learning sessions, the scientist's passion, a sense of contribution, and close bonds between participants were mentioned to be of influence on the participants. Additional findings are discussed in part C, which gives a full description of the development of the questionnaire. With these results, the questionnaire was created. It was tested by three people who joined a volunteer programme abroad and by one person who had been a volunteer for several Earthwatch expeditions himself.

The final questionnaire was in English, available online and available for people from all over the world. The questionnaire can be found in part IV. The initial plan was to pass the questionnaire link on to the Earthwatch marketing team, which would then post the link to their Facebook page (over 20.000 likes) and on their Twitter account (over 7.000 followers), possibly also spreading the link even further through their newsletter.

A4. Discussion of the chosen method

There are some potential problems to take into account when developing the questionnaire and analysing the results. According to Smit et al (2006), it is difficult to make a clear distinction between values and actual behaviour with self-reported data, but although actual measured behaviour is preferred over self-reported, the former is not feasible in this time frame. People like to present a consistent image of their behaviour and attitude, which could influence the results. Another issue Smit et al mention, is that people might be inclined to give socially desirable answers, further influencing the results. It was hoped that the follow-up conversations would reduce this bias.

Part B - Problems encountered and lessons learned

This part of the appendix discusses the circumstances that led to an inadequate response to the questionnaire, which forced the decision to switch to a literature review.

As described in part A, the plan was to spread the questionnaire by means of Earthwatch's social media accounts and, ideally, also through their mailing list. During the preparation phase of the research, this seemed to be a possible and feasible plan. I exchanged several emails with someone from the Oxford office, with whom I discussed the questionnaire and worked on some additional questions that some employees of Earthwatch were interested in seeing the answers of. However, when the questionnaire was developed and ready, the marketing team, when asked to spread the link to questionnaire and shown the questions, suspected that the same data could be found in the volunteer evaluations Earthwatch already had in its database.

For a non-profit organisation like Earthwatch, support from participants, funders and volunteers is vital. Therefore, they have to be very careful in their marketing and social media usage, and being critical about what they put online is a part of that. The marketing team is very aware of this, which why they decided not to put the link online; they expected that the data were already available in the database and not asking people to fill out a questionnaire which Earthwatch already had enough data for was an understandable decision.

This was however still an unfortunate and unexpected setback, and when we received this message we explored other options, starting with indeed using the data from the database. There were some disadvantages to using the database instead of the questionnaire. Firstly, these evaluations take place shortly after the expedition and will therefore mostly report on intentions instead of actual action taken, and longer-term effects would not be described too. Furthermore, and more importantly, the evaluations are directed at getting feedback about the expeditions, not at examining their impact on people's daily life. Using the evaluations therefore meant that I would have been dependent on what people incidentally mentioned - not what actually takes place. By directly asking people about behaviour and how the expeditions influenced that more information would have been found. This method also had one large advantage; it also provided the opportunity to send people an email in person for follow-up questions or requests for follow-up conversations, and conducting follow-up calls would solve many of the problems. However, after discussing this idea it became apparent that due to the participants not explicitly giving permission for contacting them for this it was not possible to use this method either.

After that we resorted to another option; an Earthwatch employee running the 6th form college groups programme, which sends teens on the public programme projects, personally contacted the 26 6th form students that joined Earthwatch projects and several more that joined expeditions from similar organisations. Due to this personal approach a high response rate was hoped for. However, no responses were documented, probably because the students did not have time since the link and the reminder were sent around the same time as the finals.

Finally, due to these time-consuming obstacles there was little time left for the research. Therefore it was decided to not use the questionnaire, but to switch to a literature review, looking the literature from a social practices point of view. What I learned from this is that it is not easy to collect responses for a questionnaire, even when it seems like it is set and possible to arrange. Earthwatch has offices spread across the world, and whereas I was in contact with someone from the research team in Oxford (UK), the marketing team is based in Boston (US), which makes casual conversation during breaks or in the hallways about things like this impossible.

Part C - Questionnaire development

C1. Introduction

This chapter forms the backbone of the development of the questionnaire, which is aimed at testing whether and how participation in conservation PERT projects leads to a change in environmental behaviour. Before creating the questions, some steps need to be taken. According to Brace (2008:35), for the planning of the questionnaire it is necessary to define the principal information required, to determine the secondary information that is required for analysis purposes, and to map the flow of the subject areas or subsections within the questionnaire. After that, the types of questions and data as well as the rating scales need to be determined, after which the questionnaire can be written.

C2. Planning the questionnaire

C2.1 Principal information need

The primary information that the questionnaire should yield is whether a behavioural change occurs and what aspects of an expedition influence this change. The over-arching questions that should be answered by this questionnaire thus are:

1. Is there a difference in environmental behaviour before and after participation in a conservation PERT project?
2. How does the conservation PERT experience influence this difference?

The primary information need centres on two variables; environmental behaviour after participation as the influenced variable and the conservation PERT project experience as the influencing variable. The influenced variable can be measured by researching the environmental behaviours that respondents are engaged in. It is important to realise that behaviour is not easy to measure. Also, there is not one single event or idea that influences behaviour. Therefore, direct questions about what behaviour someone engaged in prior to and after participation in a conservation PERT project and how the experience influenced that will be difficult to answer for respondents. A different approach is to let respondents define their environmental and nature-related behaviours to get an idea of their overall lifestyle and then ask what aspects of the PERT experience influenced this. This way the influencing variable, the conservation PERT project experience, can also be measured; it can become clear what happens during a PERT project that makes participants act in a different way.

C2.2 Secondary information need

In addition to the principal information needs, secondary information is required for analysis purposes. First, demographic data on age, gender, education level, and nationality are needed. In previous studies these variables have been found to influence environmental attitudes, values and behaviour. Kollmuss and Agyeman (2002) mention several studies that show that gender influences environmental behaviour: usually women have less extensive environmental knowledge than men, but are more emotionally engaged, show more concern about environmental destruction, believe less in technological solutions, and are more willing to change. This might also influence to what degree participating in a conservation PERT project impacts environmental behaviour. Age is also a variable to take into account. Diamantopoulos et al (2003) investigated the relation between several demographics and environmentally sensitive behaviour. They suggested that older people might have more financial means whereas younger people might lack the resources to engage in more environmentally responsible behaviour. This could also play a role in this research. The same study also noted that higher-educated people possibly understand environmental issues more fully and thus are more motivated to engage in environmentally friendly behaviour (although, as explained, knowledge does not necessarily lead to a change in behaviour). Already having a certain level of knowledge could increase the impact of a conservation PERT experience, so this is also a variable to take into account. Finally, since this is an international research, also differences between nationalities could also occur. Therefore nationality is also used as a variable to control for when needed.

In addition to these demographics there are some factors that are important to take into account and that function as filters. It is possible that respondents have joined more than one PERT project (this can be an Earthwatch expedition and expeditions from other organisations). This can influence the questionnaire results in two ways. Firstly, it has been found that multiple interventions are needed for people to change their behaviour (Crall et al, 2012). Moreover, practice theory suggests that the more expeditions someone joins, the more competences they might get. However, it has also been suggested that joining for a first time can have the biggest impact since the experience is new (McGehee, 2002). Therefore mixing data from respondents who joined multiple expeditions with respondents who only joined one expedition can lead to incorrect results, so respondents who have joined more often will be presented with a different set of questions.

It is also important to take into account that respondents might have joined an expedition several years ago. In that case there are various factors that can have influenced behaviour in the time between the expedition and the questionnaire, like media, friends and family, education, etc. This type of long term effects are more difficult to study since it becomes difficult to distinguish between the effects of participation and other factors. Moreover, participants could have difficulty recalling what they changed because of participation in an expedition. However, at the same time, this group of respondents forms a very interesting group; it could show how much and which of the changes persist over the years. Therefore, this group of respondents will not be excluded from participating in the questionnaire, but might be accounted for depending on the results.

Some basic characteristics of the expedition are also needed, like the expedition title, main focus of the expedition, location, duration, and expedition programme. Not only might there be differences in behavioural influence caused by e.g. the focus of the expedition (climate change versus wildlife for example), but asking these questions at the beginning of the questionnaire also stimulates respondents to revisit the expedition experience in their minds. Earthwatch also offers special expeditions, broadening its participant diversity. Participants for Earthwatch expeditions are coming from all parts of society; besides members of the general public also corporate employees, teachers and students join expeditions. Teachers can take part in a special educator programme, the Teach Earth Programme, where they join an expedition with a team of other educators and upon return they can use their experiences to teach and inspire others (Earthwatch, 2014e). Teens can join teen expeditions, designed for 15- to 18-year olds (Earthwatch, 2014f). Also, there are also special expeditions for corporate employees; Earthwatch partners with businesses that 'show a credible commitment to improving their environmental sustainability' and offer employee engagement as well as community programmes and support of environmental research and conservation (Earthwatch, 2014g). There are differences between these special programmes and the public programme which could have a different effect on the participants, so asking about this distinction is also relevant.

Finally, some technical information is needed; the permission to contact respondents for follow-up calls and if they give this permission, their contact details in the form of an email address. A section for open comments will also be provided.

C3. Writing the questionnaire

C3.1 Subject area flow

The questionnaire will exist of four parts:
- Part 1 asks filter questions and redirects the different types of respondents to their question sets.
- Part 2 is meant to create an image of the citizen science project the respondent has participated or is participating in. It will ask for the basic expedition characteristics.
- Part 3 will ask questions regarding (self-reported) nature, conservation and environmental behaviour the respondents engage in as well as expedition characteristics that could influence this change.
- Part 4 is about the demographics and offers an open comments section. It will also ask whether respondents are interested in a follow-up Skype call and if they are they can fill in their contact details.

C3.2 Types of questions, data and rating scales

The next step in developing a questionnaire is to determine the types of questions. The filter questions (table C-1) will be closed questions. The basic expedition characteristics (table C-2) are also closed. They are based on the variety of Earthwatch programmes and projects.

Table C-1: Filter variables and question types

Variable	Set of values	Question type
Number of Earthwatch expeditions joined	1 2 3-5 6-10 More than 10	Closed
Other similar holidays joined before (first) Earthwatch expedition	Yes No	Closed
Time to first expedition	Less than 1 month ago 1-6 months ago 7-12 months ago 1-2 years ago 3-5 years ago 6-10 years ago 11-20 years ago More than 20 years ago	Closed

Table C-2: Expedition basics and question types

Variable	Set of values	Question type
Expedition title	All titles of expeditions	Open
Main focus expedition	Archaeology and culture Climate change Ocean health Wildlife and ecosystems Agriculture Freshwater	Closed
Location	All countries where expeditions take place	Open
Duration of expedition	1 day 2-3 days 4-7 days 8-14 days 15-30 days More than 30 days	Closed
Expedition programme	Public Corporate Teacher Teen Other, namely...	Closed

Part three starts with statements about the environmental and nature-related actions someone engages in. Respondents can score them as NEVER, RARELY, SOMETIMES, MOSTLY, ALWAYS and NOT APPLICABLE OR DON'T KNOW. This makes it possible to keep the question-answer format the same throughout the core of the questionnaire. An open question about other environmental-/nature-related actions that are not listed in the statements is also included. This question can be answered with 'none' if respondents do not engage in additional actions and is shown on the same page as the statements. The reason for this is that respondents will have to be able to look at the statements to come up with extra actions, and the format of the questionnaire does not allow the option to revisit previous pages. Next, they are asked about how important several aspects of their expedition were in influencing their environmental and nature-related behaviour. These are be scored as NOT IMPORTANT, SOMEWHAT IMPORTANT, VERY IMPORTANT and DON'T KNOW. Here again an open question follows for respondents to add other aspects. Several additional questions about more specific actions are also asked.

For this part of the questionnaire, statements have to be developed (table C-3). These are based on categories defined in, amongst others, Defra (2008), Jackson (2005), Powell and Ham (2008), Bögeholz (2006), and Cottrell (2003). Often environmental behaviour is analysed in terms of consumer practices in and around the house and their impact on climate change, air quality, water quality, and waste. For this thesis, a broader outlook will be taken on in order to also include behaviours related to nature conservation, biodiversity enhancement, protection of natural resources. The categories therefore are electricity-conserving behaviour, personal transport behaviour, water-conservation behaviour, recycling behaviour, behaviour regarding food impact, purchasing behaviour, direct environmental citizenship, indirect environmental citizenship, passive political action, active political action, nature-protecting behaviour, nature-enjoying behaviour, and nature investigating behaviour. These are split into two sets of statements, one about the environmental and one about the nature-related behaviours.

In order to explore if the components and factors found in literature were also applicable and relevant to conservation PERT projects, a survey was spread under employees of Earthwatch. Making personal changes (like actions related to the sub variable, e.g. wasting less, recycling more) was mention by three respondents, although one respondent noted:

"I don't think it affects their daily life routine as much. (…) As far as their basic day to day decisions go, I think these are impacted to a lesser degree."

Some additional actions not found in literature became apparent; half of the survey respondents mentioned that participants sometimes remain active for the project by becoming advocates for the project they participated on, raising money for the focus of the expedition and continue being involved in the research efforts. One respondent also wrote that some participants have a transformational experience and develop a different outlook on field research, their education, and their career paths and even select new careers of change education tracks. These additional actions do not fit in the categories and are specifically related to participating in the expeditions, and will therefore be tested by asking separate questions instead of statements.

Table C-3: Environmental and nature-related actions and question types

	Categories	Statement	Question type
Environmental behaviour	Electricity-conserving behaviour	I take the environment into account when it comes to electricity use (e.g. by installing solar panels, using green electricity, switching off electric appliances when leaving the house, using energy efficient appliances, ...)	Closed; Statements, score on scale
	Personal transport behaviour	I reduce the environmental impact of my travel behaviour as much as possible (e.g. by using public transport for going to work, using a bike for short distances, ...)	Closed; Statements, score on scale
	Water-conservation behaviour	I reduce my water consumption as much as possible (e.g. by taking short showers, installing a dual-flush toilet, ...)	Closed; Statements, score on scale
	Recycling behaviour	I recycle my waste as much as possible (e.g. glass, metal, plastic and paper, composting garden/kitchen waste, ...)	Closed; Statements, score on scale
	Behaviour regarding food impact	I reduce the environmental impact of my food as much as possible (e.g. by consuming organic or local food, by not eating meat very often, ...)	Closed; Statements, score on scale
	Purchasing behaviour	I avoid the use or purchase of certain products because of their environmental impact	Closed; Statements, score on scale
	General	I think about whether my actions harm the environment	Closed; Statements, score on scale
	Direct environmental citizenship	I support one or more organisations concerned with conservation and/or environmental issues (e.g. through membership, donations, involvement in activities, ...)	Closed; Statements, score on scale
	Indirect environmental citizenship	I encourage others to act in an environmentally responsible way	Closed; Statements, score on scale
	Passive political action	I vote for political parties that support environmental protection	Closed; Statements, score on scale
	Active political action	I am active in (local) environmental politics (e.g. by joining an environmental party, joining environmental pressure groups, attending meetings, ...)	Closed; Statements, score on scale

Nature conservation behaviour	Nature-protecting behaviour	- I clean up waste in nature - I improve species habitat (e.g. by providing nest boxes, water resources, ...)	Closed; Statements, score on scale
	Nature-enjoying behaviour	- I spend time in nature at least once a week for enjoyment purposes - I enjoy the beauty of plants, animals and landscapes	Closed; Statements, score on scale
	Nature-investigating behaviour	- I spend time investigating ecosystems, plants and/or animals - I spend time investigating the state of the environment (e.g. water or air quality, environmental changes, ...) - I collect data on ecosystems, plants and/or animals and submit my findings to a research project (aka citizen science) - I collect data on the state of the environment and submit my findings to a research project (aka citizen science)	Closed; Statements, score on scale
Extra	Continued contribution to the protection and improvement of the expedition area and/or research subject after your expedition	-	Yes/No If yes → Open question how
	Change career choices (career or education track)	-	Yes/No If yes → Open question role expedition

The influencing variable is aspects of the PERT experience. In the literature study, the experience was hypothesised to spill over into other practices through meaning and competence elements as well as newly formed networks. Therefore, the influencing aspects are related to the meanings, competences, and networks that can be altered by the expedition. From the employee survey, it also became apparent that the variables found in literature were indeed relevant. Especially learning sessions, the scientist's passion, a sense of contribution, and close bonds between participants were mentioned to be of influence on the participants. Also for example understanding how the research fits into the big picture of environmental change and impact, and being fully immersed in nature and a research project were mentioned. The participatory nature of these expeditions was also emphasised; the hands on research was mentioned as an important influence.

"It's one thing to learn about coral reef conservation in a classroom. It's another thing entirely to measure the reef depth, rigosity, size, and species composition while snorkelling in Cape Eleuthera."

When the respondents were asked to rate several influencing variables (table C-4), especially a sense of contribution/feeling of making a difference, seeing how a conservation project works, helping with data collection, interaction with research subjects, being in nature and environmental interpretation scored high. Also close bonds and volunteer conversations as well as an increased understanding of the links between one's own actions and the environment as well as awareness of environmental problems were ranked high.

Table C-4: Influencing expedition aspects and question types

	Aspects	**Question type**
Competences-related aspects	- A new or increased understanding and awareness of (distant) environmental problems - A new or increased understanding and awareness of the link between my own actions and wider environmental problems - On-site training and presentations - Conversations with the research staff - Hands-on research - Seeing how a conservation project can benefit nature and wildlife	Closed; score on scale
Meaning-related aspects	- A sense of contribution, or making a difference - A sense of connection with nature - Being immersed in nature - An emotional bond created with wildlife and research subjects through observing, interactions and/or encounters	Closed; score on scale
Network-related aspects	- Meeting and spending time with like-minded people - Forming close bonds with fellow participants	Closed; score on scale

Finally, the demographical questions are a mix of open and closed (table C-5).

Table C-5: Demographic variables and question types

Variable	Set of values	Question type
Year of birth	All years	Open
Nationality	All countries	Open
Gender	Male Female	Closed
Occupation	Student Employed Homeworker Retired Other	Closed
Highest educational qualification achieved	Primary education High school diploma Vocational school or similar Bachelor's (or equivalent) degree Master's (or equivalent) degree Ph.D. (or equivalent) Other	Closed

Part D - Final version of the questionnaire

Please note that this final version of the questionnaire differs at some points from the questions presented in part C due to this version being modified for the 6th form students.

The influence of expeditions on environmental behaviour

BLOCK 1: INTRODUCTION (ALL RESPONDENTS)

1.1 Thank you for taking part in this questionnaire!

Your input will be of great help for my MSc thesis, which investigates the influence of an Earthwatch expedition or a similar experience* on environmental behaviour. With your data I hope to be able to analyse if a behavioural change occurs and, if so, what aspects of the expedition experiences influence that change.

Completing the questionnaire will take approximately 15 minutes of your time. You may withdraw from this research any time you wish. This questionnaire does not enable going back to previous questions and answers. At the end of the questionnaire, you can write down any comments or questions you may have. Your answers will be treated anonymously. Depending on your answers, you will skip certain questions and parts of the questionnaire (because of this the question numbers might look like they are incorrect).

Again, thank you so much!

*With an Earthwatch expedition or similar experience I refer to 'participatory environmental research tourism' experiences, or citizen science expedition experiences; short-term travel (less than 1 month) by volunteers who actively undertake conservation efforts, primarily by participating in field research or data collection.

BLOCK 2: INTRODUCTORY QUESTIONS (ALL RESPONDENTS)

2.1 How many expeditions have you joined?

- ❍ 1 (1)
- ❍ 2 (2)
- ❍ 3-5 (3)
- ❍ 6-10 (4)
- ❍ More than 10 (5)

PAGE BREAK

2.2 What organisation(s) did you go on expedition with? (If you joined expeditions from several organisations please fill in all organisations.)

Organisation 1 (1)
Organisation 2 (2)
Organisation 3 (3)
Organisation 4 (4)
Organisation 5 (5)
Organisation 6 (6)

2.3 Is Earthwatch (one of) the organisation(s) you wrote down in the previous question?

- ❍ Yes (1)
- ❍ No (2)

PAGE BREAK

Answer If How many expeditions have you joined? 1 Is Not Selected

2.4 What was the organisation that organised your first expedition?

BLOCK 3: EXPEDITION BASICS >1-TIMERS (IF 2.1=NOT 1)

3.1 The next questions will be about details of your first and later expeditions (your first expedition can be an Earthwatch expedition or a volunteer holiday/expedition similar to Earthwatch - both will be referred to as 'expedition' in the next questions).

PAGE BREAK

3.2 How long ago did you join your first expedition?

- ❍ Less than 1 month (1)
- ❍ 1-6 months (2)
- ❍ 7-12 months (3)
- ❍ 1-2 years (4)
- ❍ 3-5 years (5)
- ❍ 6-10 years (6)
- ❍ 11-20 years (7)
- ❍ More than 20 years (8)

PAGE BREAK

3.3 What was the name of your first expedition? (If you do not know the exact expedition title anymore, you can fill in what you think comes close.)

3.4 What were the names of other expeditions you joined? (If you do not know the exact expedition titles anymore, you can fill in what you think comes close.)

PAGE BREAK

3.5 What was the main focus of your first expedition?

- ❍ Archaeology and culture (1)
- ❍ Climate change (2)
- ❍ Ocean health (3)
- ❍ Wildlife and ecosystems (4)
- ❍ Agriculture (5)
- ❍ Freshwater (6)
- ❍ Other... (7) _____

3.6 What focus(es) did your other expedition(s) have? (If you joined more than two expeditions you can tick multiple answers.)

- ❑ Archaeology and culture (1)
- ❑ Climate change (2)
- ❑ Ocean health (3)
- ❑ Wildlife and ecosystems (4)
- ❑ Agriculture (5)
- ❑ Freshwater (6)

PAGE BREAK

3.7 Which countries were your expeditions located in?

Country of first expedition (1)
Country expedition 2 (2)
Country expedition 3 (3)
Country expedition 4 (4)
Country expedition 5 (5)
Country expedition 6 (6)
More countries... (7)

PAGE BREAK

3.8 What was the duration of your first expedition?

- ❍ 1 day (1)
- ❍ 2-3 days (2)
- ❍ 4-7 days (3)
- ❍ 8-14 days (4)
- ❍ 15-30 days (5)
- ❍ More than 30 days (6)

PAGE BREAK

3.9 Please give a description of your first expedition experience (e.g. main tasks and activities, most important thing you learned, what made the largest impression, etc.)

3.10 If you want to give a description or impression of your other expedition experiences, you can do so here:

BLOCK 4: BEHAVIOUR AND EXPERIENCE QUESTIONS >1-TIMERS (IF 2.1=NOT 1)

4.1 Next, you will be asked some questions regarding your environmental and nature-related behaviour and the expedition experiences.

PAGE BREAK

4.2 Please indicate how these statements regarding environmental actions apply to you.

	Never (1)	Rarely (2)	Sometimes (3)	Mostly (4)	Always (5)	Not applicable or don't know (6)
I take the environment into account when it comes to electricity use (e.g. by installing solar panels, using green electricity, switching off electric appliances when leaving the house, using energy efficient appliances, ...) (1)	❍	❍	❍	❍	❍	❍
I reduce the environmental impact of my travel behaviour as much as possible (e.g. by using public transport for going to school or work, using a bike for short distances, ...) (2)	❍	❍	❍	❍	❍	❍
I reduce my water consumption as much as possible (e.g. by taking short showers, installing a dual-flush toilet, ...) (3)	❍	❍	❍	❍	❍	❍
I recycle my waste as much as possible (e.g. glass, metal, plastic and paper, composting garden/kitchen waste, ...) (4)	❍	❍	❍	❍	❍	❍
I reduce the environmental impact of my food as much as possible (e.g. by consuming	❍	❍	❍	❍	❍	❍

organic or local food, by not eating meat very often, ...) (5)						
I avoid the use or purchase of certain products because of their environmental impact (6)	❍	❍	❍	❍	❍	❍
I think about whether my actions harm the environment (7)	❍	❍	❍	❍	❍	❍
I support one or more organisations concerned with conservation and/or environmental issues (e.g. through membership, donations, involvement in activities, ...) (8)	❍	❍	❍	❍	❍	❍
I encourage others to act in an environmentally responsible way (9)	❍	❍	❍	❍	❍	❍
I vote for political parties that support environmental protection (10)	❍	❍	❍	❍	❍	❍
I am active in (local) environmental politics (e.g. by joining an environmental party, joining environmental pressure groups, attending meetings, ...) (11)	❍	❍	❍	❍	❍	❍

4.3 What other environmental actions do you engage in besides those listed above? (Please answer 'None' if you do not engage in other actions.)

4.4 Have you changed anything in your environmental behaviour as a result of your expedition experiences?

- ❍ Yes (1)
- ❍ No (2)

PAGE BREAK

Answer If Have you changed anything in your environmental behaviour as a result of your expedition experiences? Yes Is Selected

4.5 You indicated that you changed something in your environmental behaviour as a result of your expedition experiences. What have you changed and why?

PAGE BREAK

4.6 Please indicate how these statements regarding nature-related behaviour apply to you.

	Never (1)	Rarely (2)	Sometimes (3)	Mostly (4)	Always (5)	Not applicable or don't know (6)
I clean up waste in nature (1)	❍	❍	❍	❍	❍	❍
I improve species habitat (e.g. by providing nest boxes, water resources, ...) (2)	❍	❍	❍	❍	❍	❍
I spend time in nature at least once a week for enjoyment purposes (3)	❍	❍	❍	❍	❍	❍
I enjoy the beauty of plants, animals and landscapes (4)	❍	❍	❍	❍	❍	❍
I spend time investigating ecosystems, plants and/or	❍	❍	❍	❍	❍	❍

animals (5)						
I spend time investigating the state of the environment (e.g. water or air quality, environmental changes, ...) (6)	❍	❍	❍	❍	❍	❍
I collect data on ecosystems, plants and/or animals and submit my findings to a research project (aka citizen science) (7)	❍	❍	❍	❍	❍	❍
I collect data on the state of the environment and submit my findings to a research project (aka citizen science) (8)	❍	❍	❍	❍	❍	❍

4.7 What other nature-related actions do you engage in besides those listed above? (Please answer 'None' if you do not engage in other actions.)

4.8 Have you changed anything in your nature-related behaviour as a result of your expedition experiences?

❍ Yes (1)

❍ No (2)

PAGE BREAK

Answer If Have you changed anything in your nature related behaviour as a result of your expedition experiences? Yes Is Selected

4.9 You indicated that you changed something in your nature-related behaviour as a result of your expedition experiences. What have you changed and why?

PAGE BREAK

4.10 How important were the following aspects of your expedition experiences in influencing your environmental and nature-related behaviour?

	Not important (1)	Somewhat important (2)	Very important (3)	Not applicable or don't know (4)
A new or increased understanding and awareness of (distant) environmental problems (1)	❍	❍	❍	❍
A new or increased understanding and awareness of the link between my own actions and wider environmental problems (2)	❍	❍	❍	❍
A sense of contribution, or making a difference (3)	❍	❍	❍	❍
A sense of connection with nature (4)	❍	❍	❍	❍
Being immersed in nature (5)	❍	❍	❍	❍
An emotional bond created with wildlife and research subjects through observations, interactions and/or encounters (6)	❍	❍	❍	❍
On-site training and presentations (7)	❍	❍	❍	❍
Conversations with the research staff (8)	❍	❍	❍	❍
Hands-on research (9)	❍	❍	❍	❍
Seeing how a conservation project can benefit nature and wildlife (10)	❍	❍	❍	❍
Meeting and spending time with like-minded people (11)	❍	❍	❍	❍
Forming close bonds with fellow participants (12)	❍	❍	❍	❍

4.11 Besides the items listed above, what other aspects of your expedition experiences influenced your environmental and nature-related behaviour? (Please answer 'None' if there are no other influencing aspects.)

4.12 What were the key elements of your expedition experience that inspired behaviour change?

PAGE BREAK

4.13 Did you continue to contribute to the protection and improvement of the research location and/or research subject after one or several expeditions? (e.g. by raising and/or donating money or by getting others involved)

- ❍ Yes (1)
- ❍ No (2)

PAGE BREAK

Answer If Did you continue to contribute to the protection and improvement of the expedition area and/or research subject after one or several expeditions (e.g. by raising and/or donating money)? Yes Is Selected

4.14 How did you continue to contribute to the protection and improvement of the research location and/or research subject?

PAGE BREAK

4.15 Did you change your career or education track as a result of your expedition experiences?

- ❍ Yes, my career (1)
- ❍ Yes, my education track (2)
- ❍ No (3)

PAGE BREAK

Answer If Did you change your career or education track as a result of your expedition experience(s)? Yes, my career Is Selected Or Did you change your career or education track as a result of your expedition experience(s)? Yes, my education track Is Selected

4.16 How did the expedition experiences influence this decision?

PAGE BREAK

4.17 You have joined more than one expedition. How did your former expedition experience(s) influence your decision to participate in additional expedition(s)?

BLOCK 5: EXPEDITION BASICS 1-TIMERS (IF 2.1= 1)

5.1 The next questions will be about details of your expedition.

PAGE BREAK

5.2 How long ago did you join your expedition?

- ❍ Less than 1 month (1)
- ❍ 1-6 months (2)
- ❍ 7-12 months (3)
- ❍ 1-2 years (4)
- ❍ 3-5 years (5)
- ❍ 6 -10 years (6)
- ❍ 11-20 years (7)
- ❍ More than 20 years (8)

PAGE BREAK

5.3 What is the name of your expedition? (If you do not know the exact expedition title anymore, you can fill in what you think comes close.)

5.4 What was the main focus of your expedition?

- ❍ Archaeology and culture (1)
- ❍ Climate change (2)
- ❍ Ocean health (3)
- ❍ Wildlife and ecosystems (4)
- ❍ Agriculture (5)
- ❍ Freshwater (6)
- ❍ Other... (7) _____

PAGE BREAK

5.5 In which country did your expedition take place?

5.6 What was the duration of your expedition?

- ❍ 1 day (1)
- ❍ 2-3 days (2)
- ❍ 4-7 days (3)
- ❍ 8-14 days (4)
- ❍ 15-30 days (5)
- ❍ More than 30 days (6)

PAGE BREAK

5.7 Please give a description of your expedition experience (e.g. main tasks and activities, most important thing you learned, what made the largest impression, etc.)

BLOCK 6: BEHAVIOUR AND EXPERIENCE QUESTIONS 1-TIMERS (IF 2.1= 1)

6.1 Next, you will be asked some questions regarding your environmental and nature-related behaviour and the expedition experience.

PAGE BREAK

6.2 Please indicate how these statements regarding environmental actions apply to you.

	Never (1)	Rarely (2)	Sometimes (3)	Mostly (4)	Always (5)	Not applicable or don't know (6)
I take the environment into account when it comes to electricity use (e.g. by installing solar panels, using green electricity, switching off electric appliances when leaving the house, using energy efficient appliances, ...) (1)	❍	❍	❍	❍	❍	❍
I reduce the environmental impact of my travel behaviour as much as possible (e.g. by using public transport for going to work or school, using a bike for short distances, ...) (2)	❍	❍	❍	❍	❍	❍
I reduce my water consumption as much as possible (e.g. by taking short showers, installing a dual-flush toilet, ...) (3)	❍	❍	❍	❍	❍	❍
I recycle my waste as much as possible (e.g. glass, metal, plastic and paper, composting garden/kitchen waste, ...) (4)	❍	❍	❍	❍	❍	❍
I reduce the environmental impact of my food as much as possible (e.g. by consuming	❍	❍	❍	❍	❍	❍

organic or local food, by not eating meat very often, ...) (5)						
I avoid the use or purchase of certain products because of their environmental impact (6)	❍	❍	❍	❍	❍	❍
I think about whether my actions harm the environment (7)	❍	❍	❍	❍	❍	❍
I support one or more organisations concerned with conservation and/or environmental issues (e.g. through membership, donations, involvement in activities, ...) (8)	❍	❍	❍	❍	❍	❍
I encourage others to act in an environmentally responsible way (9)	❍	❍	❍	❍	❍	❍
I vote for political parties that support environmental protection (10)	❍	❍	❍	❍	❍	❍
I am active in (local) environmental politics (e.g. by joining an environmental party, joining environmental pressure groups, attending meetings, ...) (11)	❍	❍	❍	❍	❍	❍

6.3 What other environmental actions do you engage in besides those listed above? (Please answer 'None' if you do not engage in other actions.)

6.4 Have you changed anything in your environmental behaviour as a result of your expedition experience?

- ❍ Yes (1)
- ❍ No (2)

PAGE BREAK

Answer If Have you changed anything in your environmental behaviour as a result of your expedition experience? Yes Is Selected

6.5 You indicated that you changed something in your environmental behaviour as a result of your expedition experience. What have you changed and why?

PAGE BREAK

6.6 Please indicate how these statements regarding nature-related behaviour apply to you.

	Never (1)	Rarely (2)	Sometimes (3)	Mostly (4)	Always (5)	Not applicable or don't know (6)
I clean up waste in nature (1)	❍	❍	❍	❍	❍	❍
I improve species habitat (e.g. by providing nest boxes, water resources, ...) (2)	❍	❍	❍	❍	❍	❍
I spend time in nature at least once a week for enjoyment purposes (3)	❍	❍	❍	❍	❍	❍
I enjoy the beauty of plants, animals and landscapes (4)	❍	❍	❍	❍	❍	❍
I spend time investigating ecosystems, plants and/or	❍	❍	❍	❍	❍	❍

animals (5)						
I spend time investigating the state of the environment (e.g. water or air quality, environmental changes, ...) (6)	❍	❍	❍	❍	❍	❍
I collect data on ecosystems, plants and/or animals and submit my findings to a research project (aka citizen science) (7)	❍	❍	❍	❍	❍	❍
I collect data on the state of the environment and submit my findings to a research project (aka citizen science) (8)	❍	❍	❍	❍	❍	❍

6.7 What other nature-related actions do you engage in besides those listed above? (Please answer 'None' if you do not engage in other actions.)

6.8 Have you changed anything in your nature-related behaviour as a result of your expedition experience?

❍ Yes (1)

❍ No (2)

PAGE BREAK

Answer If Have you changed anything in your nature-related behaviour as a result of your expedition experience? Yes Is Selected

6.9 You indicated that you changed something in your nature-related behaviour as a result of your expedition experience. What have you changed and why?

PAGE BREAK

6.10 How important were the following aspects of your expedition experience in influencing your environmental and nature-related behaviour?

	Not important (1)	Somewhat important (2)	Very important (3)	Not applicable or don't know (4)
A new or increased understanding and awareness of (distant) environmental problems (1)	❍	❍	❍	❍
A new or increased understanding and awareness of the link between my own actions and wider environmental problems (2)	❍	❍	❍	❍
A sense of contribution, or making a difference (3)	❍	❍	❍	❍
A sense of connection with nature (4)	❍	❍	❍	❍
Being immersed in nature (5)	❍	❍	❍	❍
An emotional bond created with wildlife and research subjects through observations, interactions and/or encounters (6)	❍	❍	❍	❍
On-site training and presentations (7)	❍	❍	❍	❍
Conversations with the research staff (8)	❍	❍	❍	❍
Hands-on research (9)	❍	❍	❍	❍
Seeing how a conservation project can benefit nature and wildlife (10)	❍	❍	❍	❍
Meeting and spending time with like-minded people (11)	❍	❍	❍	❍
Forming close bonds with fellow participants (12)	❍	❍	❍	❍

6.11 Besides the items listed above, what other aspects of your expedition experience influenced your environmental and nature-related behaviour? (Please answer 'None' if there are no other influencing aspects.)

6.12 What were the key elements of your expedition experience that inspired behaviour change?

PAGE BREAK

6.13 Did you continue to contribute to the protection and improvement of the research location and/or research subject after your expedition? (e.g. by raising and/or donating money or by getting others involved)

- ❍ Yes (1)
- ❍ No (2)

PAGE BREAK

Answer If Did you continue to contribute to the protection and improvement of the expedition area and/or research subject after your expedition (e.g. by raising and/or donating money)? Yes Is Selected

6.14 How did you continue to contribute to the protection and improvement of the research location and/or research subject?

PAGE BREAK

6.15 Did you change your career or education track as a result of your expedition experience?

- ❍ Yes, my career (1)
- ❍ Yes, my education track (2)
- ❍ No (3)

PAGE BREAK

Answer If Did you change your career or education track as a result of your expedition experience(s)? Yes, my career Is Selected Or Did you change your career or education track as a result of your expedition experience(s)? Yes, my education track Is Selected

6.16 How did the expedition experience influence this decision?

BLOCK 7: EARTHWATCH QUESTIONS (IF 2.3=YES)

7.1 Next are four questions specifically about Earthwatch.

7.2 What was your motivation for getting involved with Earthwatch?

7.3 What environmental issues are you most interested in experiencing/getting involved in as part of an Earthwatch project?

7.4 Do you have any suggestions for new and inspiring types of citizen science experiences?

7.5 What would you suggest are the best communication channels to share opportunities for citizen science to new people?

BLOCK 8: DEMOGRAPHICS (ALL RESPONDENTS)

8.1 This last set of questions is about demographics.

8.2 In what year were you born?

8.3 What country do you live in?

8.4 Are you...
- ❍ Male (1)
- ❍ Female (2)

8.5 What is your occupation?
- ❍ Student (1)
- ❍ Employed (2)
- ❍ Homeworker (3)
- ❍ Retired (4)
- ❍ Other (5)

8.6 What is the highest education level you achieved?
- ❍ Primary education (1)
- ❍ High school diploma (2)
- ❍ Vocational school or similar (3)
- ❍ Bachelor's (or equivalent) degree (4)
- ❍ Master's (or equivalent) degree (5)
- ❍ Ph.D. (or equivalent) degree (6)
- ❍ Other (7) _____

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8.7 Your help with filling out this questionnaire is very valuable for my thesis research, so thank you! In addition to this questionnaire, there are still many experiences to be talked about. Therefore, I am looking for respondents for a follow-up conversation through Skype.Would you be willing to participate in this?
- ❍ Yes (1)
- ❍ No (2)

PAGE BREAK

Answer If Your help with filling out this questionnaire is very valuable for my thesis research, so thank you! In addition to this questionnaire, there are still many experiences to be talked about. Therefor... Yes Is Selected

8.8 Thank you for your willingness to participate in a follow-up conversation! Please leave your e-mail address below so I can contact you. Your email will only be used for this thesis research and will not be shared with anyone else nor will it be used for other purposes.

PAGE BREAK

8.9 If you have any comments about this questionnaire, you can write them down here:

8.10 If you are interested in receiving a report of my thesis once it is finished (August/September this year), please leave your email address below. Your email will only be used for this thesis research and will not be shared with anyone else nor will it be used for other purposes.

PAGE BREAK

8.11 Thank you so much for filling out this questionnaire! To complete your submission, please click the arrow button one more time.

END OF SURVEY