rijksuniversiteit groningen / campus fryslân

INFORMAL EDUCATION AS A WAY TO REDUCE LITTERING BEHAVIOR AMONG CHILDREN IN THE NATURAL AREA OF THE VELUWE

by

Zarina Adelinde Buckert (S3772497) z.a.buckert@student.rug.nl)

Bachelor Thesis

University of Groningen

20 June 2021

Supervised by Dr. J.L. Geiger (j.l.geiger@rug.nl)

Abstract

As a result of inadequate waste disposal by visitors, the deterioration of the environmental quality of natural areas has become a growing worldwide concern. Although growing literature exists on reducing littering behavior among adults, the applicability of these theoretical frameworks on children has not been examined yet. Therefore, this study investigated the effectiveness of an informal educational route on littering behavior among children, by focusing on values, injunctive and descriptive norms and information provision. In a quantitative field experiment, children were randomly assigned to two conditions (examination before or after participation in intervention) and were given a treat. It was then observed what they did with the packaging of this treat, throw it in a trashcan, litter in the environment or put it in their pockets. Significant effects of this intervention on littering behavior were found, while also finding an effect on the children's choice of treat. The results showed that children were more likely to perform pro-environmental behavior after participating in the intervention. On this basis, interventions that integrate values and descriptive and injunctive norms to reduce littering behavior among children can be further designed and examined. To conclude, existing theoretical frameworks on reducing littering behavior among adults also seem to be effective on the demographic group of children.

Keywords: Pro-environmental behavior, children, littering, values, social norms, informal education, intervention

Table of content

1. Introduction

The deterioration of the environmental quality of natural areas has become a worldwide problem and a growing concern in recent decades. As a result of inadequate waste disposal by visitors, administrators of these natural areas have been struggling to maintain the regions clean. With a growing number of visitors, the existing problem will further intensify. Therefore, solutions to the issue should be developed in order to preserve the biodiversity within natural areas.

Litter generally includes synthetic materials associated with smoking, eating and drinking that are improperly discarded, left by members of the public (Campbell, 2007). However, there is not a fixed definition as it is a dynamic and broad concept. In 1990, the Environmental Protection Act stated that litter is 'anything that is dropped, thrown, left or deposited that causes defacement in a public place' (EPA, 1990). The Clean Neighbourhoods and Environment Act 2005 (CNEA 2005) further broadened the definition by stating that it includes anything dropped on private land and rivers, ponds and lakes. Litter could also be seen as a 'matter out of place', which is a theory proposed by Mary Douglas. She argues that our world consists of symbolic systems which bring order to our perceptions and experiences by classifications and binary contradictions (Douglas, 1966). However, not everything fits into these categories, objects can be anomalies, ambiguous or temporarily out of place, because of which it is seen as an impurity and awakens unpleasant feelings (Douglas, 1966). Litter can be seen as an impurity which does not fit into the world's symbolic systems, and thus can be seen as a matter our of place. This definition is not in line with the scope of this paper, therefore, the previously mentioned definition as proposed by the Environmental Protection Act will be used.

Solving the problem of littering could be linked to values (Karp, 1996; Corraliza & Berenguer, 2000), descriptive and injunctive norms (Bateson et al., 2013; Cialdini, Reno &

Kallgren, 1990) and levels of knowledge (Matsekoleng & Mapotse, 2018), yet there is surprisingly little research on interventions that focus on a combination of these aspects within the demographic group of children (e.g., Knafo & Galansky, 2008; Ballantyne, Connell & Fien, 1998), and only few interventions have been proposed and tested addressing the littering behavior of children (e.g., Hartley, Thompson and Pahl, 2014).

This paper will address the existing research gap, by (1) examining and summarising existing literature on interventions that stimulate pro-environmental behavior, and by (2) testing the impact of informal education as a way to encourage sustainable behavior among children. The intervention was designed to focus on values, injunctive and descriptive norms, and information provision, to encourage children to put their litter in bins and thereby, to stimulate them to contribute to the collection of improperly disposed waste. Therefore, it is hypothesised that children will engage in non-littering behavior as a result of participating in an educational intervention about littering. This field experiment has been conducted in one of the biggest nature areas in the Netherlands. By conducting the research in the natural environment, people will be least likely to be influenced by the fact that they participate in a research. Furthermore, the educational route will be set up along a walking path that the participants would already go on; therefore, little extra effort was asked and the willingness to participate was increased.

2. Literature review

There is growing evidence and awareness that human behavior reinforces environmental problems like a decline of biodiversity and water pollution (IPCC, 2018). The inadequate waste disposition by tourists is a worldwide problem, which has been highlighted in the last decades because of an increase in tourism and population (Rodriguez-Santos et al., 2005; Ariza et al., 2008; Brown et al., 2010). Therefore, it is relevant to study factors that could more easily facilitate pro-environmental choices. Pro-environmental behavior is defined as behaviors that modify the availability of resources from the environment or positively influence the structure and dynamics of ecosystems or the biospheric environment (Stern, 2000). This paper will address existing literature on social norms, values and information provision. Furthermore, previous studies on promoting sustainable behavior among children will be discussed. However, not many papers have been found, which is why studies on pro-environmental behavior among adults are used and applied to children.

2.1 Injunctive and descriptive norms

Researchers have identified various factors that influence pro-environmental behavior, for instance, social norms (Cialdini et al., 1990). Social norms are effective predictors for behavior as people might wish to fit in with the majority of a group, aim for social approval, look for social esteem, or find the most effective behavior in a certain situation (Farrow, Grolleau & Ibanez, 2017). Paradoxically, people tend to underestimate the influence of social norms on their behavior (Cialdini, 2007), which indicates that social norms operate through rapid, intuitive, and emotional mental heuristics (Farrow, Grolleau & Ibanez, 2017).

Social norms are crucial for the way individuals interpret and interact in their social environment (Smith et al., 2012). They can be divided in injunctive and descriptive norms (Cialdini et al., 1990). Injunctive norms include perceptions of what is ought to be done,

motivated by rewards or punishments associated with engaging in the behavior, while descriptive norms focus on whether the behavior is normally performed by other people (Cialdini et al., 1990; Smith et al., 2012). Experimental research has also exposed that individuals are more likely to litter in a littered environment, compared to clean environments and are less likely to litter when they have observed someone pick up litter (Cialdini et al., 1990; Cialdini, 2003; Schultz et al.,2011). This implies that injunctive and descpritive norms are relevant in stimulating sustainable behaviors. Various interventions have been tested in the field of pro-environmental normative behavior, for instance, persuasive signs and demonstrative messages are based on injunctive norms and could be used to prevent littering (Marion and Reid, 2007; Brown et al., 2010; Cialdini, 2003; Keizer et al., 2008; Ardoin et al., 2015). Persuasive communication in this specific case could entail signs that say “Do not litter!”, while demonstrative messages show people how to behave in a given setting and would thus include picking up litter at the sight of visitors (Schultz et al., 2013; Keizer et al., 2013). Research by Reiter and Samuel (1980) has proven that posting persuasive signs in the form of anti-litter signs is not a sufficient way of preventing littering. It was effective the first few times people saw the signs, but after some time they were no longer novel stimuli, so people blurred them from their sights (Reiter and Samuel, 1980). Therefore, a combination of persuasive and demonstrative signs should be used (Brown et al., 2010; Rodríguez-Rodríguez, 2012; Gusmerotti et al., 2016). Another example of the application of injunctive norms on an intervention is the “watching eyes effect” (Bateson et al., 2015). The idea of the watching eyes effect is that images of eyes will be placed onto objects in the experimental environment where littering is being researched. Because of the feeling of being watched, people would feel uncomfortable with littering because it could potentially harm them socially or reputationally (Bateson et al., 2015). However, this would mean that the eyes have

to be placed in every single high litter-potential spot, which is very cost-inefficient. Therefore, Bateson et al. (2015) concluded that this method is ineffective.

To the best of my knowledge, descriptive norms have not been addressed separately in relation to litter-reducing behavioral studies. They do occur frequently in theoretical frameworks that combine injunctive norms and descriptive norms, and in psychological studies on sustainable consumption (Demarque et al., 2015), charitable giving (Agerström et al., 2016), and towel reuse behavior (Bohner & Schlüter, 2014). Therefore, descriptive norms will be included, but only in combination with injunctive norms.

Concluding, various researchers have examined the application of injunctive and descriptive norms in intervention development and came to the conclusion that both injunctive and descriptive norms are effective in the stimulation of pro-environmental behavior. However, they appear to be most effective when combined (Cialdini et al., 1990; Schultz, 1999; Cialdini et al., 2006; Schultz et al., 2007). Accordingly, it can be hypothesized that an informal educational route which includes both injunctive and descriptive norms will be effective in reducing littering behavior. For example, monetary punishments as an injunctive norm and picking up litter as a descriptive norm (Reno, Cialdini and Kallgren, 1993) could be influential within the intervention. Furthermore, peer-to-peer education, such as presentations at school, could be an example of descriptive norms. Due to limited research it is not possible to identify whether social norms are an accurate predictor of pro-environmental behavior among children. However, as it has been proven to be effective for adults, it is hypothesized that social norms will also be significantly influential for children's behavior.

2.2 Values

Additionally, personal values can be the decisive factor that determines whether people will litter or not, and is defined as a desirable trans situational (relatively steady) aim of

various relevance that acts as a guiding principle in the life of a person or other social entity (Schwartz, 1992). Although all values are important, they can be strengthened to reach a precise goal. Some are more decisive depending on the person and situational factors that make people focus on certain consequences of their behavior, which is why Schwartz (1992) ordered them in a system of value priorities. This means that choices are made based on the value that is considered as the most important in that specific situation. In the case of pro-environmental behavior, hedonic, egoistic, altruistic and biospheric values are assumed to be related to choices that will be made (de Groot & Steg, 2009).

Biospheric values are the "ecocentric" values that prioritize the ecosystem and biosphere as a whole, while altruistic values are the "prosocial" values that focus on the highest cost-benefit efficiency for other people (Stern, 2000). Accordingly, altruistic and biospheric values suggest pro-environmental behavior because this is often associated with great societal and environmental benefits. For example, when choosing between driving a car or riding a bike, people with strong biospheric values will choose the bike because it is the least harmful to the natural environment. People with strong altruistic values will choose the bike because it reduces environmental pollution, which is better for the overall health of a society. Egoistic values are the "self-enhancement" values and benefit the individual (Stern, 2000). People with strong egoistic values will choose the car over a bike because it is the most comfortable option. A combination of these can form the decisions people make regarding pro-environmental behaviors, however, in many cases acting on egoistic values implies unsustainable behavior as the personal costs outweigh personal benefits (de Groot & Steg, 2009).

For long-term behavioral change, egoistic values are usually least effective. Although positive reinforcement can be effective in reducing littering, the sustainable behavior tends to decrease when the reward is removed (Burgess et al., 1971). For example, when people will

be rewarded with monetary incentives, they will be more likely to recycle their waste but when the incentive is removed, it is expected that they will stop behaving pro-environmentally. Thus, in order to create an effective intervention, it is important to focus on strengthening societal and environmental values.

Within the proposed intervention, values will play a crucial role. Firstly, the environmental and financial advantages of picking up litter will be described, which focuses on egoistic and biospheric values, but also on altruistic values as it benefits everyone. Furthermore, biospheric values are present as the importance for the environment and biodiversity will be highlighted. The combination of multiple types of values is crucial for the effectiveness of the proposed intervention due to the value conflict and the unstableness of the impact of egoistic values(Burgess et al., 1971).

2.3 Information provision

Information provision and informal education have been proven to be partly effective for stimulating sustainable behavior as knowledge is identified as a decisive factor in human behavior (Elroy, 2002; Jorna, 2006). Free-choice learning has been subject of many research projects in the field of behavioral change, however, many of these papers are somewhat pessimistic about the effectiveness of information provision in interventions (Lilley, 2009; Hobson, 2003). The short term impacts of such interventions are present in most research, but long-term effects are often not measured (Ballantyne & Packer, 2011). The main problem described is that education and knowledge on its own is not enough for behavioral change, but multiple levels of intervention are needed. Hence, the proposed intervention of this paper will consist of knowledge provision as a component, while not being completely dependent on it. The distinction between long- and short term effects is not relevant for this specific paper as it primarily focuses on short term behavioral change.

2.4 Children as participants

In contrast to increasing literature concerning adult (pro-)environmental attitudes and behaviors, there is little literature on children's' behaviors on sustainable alternatives and how to stimulate these. However, as children are the future generations, they need to take part in large-scale behavioral changes in order to mitigate climate change (Zeiske et al., 2020). Research suggests that young people are aware of major environmental problems but find it difficult to understand the causes of and solutions to these issues (Kahn, 1999; Kahn & Lourenco, 2002; Miller, 1975). Therefore, education on these topics might stimulate them to form perceptions of possible causes and solutions. Hartley, Thompson and Pahl (2014) concluded that after participating in a marine litter educational activity, children did not only have more knowledge and understanding of the topic, they also reported performing more litter-reducing activities. Furthermore, although the Value-Identity-Personal norms model (VIP model; Ruepert et al., 2016; Van der Werff & Steg, 2016), which proposes that the degree to which people support biospheric ideals is a significant and consistent predictor of diverse pro-environmental behaviors (Zeiske et al., 2020), is designed to reflect on adult attitudes and behavior, it has been proven to be applicable to children as well (Ando et al., 2015; Krettenauer & Victor, 2017; Matthies et al., 2012; Zeiske et al., 2020). This suggests that similar factors may be effective in stimulating pro-environmental behaviors among children. This research also shows the importance of including biospheric values in the intervention.

Moreover, children have the potential to influence their friends and families (Lee, 2008). This is comparable with the way marketing professionals recognize children's influence on decision making and consumer choices, also referred to as 'pester power' (Flurry and Burns, 2005; Wilson and Wood, 2004). Likewise, children can influence

environmental knowledge, attitudes and behaviors of their parents (Damerell et al., 2013), in this case with regards to littering.

Although there is support for the positive influence of education and awareness creation on the reduction of littering, questions remain whether values, norms and knowledge are predictive for children's pro environmental behavior. To the best of my knowledge, little research has been performed on litter-reducing interventions for children in natural areas. Therefore, biospheric values, injunctive and descriptive norms, and information provision will be used as the basis for the proposed intervention. It is expected that the educational route will positively influence sustainable behavior of children. More specifically, it is expected that children who have not participated in the route will litter more compared to those that have been participating in the intervention.

2.5 Current research

The signs of the informal educational route were placed along a path that leads visitors from the parking lot to the Loenense Waterval. This waterfall is located in the natural area of the Veluwe, a scholarly example of a natural area that has been growing in popularity among tourists. It is a forest-rich part of the Netherlands located in the province of Gelderland and is approximately 1100 square kilometers, however, it does not have any defined borders. The region is home to many different species of animals like wild boars, deers, snakes, and foxes. In 2018, the wolf also made its re-entrance and the prognosis is that many more wolves will find their homes in the area (Wolven in Nederland, n.d.). In order to increase the genetic diversity of the wildlife population on the Veluwe, wildlife crossings are built over highways. By doing this, separated parts of the area are connected again and wildlife expands their territories without passing dangerous roads (van der Ree, et. al., 2009).

The natural diversity makes the Veluwe a popular destination for tourists, especially for Dutch people that go on a short vacation within their own country. Many bungalow parks and

camping sites are located in the area. Tourists usually visit the Veluwe to enjoy walking in nature, visiting the Kröller-Müller art museum and the royal palace Het Loo. In 2019, 2.042.000 people visited the Veluwe as part of a national vacation which makes it the most popular Dutch holiday destination (NBTC-NIPO, 2020). While the local economy is stimulated with the visits of these tourists, the environment is seriously damaged because littering is a problem within the area. According to locals, waste is frequently inadequately disposed of around one of the most popular tourist attractions, the Loenense Waterval. This causes much of the waste to end up along the road that leads to the parking lot of the waterfall, causing visual contamination and negatively impacting the biodiversity of the area. Therefore, this particular study is of high relevance for the local community and natural environment.

3. Methods

3.1 Participants

A total of 38 families, consisting of 89 Dutch children, participated in the study at the Loenense Waterval in the Netherlands. All children were approximately 5 to 12 years old and participated in the study accompanied by at least one parent. 8 families consisted of a single child with their parent(s), while the other 81 families consisted of multiple children, ranging from 2 to 6 children per family. A total of 45 children were part of the control condition, and 44 children were part of the experimental condition.

3.2 Procedure and measures

3.2.1 Procedure

In both conditions participants were randomly approached as they were walking from the parking spaces towards the path that leads to the waterfall (Figure 2; Figure 3). The starting point as indicated in Figure 2 was also the location where the dependent variable was observed. All participants walked the same route towards the waterfall, and back to the starting point. Families were given an unlimited amount of time to complete the route. Children and parents were explained that an educational route for children on the topic of litter had been designed and set up along the path. Furthermore, it was explained that this is part of a bachelor's thesis research project. Parents and children were asked for verbal consent. In the control condition, the dependent variable was observed before the family participated in the educational route. Children were offered a treat; either a mandarin or candy. It was then observed what the children did with the packaging/peel of this treat; throw it in nature, put it in their pocket, or dispose of it in a trashcan. In the experimental condition, participants were asked before the start of the route to return to the starting point so that children could get a treat, and to evaluate their thoughts of the route. When they returned, the children were given a treat and their behavior was observed. By doing this, the dependent

variable, whether the children's behavior is significantly different after participation compared to prior to the intervention, was tested. At the end of the intervention, when children had gotten a treat and their behavior was observed, the parents were given a debriefing form to inform them about the purpose of the study. This form can be found in Appendix 8.1.

3.2.1.1 Testing.

The effectiveness of the intervention was tested by an observational study element. The children in the experimental group participated in the education route, after which they were given a treat as a "reward" for their attendance. It was then observed whether they dispose of the packaging of this treat in a bin, or in nature. A control group was given this treat without participating in the intervention. The results of these groups have been compared in order to spot potential differences in their (non-) littering behavior. Children that have put the residual of the treat into their pockets were included as a separate variable in the analysis. The risk of the litter ending up in nature is existent. Although accidentally littering is not specified in the law that enforces fines for the wrongful disposition of waste (art. 3 sub e GW 2008), unintentional littering behavior is a risk for local biospheres. Therefore, the analysis will include these children instead of deleting them from the data.

In addition to the observation of littering behavior, the choice of treat was also observed. Children could choose between a mandarin or a candy.

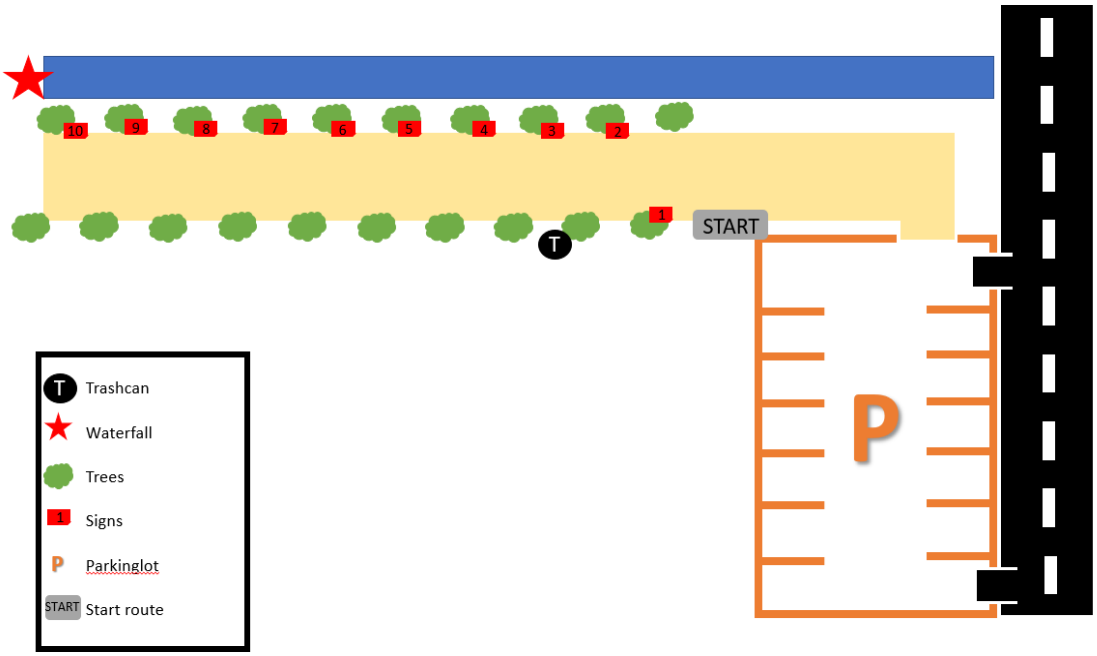


Figure 2 Map of the experimental location.

Figure 3 Starting point of the experimental location at the Loenense Waterval.

3.2.1.2 Survey of values.

In order to distract participants from thinking too much about the disposal of the packaging of the treat, parents were asked to fill in a short survey on values. The content of this survey has been based on the Environmental Portrait Value Questionnaire (E-PVQ) as proposed by Bouman, Steg & Kiers (2018). However, the data of this survey was not used for claims and arguments in this project as very few families filled in the survey.

3.2.2.1 Measures.

Children participated in an educational route in the area where the Loenense Waterval can be found. This route was designed to promote non-littering behavior among children by using values, norms and information provision. Across ten signs that were carefully designed specifically for this intervention, biospheric and egoistic values, and injunctive and descriptive norms have been used to influence the behavior of children. The signs had a dark green/emerald color background and were about a character “Daan” who was guiding the children along the way. As the signs were designed specifically for children, simple language and fun graphics were used. Along the route, questions had to be answered and suggestions were provided to help the children to gain insight in the littering problem. Images were used to keep the attention of the children and to make the topics more tangible. The signs that were used during the intervention can be found in appendix 8.2.

3.2.2.2 Sign 1.

The first sign was used as a general introduction to the topic. The character “Daan” was introduced and littering as the problem statement was mentioned. The children were asked to help Daan with keeping the environment clean by answering as many questions correctly as possible.

3.2.2.3 Sign 2.

The second sign asked the children to guess how many kilos of waste ends up in nature per year. Furthermore, the definition of ‘litter’ is explained. The purpose of this sign was to inform children about the importance of the existing problem.

3.2.2.4 Sign 3.

The third sign informed children about the benefits of picking up litter. Firstly, egoistic values were highlighted, as it is stated that picking up litter can be seen as a healthy exercise for the body. Furthermore, it helps to keep the environment clean and to make sure the litter does not end up in the food of animals. This benefit focused on the biospheric values. Moreover, the sign mentioned that picking up litter can be fun, as you can do it together with friends. This highlights hedonic and egoistic values. Lastly, it explained that picking up litter is relatively easy and that you could even get some monetary resources from it by bringing drinking cans to the local supermarket.

3.2.2.5 Sign 4.

The fourth sign asked children how long it would take to decompose certain products. A banana peel, cigarettes and drinking bottles were included. This sign was designed to target biospheric values and information provision.

3.2.2.6 Sign 5.

The fifth sign informed children about a possible 140 euros fine they could get when you wrongfully dispose of waste in nature. Furthermore, it was mentioned that because of this punishment, it is clear that littering is not appropriate. Therefore, this sign targets both egoistic values and injunctive norms.

3.2.2.7 Sign 6.

The sixth sign portrayed an artwork made of plastic straws, and therefore demonstrated how litter can easily be turned into something beautiful. The children were given the suggestion that they could also make such an artwork and give a presentation about it in class. This could serve as a descriptive norm and a good example for the other children in their class.

3.2.2.8 Sign 7.

The seventh sign consisted of a question about red deers, who are also called the kings of the Veluwe. With this sign, biospheric values were highlighted as children were told that litter also ends up in the food of red deers, and that this is harmful.

3.2.2.9 Sign 8.

The eighth sign showed how relatively easy it could be to keep the environment clean. A quiz question demonstrated to children that the Netherlands would be clean in almost no time if everyone picks up 1 piece of litter per day. A possible barrier related to egoistic values is hereby removed. Moreover, if someone starts picking up litter, this can serve as a descriptive norm for other people.

3.2.2.10 Sign 9.

The ninth sign informed children what they could practically implement themselves to prevent litter. This included taking reusable bottles instead of single-use plastic bottles, a reusable lunch box instead of plastic bags, and simply putting your waste into the trash can. Furthermore, children were asked to write down any suggestions they could think of. With the information gathered during the walking route, children were asked to actively start thinking about other possible solutions to the existing problem, which shows the importance of information provision.

3.2.2.11 Sign 10.

The last sign was a general conclusion of the route.

4. Results

The quantitative data that was collected by observing the children's behavior was processed using Excel and STATA. Chi-square tests were performed to analyze potential differences between the experimental and control group. Furthermore, an additional chi-square test was performed to identify whether the intervention was responsible for an effect on the children's choice of treat. In order to investigate potential social influences on children's behavior, separate analyses would have been ran for the group of single children, and the group of children accompanied by their siblings. However, as only 8,99% of the total number of children was a single child, this would not lead to a representative study with reliable results.

Firstly, a chi-square test was performed. The difference in littering behavior between the experimental condition and the control condition was examined with the use of three dependent (outcome) variables. These represent putting the packaging residual in a trashcan, putting the packaging residual in their pockets, and throwing the packaging residual in nature. The overall effects of the intervention, measured by analyzing the effects on all three individual variables in in both conditions, were significant (X^2 (1, N = 89) = 9.5 , p = .009)). In the experimental condition, 75,6% of the total amount of children put the litter into a trashcan, 15,5% put it into their pocket and 8,9% threw the waste in nature. In the control condition, 44,2% of children put the litter in a trashcan, 40,9% put the packaging into their pockets and 15,9% littered in nature. Accordingly, after participating in the intervention, children were less likely to litter and more likely to put their waste in a bin.

After performing the chi-square tests for each dependent variable separately, it can be concluded that the intervention had a significant effect on the variable "Putting the residual in the trashcan" (X^2 (1, N = 89) = 7.1 , p = .008)). Hence, in the control condition 43.2% of participants threw their litter in the trashcan and in the experimental condition 75.6% of

participants threw the packaging in the trashcan. The intervention also had a significant effect on the variable “Putting the packaging in their pockets” (X^2 (1, N = 89) = 9.7 , p = .002)). In the control condition, 40.9% of children put the packaging in their pockets, while in the experimental condition this was 15.6%. The intervention was not proven to be statistically significant on the variable “Throwing the packaging in nature” ((X^2 (1, N = 89) = 1.0 , p = .314)). In the control condition, 15.9% of participants disposed of the litter in nature, and in the control condition this was 8.9%.

The effect of participation in the educational route on the choice of treat was examined with a chi-square test. The intervention was found to be of significant influence, X^2 (1, N=89) = 20, p = .000. In the control condition, 100% of children chose candy as a treat, while 63,6% of children in the experimental condition chose candy as a treat.

5. Discussion

This study aimed at finding a solution for the littering problem in natural areas. Specifically, the aim was to test the effectiveness of an informal educational route on littering behavior among children. The hypothesis was supported, as the intervention was found to be significantly influential on children's littering behavior. Furthermore, an additional effect of the intervention on the choice of treat was found. Subsequently, the results will be discussed and possible explanations will be given.

5.1 The effect of the educational route on littering behavior

The results are in line with the hypothesis as they indicate that the educational route as an intervention was significantly effective. The number of children that littered before participating in the intervention (control condition) was higher compared to the number of children that littered after participation. These findings add to previous research that prove injunctive and descriptive norms, and values to be an effective measure for stimulating pro-environmental behavior. This is in line with what Hartley, Thompson and Pahl (2014) concluded in their study on marine litter education. In this study, children's' baseline marine litter understanding and self-reported actions were examined, and the impact of an educational intervention was tested. Children had more knowledge and understanding of the topic after participation, and they performed more litter-reducing behavior. In the intervention, norms and values were targeted. However, since the underlying processes have not been tested, it can only be speculated which individual factor drove the effects. In previous research, both values and social norms have been proven to be effective, and also in combination with each other they appeared to have significant influence. The effectiveness of the combination of both factors has been confirmed by this specific study.

A possible explanation of the improved sustainable behavior could be the VIP model as discussed by Ruepert et al. (2016), and Van der Werff & Steg (2016). After the intervention, the children might have endorsed biospheric values more strongly, which led to less littering behavior. This study also confirms statements in previous research on the applicability of this model on children behavior (Ando et al., 2015; Krettenauer & Victor, 2017; Matthies et al., 2012; Zeiske et al., 2020). Therefore, the most important finding of this study was that models focused on adult behavior, also seem to be applicable to children. Future research should examine which parts of the used theoretical frameworks have been most influential. An online questionnaire could be used to identify and understand underlying processes. For example, this could be done by examining the effects of values, norms or information provision separately. Although, as mentioned previously, it is expected that combining the different factors will be most effective, it is relevant to identify to what extent the individual factors are influential.

5.2 Spill-over effect on choice of treat

An interesting additional effect was found, the intervention significantly influenced the choice of treat, which might be due to a spillover effect of nature connectedness on personal health (Martin et al., 2020; Netuveli & Watts, 2020). This spill-over effect suggests that people with strong environmental values are more likely to take good care of their body. In this specific case this would imply that participants' biospheric values were strengthened in the intervention, after which they preferred the healthy option of a mandarin over a candy. However, a limitation on this is that the candy was packaged in plastic, while the mandarin did not have a packaging over its peel. Therefore, the fact that the candy packaging was made of plastic could have also influenced this decision. Future research on this topic is needed as the cause of this spill-over effect could not be identified. Possibly, biospheric values have

influenced the children's choice, or the plastic packaging on the candy, as opposed to the “natural” peel of the mandarin.

5.3 Theoretical implications

To the best of my knowledge, this is the first field experiment in the field of environmental psychology that investigates the applicability of theories focused on adults’ littering behavior on the demographic group of children. Therefore, this research is valuable and fills an existing research gap. It is a combination of sustainability initiatives from both practical and academic origins, and relates to many interdisciplinary perspectives. This intervention study could be used as the starting point to further investigate littering behavior among children more specifically and to better understand the underlying processes of this effect. The study supports existing literature and theories on adult behavior, while applying it to a new demographic group. As the findings of this paper do not identify the effect of the individual factors (values, social norms and information provision), future research should extend the testing of the intervention on multiple levels. This way, the most influential factor can be identified.

Furthermore, as this study was performed in the natural habitat of participants, as opposed to a clinical environment in lab experiments, authentic behavior could be observed without strong priming mechanisms. Real behavior was observed in a real world setting, which is valuable for psychological research and a strength of this particular study. Field studies in general are beneficial as they can reveal societal truths that aren't immediately apparent or that participants aren't aware of, this naturally also applies to this particular study.

The possible spill-over effect that has been found on the choice of treat adds an extra and novel dimension to the experiment and should be investigated further. The relationship between the specific factors and the choice of treat should be examined. Moreover, the

motivation behind the choice of treat is important to identify in order to determine the reason why children were more likely to choose the mandarin in the experimental condition. For instance, this could be health-related or due to the fact that the candy was wrapped in plastic packaging, as opposed to the mandarin.

5.4 Practical implications

This research provides important suggestions for policymakers aiming at reducing littering behavior among children. The results show that a combination of values, social norms and information provision within an intervention, specifically an informal educational route, are effective influences for children's behavior.

As children are the global citizens of the future and the change agents for sustainability, it is crucial to educate them on topics related to climate change (Stuhmcke, 2012; Zeiske et al., 2020). Children will gain new insights from the proposed intervention and are encouraged to distribute this among their friends and peers, which highlights the strengthening of descriptive norms in the educational route.

Municipalities and organizations that supervise natural areas could implement the educational route at the most prominent and popular tourism locations. Although the effects of the individual factors are not yet clear, practitioners could either use the intervention as proposed in this paper with a combination of variables, or invest into research on specific factors. The suggested educational route is cost-effective and could be easily implemented by governing bodies, without high placing and maintenance costs.

5.5 Limitations

A limitation to this study is that 25 out of 89 (28.1%) children have put the packaging of the treat into their pockets. As it is not clearly identifiable if this waste will (accidentally) end up in the natural area, and one may also argue that putting the packages into the pocket

can be considered as non-littering behavior, no conclusions can be drawn from these observations. A further limitation to the study was that only 8 out of 89 (8.99%) children were not accompanied by their brothers and/or sisters. Therefore, the effect of social pressure could not be accurately measured. It could be possible that this study would be less effective for single children compared to children with siblings, or that social pressure has confounded the effects. Similarly, the effect of the presence of parents in this case could not be identified, while the effect could be both positive or negative. However, the presence of parents could be a strength of the study since they could be indirectly influenced as well. Lastly, the long-term effectiveness of the intervention can not be guaranteed. Future research should test the effectiveness overtime to identify whether the significant effect was found because the testing was performed right after participation in the experiment. Moreover, it is unclear what specific part of the intervention drove the effect, more research is needed to understand underlying processes.

6. Conclusion

To conclude, this study has aimed to examine the effectiveness of an informal educational intervention on the littering behavior of children, while focusing on values, descriptive and injunctive norms, and information provision. Based on a quantitative analysis, the intervention was found to have significant positive effect on the littering behavior of children, while also having a potential spill-over effect on the choice of treat. After participating in the intervention, children were less likely to litter in the natural environment. While research on littering behavior exists, this study provides novel and valuable insights as it is, to the best of my knowledge, the first study that examines the effectiveness of these theories on children in a field experiment. Therefore, this paper could form the basis for future research in the field of pro-environmental psychology among children.

7. References

Agerström, J., Carlsson, R., Nicklasson, L., & Guntell, L. (2016). Using descriptive social norms to increase charitable giving: The power of local norms. Journal of Economic Psychology, 52, 147-153.

Ando, K., Yorifuji, K., Ohnuma, S., Matthies, E., & Kanbara, A. (2015). Transmitting pro-environmental behaviors to the next generation: A comparison between Germany and Japan. *Asian Journal of Social Psychology*, *18*(2), 134–144.

Ardoin, N. M., Wheaton, M., Bowers, A. W., Hunt, C. A., & Durham, W. H. (2015). Nature-based tourism's impact on environmental knowledge, attitudes, and behavior: a review and analysis of the literature and potential future research. *Journal of Sustainable Tourism*, *23*(6), 838-858.

Ariza, E., Jiménez, J. A., & Sardá, R. (2008). Seasonal evolution of beach waste and litter during the bathing season on the Catalan coast. *Waste management (New York, N.Y.)*, *28*(12), 2604–2613.

Ballantyne, R., Connell, S., & Fien, J. (1998). Students as catalysts of environmental change: A framework for researching intergenerational influence through environmental education. *Environmental education research*, *4*(3), 285-298.

Bateson, M., Callow, L., Holmes, J. R., Roche, M. L. R., & Nettle, D. (2013). Do images of 'watching eyes' induce behavior that is more pro-social or more normative? A field experiment on littering. *PloS one*, *8*(12), e82055.

Bateson, M., Callow, L., Holmes, J. R., Roche, M. L. R., & Nettle, D. (2013). Do images of 'watching eyes' induce behavior that is more pro-social or more normative? A field experiment on littering. PloS one, 8(12), e82055.

Bateson, M., Robinson, R., Abayomi-Cole, T., Greenlees, J., O'Connor, A., & Nettle, D. (2015). Watching eyes on potential litter can reduce littering: evidence from two field experiments. *PeerJ, 3*, e1443.

Bohner, G., & Schlüter, L. E. (2014). A room with a viewpoint revisited: descriptive norms and hotel guests' towel reuse behavior. PloS one, 9(8), e104086.

Bouman T., Steg L. & Kiers H.A.L. (2018). Measuring Values in Environmental Research: A Test of an Environmental Portrait Value Questionnaire. *Frontiers in Psychology, 9*, 564.

Brown, T. J., Ham, S. H., & Hughes, M. (2010). Picking up litter: An application of theory-based communication to influence tourist behavior in protected areas. *Journal of Sustainable Tourism*, *18*(7), 879-900.

Burgess, R. L., Clark, R. N., & Hendee, J. C. (1971). AN EXPERIMENTAL ANALYSIS OF ANTI-LITTER PROCEDURES 1. *Journal of Applied Behavior Analysis*, *4*(2), 71-75.

Cialdini, R. B. (2003). Crafting normative messages to protect the environment. *Current directions in psychological science*, *12*(4), 105-109.

Cialdini, R. B. (2007). Descriptive social norms as underappreciated sources of social control. *Psychometrika*, 72(2), 263-268.

Cialdini, R. B., Demaine, L. J., Sagarin, B. J., Barrett, D. W., Rhoads, K., & Winter, P. L. (2006). Managing social norms for persuasive impact. *Social influence, 1(*1), 3-15.

Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of personality and social psychology*, *58*(6), 1015.

Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of personality and social psychology*, *58*(6), 1015.

Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. Journal of personality and social psychology, 58(6), 1015.

Cingolani, A. M., Barberá, I., Renison, D., & Barri, F. R. (2016). Can persuasive and demonstrative messages to visitors reduce littering in river beaches?. *Waste management*, *58*, 34-40.

ContinueVakantieOnderzoek (CVO) van NBTC-NIPO, 2020 (but i cant find the report: cited from de Stentor https://www.destentor.nl/veluwe/veluwe-nog-meer-in-trek-bij-nederlanders-jaarlijks-twee-miljoen-vakanties~aaec4a5b/?referrer=https%3A%2F%2Fwww.google.com%2F).

Corraliza, J. A., & Berenguer, J. (2000). Environmental values, beliefs, and actions: A situational approach. *Environment and behavior*, *32*(6), 832-848.

Damerell, P., Howe, C., & Milner-Gulland, E. J. (2013). Child-orientated environmental education influences adult knowledge and household behavior. *Environmental Research Letters*, *8*(1), 015016.

De Groot, J. I., & Steg, L. (2008). Value orientations to explain beliefs related to environmental significant behavior: How to measure egoistic, altruistic, and biospheric value orientations. *Environment and Behavior*, *40*(3), 330-354.

De Groot, J. I., & Steg, L. (2009). Mean or green: which values can promote stable pro-environmental behavior?. *Conservation Letters*, *2*(2), 61-66.

De Kort, Y. A., McCalley, L. T., & Midden, C. J. (2008). Persuasive trash cans: Activation of littering norms by design. *Environment and Behavior*, *40*(6), 870-891.

Demarque, C., Charalambides, L., Hilton, D. J., & Waroquier, L. (2015). Nudging sustainable consumption: The use of descriptive norms to promote a minority behavior in a realistic online shopping environment. Journal of Environmental Psychology, 43, 166-174.

Douglas, M. (1966). Purity and Danger: an analysis of concepts of pollution and taboo. *London and New York: Routledge & Keagan Paul*.

Farrow, K., Grolleau, G., & Ibanez, L. (2017). Social norms and pro-environmental behavior: A review of the evidence. *Ecological Economics*, 140, 1-13.

Flurry, L. A., & Burns, A. C. (2005). Children's influence in purchase decisions: a social power theory approach. *Journal of Business Research*, *58*(5), 593-601.

Gusmerotti, N. M., Corsini, F., Testa, F., Borghini, A., & Iraldo, F. (2016). Predicting behaviors related to marine litter prevention: an empirical case based on junior high school students in Italy. *International Journal of Sustainable Society*, *8*(1), 1-21.

Hartley, B. L., Thompson, R. C., & Pahl, S. (2015). Marine litter education boosts children's understanding and self-reported actions. *Marine pollution bulletin*, *90*(1-2), 209-217.

Hobson, K. (2003). Thinking habits into action: the role of knowledge and process in questioning household consumption practices. Local environment, 8(1), 95-112.

IPCC. (2018). *Summary for Policymakers: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response*

to the threat of climate change, sustainable development, and efforts to eradicate poverty. Geneva: World Meteorological Organization.

Jorna, R. (2006). Sustainable innovation: The organisational, human and knowledge dimension. *Routledge*.

Kahn Jr, P. H., & Lourenço, O. (2002). Water, air, fire, and earth: A developmental study in Portugal of environmental moral reasoning. *Environment and Behavior*, *34*(4), 405-430.

Kahn, P. H. (1999). *The human relationship with nature: Development and culture*. MIT Press.

Karp, D. G. (1996). Values and their effect on pro-environmental behavior. *Environment and behavior*, *28*(1), 111-133.

Keizer, K., Lindenberg, S., & Steg, L. (2008). The spreading of disorder. *Science*, *322*(5908), 1681-1685.

Keizer, K., Lindenberg, S., & Steg, L. (2013). The importance of demonstratively restoring order. *PloS one*, *8*(6), e65137.

Knafo, A., & Galansky, N. (2008). The influence of children on their parents' values. *Social and personality psychology compass*, *2*(3), 1143-1161.

Krettenauer, T., & Victor, R. (2017). Why be moral? Moral identity motivation and age. *Developmental Psychology*, *53*(8), 1589–1596.

Lee, K. (2008). Opportunities for green marketing: young consumers. *Marketing intelligence & planning*.

Marion, J. L., & Reid, S. E. (2007). Minimising visitor impacts to protected areas: The efficacy of low impact education programmes. *Journal of sustainable tourism*, *15*(1), 5-27.

Martin, L., White, M. P., Hunt, A., Richardson, M., Pahl, S., & Burt, J. (2020). Nature contact, nature connectedness and associations with health, wellbeing and pro-environmental behaviors. *Journal of Environmental Psychology*, 68, 101389.

Matsekoleng, T. K., & Mapotse, T. A. (2018). Mitigate littering through action research activities: an action-oriented knowledge-based environmental study. Rethinking teaching and learning in the 21st Century.

Matthies, E., Selge, S., & Klöckner, C. A. (2012). The role of parental behavior for the development of behavior specific environmental norms–The example of recycling and re-use behavior. *Journal of Environmental Psychology*, *32*(3), 277–284.

Miller, J. D. (1975). The Development of Pre-Adult Attitudes Toward Environmental Conservation and Pollution. *School Science and Mathematics*, *75*(8), 729-737.

Reiter, S. M., & Samuel, W. (1980). Littering as a Function of Prior Litter and The Presence or Absence of Prohibitive Signs 1. Journal of Applied Social Psychology, 10(1), 45-55.

Reno, R. R., Cialdini, R. B., & Kallgren, C. A. (1993). The transsituational influence of social norms. *Journal of personality and social psychology*, *64*(1), 104.

Rodríguez-Rodríguez, D. (2012). Littering in protected areas: a conservation and management challenge–a case study from the Autonomous Region of Madrid, Spain. *Journal of Sustainable Tourism*, *20*(7), 1011-1024.

Ruepert, A., Keizer, K., Steg, L., Maricchiolo, F., Carrus, G., Dumitru, A., Mira, R. G., Stancu, A., & Moza, D. (2016). Environmental considerations in the organizational context:

A pathway to pro-environmental behavior at work. *Energy Research & Social Science*, 17, 59–70.

Santos, I. R., Friedrich, A. C., Wallner-Kersanach, M., & Fillmann, G. (2005). Influence of socio-economic characteristics of beach users on litter generation. *Ocean & Coastal Management, 48*(9-10), 742-752.

Schultz, P. W. (1999). Changing behavior with normative feedback interventions: A field experiment on curbside recycling. *Basic and applied social psychology, 21*(1), 25-36.

Schultz, P. W., Bator, R. J., Large, L. B., Bruni, C. M., & Tabanico, J. J. (2013). Littering in context: Personal and environmental predictors of littering behavior. *Environment and Behavior*, *45*(1), 35-59.

Schultz, P. W., Nolan, J. M., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2007). The constructive, destructive, and reconstructive power of social norms. *Psychological science*, *18*(5), 429-434.

Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. *Advances in experimental social psychology* (Vol. 25, pp. 1-65). Academic Press.

smart energy systems: Comparing the value-belief-norm theory and the value identity-personal norm model. *Energy Research & Social Science, 22*, 107–114.

Smith, J. R., Louis, W. R., Terry, D. J., Greenaway, K. H., Clarke, M. R., & Cheng, X. (2012). Congruent or conflicted? The impact of injunctive and descriptive norms on environmental intentions. *Journal of Environmental Psychology, 32*(4), 353-361.

Stern, P. C. (2000). New environmental theories: toward a coherent theory of environmentally significant behavior. *Journal of social issues*, *56*(3), 407-424.

Stuhmcke, S. M. (2012). Children as change agents for sustainability: An action research case study in a kindergarten (Doctoral dissertation, Queensland University of Technology).

Van der Ree, R., Heinze, D., McCarthy, M., & Mansergh, I. (2009). Wildlife tunnel enhances population viability. *Ecology and Society*, *14*(2).

Van der Werff, E., & Steg, L. (2016). The psychology of participation and interest in

Wilson, G., & Wood, K. (2004). The influence of children on parental purchases during supermarket shopping. *International journal of consumer studies*, *28*(4), 329-336.

Wolven in Nederland. (n.d.). Wolven in Nederland. Retrieved January 7, 2021, from https://www.wolveninnederland.nl/

Zeiske, N., Venhoeven, L., Steg, L., & van der Werff, E. (2020). The Normative Route to a Sustainable Future: Examining Children's Environmental Values, Identity and Personal Norms to Conserve Energy. *Environment and Behavior*, 0013916520950266.

8. Appendix

8.1 Debriefing form

rijksuniversiteit groningen / campus fryslân

Debriefing

Beste deelnemer,

Hartelijk bedankt voor je deelname aan het onderzoek!

Dit project is het scriptieonderzoek van Global Responsibility and Leadership studente Zarina Buckert van de Rijksuniversiteit Groningen. Het doel van dit project is na te gaan hoe we zwerfafval in de natuur kunnen verminderen. Tijdens de wandelroute hebben jullie informatie gekregen over zwerfafval, waarbij voornamelijk is gefocust op normen en waarden. Mijn veronderstelling was dat als kinderen onderwezen worden over zwerfafval, zij meer waarde zouden hechten aan de natuurlijke omgeving en dus minder afval in de natuur zouden gooien.

Om dit te testen hebben de kinderen die meedoen aan het onderzoek na afloop van de wandelroute een traktatie gekregen. Ik wilde nagaan of deze kinderen de verpakking hiervan in de afvalbak gooien of in de natuur. Ik verwacht dat ze na de wandelroute eerder geneigd zijn om het afval in de afvalbak te gooien.
Hierbij informeer ik u dat deze data gebruikt wordt voor een bachelorscriptie onderzoek, indien u hier niet mee akkoord gaat kunt u dit laten weten bij de startlocatie van de route.

Als u nog vragen hebt, kan je mij een e-mail sturen, z.a.buckert@student.rug.nl. Omdat het project nog tot eind deze week doordraait, willen we u vragen om niet met anderen te praten over het doel van de wandelroute, omdat dit het onderzoek gaat verstoren.

Nogmaals heel erg bedankt voor uw deelname!

Zarina Buckert, Campus Fryslân (Rijksuniversiteit Groningen)

z.a.buckert@student.rug.nl

8.2 Intervention Signs

HALLO! Welkom bij de Loenense Waterval!

Mijn naam is Daan en ik woon in dit prachtige gebied!
Er is alleen één probleempje…
Er ligt heel veel afval in de natuur, kun jij mij daarmee helpen?
Probeer zo veel mogelijk vragen goed te beantwoorden!

Zwerfafval is al het afval dat rondslingert op plekken waar het niet hoort, bijvoorbeeld op straat, in de berm, op het strand of in natuurparken.

Weet jij hoe veel zwerfafval er jaarlijks in de natuur terecht komt?

A. 5.000 kilo
B. 50.000 kilo
C. 500.000 kilo
D. 5.000.000 kilo

Antwoord C is juist. Dat is het gewicht van ongeveer 520 schoolklassen kinderen!

Het opruimen van zwerfafval heeft veel voordelen.

1. Je komt zelf in beweging en bent in de natuur, dit is natuurlijk hartstikke goed voor je!

2. Je helpt om de natuur schoon te houden, zo komt het afval bijvoorbeeld niet in het voedsel van dieren terecht.

3. Je kunt met vrienden afval op gaan rapen, hartstikke gezellig!

3. Het is super makkelijk! Bij de Jumbo Supermarkt in Eerbeek kun je drinkblikjes inleveren bij een speciale machine, je krijgt er dan wat geld voor terug.

Hoe lang duurt het voordat het volgende afval oplost/vergaat in de natuur? Verbind de letters aan een cijfer.

1. Bananen-schil
2. Sigaretten
3. Drinkflesjes

A. 2 tot 12 jaar
B. Oneindig
C. Ongeveer 1 jaar

1—C
2—A
3—B

Wist je dat je in Nederland een boete kunt krijgen van de politie wanneer je afval in de natuur gooit?
In sommige gemeentes krijg je ook nog een extra straf. Dan moet je afval rapen van de straat.

Daaraan kun je zien dat het niet goed is om afval op straat te gooi-en!

Hoe hoog is de boete die je kunt krijgen?

A. 50 euro

B. 90 euro

C. 140 euro

C. 140 Euro

Wist je dat er ook kunst gemaakt kan worden van afval?

Sommige kunstenaars zijn er heel beroemd mee geworden!

Tip! Misschien kun jij ook iets moois maken van afval in de vakantie, en er je spreekbeurt over doen.

Dit coole kunstwerk is gemaakt van plastic rietjes!

Sommige materialen die in de natuur terecht komen, vergaan nooit. Bijvoorbeeld plastic valt in hele kleine stukjes uit elkaar. Hierdoor zie je het niet meer, maar het gaat nooit meer weg. Dit komt in het voedsel van dieren terecht, waardoor ze ziek kunnen worden.

Ondanks hun naam hebben ook de edelherten veel last van al dat plastic. Hoe worden de edelherten ook wel genoemd?

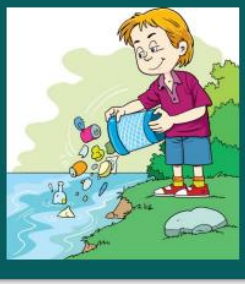
A.De prinsen van de Veluwe
B.De koningen van de Veluwe
C.De keizers van de Veluwe

Antwoord A is juist.

Vul in wat er op de puntjes moet staan.
Als iedere Nederlander elke dag … afval op zou rapen, is Neder-land super snel schoon!

A.1 stuk
B. 5 stukken
C. 7 stukken
D. 10 stukken

Het goede antwoord is A!



Wat kun je zelf doen om afval in de natuur te beperken?

1. Je kunt een herbruikbare drink-fles meenemen in plaats van plastic flesjes

2. Een goed idee is om een brood-trommel mee naar school te nemen in plaats van losse verpakkingen

3. Natuurlijk is het ook belangrijk om je afval in de prullenbakken te gooien, en niet in de natuur!

Wil je ons helpen, heb jij nog goede ideeën? Schrijf ze hier op!

Je bent aan het einde van de route gekomen! Goed gedaan! Ik hoop dat je veel plezier hebt gehad en geleerd hebt over afval in de natuur. Bij de start van de route kun je nu iets lekkers ophalen als beloning. Misschien tot de volgende keer!