

Experiencing wild or domesticated nature: effects on children's connection to nature and environmental stewardship

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"If we are going to save environmentalism and the environment, we must also save an endangered indicator species: the child in nature."

- Richard Louv in *Last Child in the Woods*, p. 158.

Preface

Ever since I came across the book 'Last child in the woods' written by Richard Louv, the challenge of reconnecting children with nature for their own sake as well as for the earth's sake has been on my mind. The question Richard Louv asks himself when he wrote "... *where the future stewards of the earth will come from*" is one that worries me. To ensure that future children will also experience the joy, wonder and healing of nature and to raise the future stewards of the earth, I have become very motivated to dig deeper in the world of environmental education. I was lucky with growing up with nature right around the corner, but not all of today's children have the opportunity to explore and enjoy nature like this. Eventually, I hope every child will have the chance to explore nature, to discover its beauty and calmness and to bond with it. And then will want to become a steward of this earth.

When I once cycled home and saw a Struin bike full of children in my hometown Nijmegen, I knew I had found something special. I had already heard about the forest preschools in other countries and was excited to learn more about these concepts in the Netherlands. This has motivated me to explore how these outside childcare centres here in the Netherlands contribute to children's connection to nature.

This research would not have been possible without a lot of people. First of all I would like to thank all the wonderful people of BSO Struin and BSO Wijs. Thank you for letting me join you on your nature experiences and for never getting tired of all my questions. Also, a lot of thanks goes to all the parents and children who participated in this research. I enjoyed talking to each of the children and I have learned so much from them. I would also like to thank my supervisors, Anne and Birgit. Anne, thank you for helping me with finding my passion and giving me the courage to pursue it. This research would not have existed without you. Birgit, thank you for all your support during the analysis of the data and writing of the report. Our discussions helped me make sense of it all again and I am grateful that you motivated me to keep going and create something worthy. Last, but not least, I would like to thank my wonderful husband. Dear Jop, thank you for always making sure I had enough tea and chocolate when I needed it. I could not have done this without your support.

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Anouk Schouten-van der Laan

Abstract

Children these days have less and less direct contact with nature. Apart from having benefits on health and development, nature experiences during childhood are also thought to promote adult environmentalism. Reconnecting children with nature therefore is important for the future of this earth. To bring children in contact with nature again, outdoor- or nature after school childcare centres take children to parks or nature areas in and around the city. Here they will stay the whole afternoon regardless of the weather. The aim of this research is to investigate whether children's connection to nature and environmental stewardship differs when they experience *wild nature* (e.g. forests outside the city) or when they experience *domesticated nature* (e.g. parks within the city). A case study of two afterschool childcare centres is done. Childcare centre Struin represents nature experiences in wild nature and childcare centre Wijs represents nature experiences in domesticated nature. Several quantitative and qualitative methods are used to investigate the children's play locations, activities, connection to nature, environmental stewardship and several other possible influential factors. Methods included observations, individual interviews with children and a questionnaire for parents.

The results show that natural environmental features at the Struin play locations are of better quality (i.e. more abundant, varied, of different sizes and changeable) than natural environmental features at Wijs. Struin locations mostly do not contain any non-natural environmental features, whereas Wijs locations mostly do. Especially playground equipment is seen a lot at Wijs and almost never at Struin. Therefore, environmental features at Struin mostly only afford activities with nature, whereas environmental features at Wijs afford for both activities with and without nature. At Wijs, a lot of activities are observed without nature, thus indirect nature experiences. The amount of direct experiences (i.e. activities with nature) seems to depend on the naturalness of the play location and the available playsets. Often more activities with nature are afforded than observed. At Struin, observed activities are mostly with nature, thus direct nature experiences.

Most children at both childcare centres seem well connected to nature. However, Struin children appear to be slightly more connected to nature than Wijs children. Struin children more often feel comfortable in nature and only occasionally show fear or aversion to dirt, dangers and bugs. They also show more empathy for nature and knowledge about environmental issues.

Children show a limited knowledge of environmental stewardship behaviours and only mention a limited amount of behaviours they sometimes do themselves. Only a few Struin children are slightly aware of the influences their daily behaviours can have on nature.

Parents seem to influence environmental stewardship more than connection to nature. Staff that guides the children might also be seen as influential adults. The Struin staff helps the children to focus their attention on nature and teaches them about nature. Wijs staff does not do this or does it less. Therefore, guiding the children in their nature experiences, by focussing their attention on nature and teach them about nature, might also positively influence connection to nature.

The fact that children at both childcare centres seem to be connected to nature suggest that experiences in wild nature as well as experiences in domesticated nature can positively influence connection to nature. However, children that visit wild nature appear more connected to nature. This suggests that play locations with a lot of good quality natural environmental features have a bigger influence on connection to nature. Also, Struin children had more direct experiences with nature. Therefore, direct experiences with nature likely influence connection to nature more than indirect nature experiences.

When trying to reconnect children to nature, the aim should therefore be to focus on play locations that contain a lot of different high quality environmental features and encourage children to have direct experiences with nature. Non-natural features are preferably avoided, as they distract children from having direct experiences with nature.

Samenvatting

Kinderen van nu hebben steeds minder direct contact met natuur. Naast allerlei positieve effecten op gezondheid en ontwikkeling wordt ook gedacht dat natuurervaringen tijdens de kindertijd natuurvriendelijk gedrag op latere leeftijd kan promoten. Kinderen weer in contact brengen met natuur is daarom belangrijk voor de toekomst van deze aarde. Om kinderen weer in contact met natuur te brengen nemen natuur buitenschoolse opvang kinderen mee naar natuurlijke plekken binnen en buiten de stad. Hier blijven ze de hele middag, ongeacht het weer. Het doel van dit onderzoek is om te ontdekken of de verbondenheid van kinderen met natuur en hun milieurentmeesterschap verschilt als ze ervaringen hebben in de *wilde natuur* (zoals bossen buiten de stad) of in de *tamme natuur* (zoals parken in de stad). Er is een casestudie van twee buitenschoolse opvang gedaan. BSO Struin vertegenwoordigt ervaringen in wilde natuur en BSO Wijs vertegenwoordigt ervaringen in tamme natuur. Verschillende kwantitatieve en kwalitatieve methodes zijn gebruikt om inzicht te krijgen in speellocaties, activiteiten, verbondenheid met natuur, milieurentmeesterschap en een aantal andere factoren die mogelijk invloed hebben. De methoden bestaan uit observaties, individuele interviews met kinderen en een vragenlijst voor ouders.

De resultaten laten zien dat natuurlijke 'omgevingskenmerken' van de Struin locaties van betere kwaliteit zijn (d.w.z. overvloedig aanwezig, gevarieerd, met verschillende groottes, en veranderlijk) dan omgevingskenmerken bij Wijs. Struin locaties hebben meestal geen niet-natuurlijke omgevingskenmerken, terwijl Wijs locaties dat vaak wel hebben. Daarom zijn bij Struin vooral activiteiten met natuur mogelijk, terwijl bij Wijs zowel activiteiten met als zonder natuur mogelijk zijn. Bij Wijs werden veel activiteiten zonder natuur geobserveerd, dus indirecte natuurervaringen. Het aantal directe natuurervaringen (d.w.z. activiteiten met natuur) leek af te hangen van de natuurlijkheid van de omgeving en het aantal aanwezige speeltoestellen. Vaak waren er meer activiteiten met natuur mogelijk dan er werden geobserveerd. Bij Struin zijn de geobserveerde activiteiten bijna altijd met natuur, dus directe natuurervaringen.

De meeste kinderen van beide BSO's lijken verbonden te zijn met de natuur. Echter, Struin kinderen lijken meer verbonden te zijn met natuur dan Wijs kinderen. Struin kinderen voelen zich vaak op hun gemak in de natuur en laten maar af en toe een angst of aversie voor viezigheid, gevaar of beestjes zien. Ze laten ook meer empathie voor natuur zien en weten meer over milieukwesties.

De kinderen lieten maar een beperkte kennis van milieurentmeesterschap gedragingen zien en noemden maar een beperkte hoeveelheid gedragingen die ze zelf weleens deden. Alleen een paar Struin kinderen waren zich deels bewust van de invloed van hun eigen dagelijkse gedragingen op natuur.

Ouders lijken milieurentmeesterschap meer te beïnvloeden dan verbondenheid met natuur. De leiding van de BSO zou ook gezien kunnen worden als invloedrijke volwassenen. De leiding van Struin helpt de kinderen hun aandacht te focussen op natuur en leert ze dingen over natuur. Bij Wijs gebeurt dit minder of niet. Daarom zou het begeleiden van kinderen in hun natuurervaringen, door het focussen van hun aandacht op natuur en het aanleren van dingen over natuur, ook een positief effect kunnen hebben op de verbondenheid met natuur.

Het feit dat kinderen van beide BSO's verbonden lijken te zijn met natuur suggereert dat ervaringen in zowel wilde als tamme natuur een positief effect kunnen hebben op verbondenheid met natuur. Echter, kinderen die de wilde natuur bezoeken lijken meer verbonden met natuur. Dit suggereert dat speellocaties met veel omgevingskenmerken van goede kwaliteit een grotere invloed hebben op verbondenheid met natuur. Daarnaast hadden Struin kinderen meer directe ervaringen met natuur. Het lijkt daarom aannemelijk dat directe ervaringen in de natuur een grotere invloed hebben op verbondenheid met natuur dan indirecte natuurervaringen.

Inspanningen om kinderen weer met natuur te verbinden zouden zich daarom moeten focussen op speellocaties die een groot aantal natuurlijke omgevingskenmerken van hoge kwaliteit bevatten en kinderen aanmoedigen directe ervaringen met natuur te hebben. Niet-natuurlijke omgevingskenmerken zouden vermeden moeten worden, omdat ze kinderen afleiden van het hebben van directe natuurervaringen.

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Chapter 1. Introduction

1.1 Problem statement

With the rise of urbanization and entertainment through screens came the decrease of children in nature. The increasing lure of screens, the scarcity of nearby nature and the increased parental fear of strangers have created a gap between the young and nature (Louv, 2005). The lack of personal experiences in nature, by some referred to as the “extinction of experience”, is often associated with indifference and disaffection towards nature (Miller, 2005). As environmentalism is often traced back to memorable childhood experiences in nature (Chawla, 1998, 2007), one may wonder what would happen if children do not have those experiences anymore. The disconnection between children and the natural world has left author Richard Louv, and many more with him, to wonder where the future stewards of this earth will come from (Louv, 2005). When today’s children grow up, will they want to care for something they do not know? Will they want to protect something they do not love and appreciate?

With the term nature-deficit-disorder, Louv (2005) links the decrease in contact with nature to the increase in mental and physical health problems. More and more studies show the effects nature can have on adults and children. It can improve children’s physical health (Lachowycz & Jones, 2011; Söderström et al., 2013), mental health (Flouri, Midouhas, & Joshi, 2014; Wells & Evans, 2003) and cognitive functions (Taylor & Kuo, 2008; Taylor, Kuo, & Sullivan, 2002; Wells, 2000; Wu et al., 2014) and in natural playgrounds, children play more creative and varied (van den Berg, Koenis, & van den Berg, 2007). Apart from being beneficial for a healthy development, contact with nature at a young age may also result in more interest in nature friendly behaviours later on in life (Chawla, 1999; Cheng & Monroe, 2012; Wells & Lekies, 2006). Greener children may become greener adults (Chawla, 1999), and greener adults may want to care about nature and biodiversity loss again (Miller, 2005).

In several countries, outdoor-based day-care centres and preschools are attempting to reconnect children with nature. These outdoor-based day-care centres and preschools seem to have originated in Germany and Denmark (Borge, Nordhagen, & Lie, 2003). They go by different names, e.g. outdoor day-care, forest day-care, forest kindergartens and nature preschools. These centres differentiate themselves from traditional childcare by staying outdoors every day for several hours, irrespective of the weather. This movement has increased rapidly in Scandinavia, presumably also because of the easy access to natural areas (Borge et al., 2003). Fjørtoft & Sageie (2000) found that the forest site used by a Norwegian kindergarten contained qualities needed for versatile play. Playing in this varied and stimulating environment resulted in the development of better motor skills (Fjørtoft & Sageie, 2000). The rules and routines of these preschools often allow the children a lot of trust, by letting them engage in risky play and handle dangerous tools, like pocketknives (Lysklett & Berger, 2016). These characteristics of childcare in nature are probably positively influencing the children’s development.

In the Netherlands, a current trend in trying to reconnect children with nature is the greening of after-school childcare. These organisations pick primary school children up after school and take care of them till their parents return from work. Traditional childcare centres take children to an inside location where they can play and usually have access to a (small) yard. Green after-school childcare however, invest in child-nature relations by giving children access to large, green yards where children are free to play with and discover nature. Some cases, however, are similar to the outdoor-based day-care centres in Germany and Scandinavia and take children to parks or nature areas in and around the city. Here they will stay the whole afternoon throughout the whole year. They do have access to an inside location, but this is mostly only used during extreme weather conditions. These outdoor-based childcare centres differ in the type of nature they bring the children to. Some of them take children to parks in the city, providing experiences in *domesticated nature*. An extreme form is taking children to nature areas outside the city, where they can experience *wild nature*.

Bixler et al. (Bixler, Floyd, & Hammitt, 2002) investigated the effect of childhood nature experiences in wild or domesticated nature on adolescent's preferences for work, recreation and education. Their study therefore suggests that different types of nature influence later interest in the environment differently. Wells & Lekies (2006) investigated the effect of childhood nature experiences in wild or domesticated nature on adult environmentalism. They found that both domesticated nature, such as picking flowers or produce, and wild nature, such as hiking or playing in the woods, had a positive effect on adult environmental attitudes. However, wild nature experiences seemed to be more related to adult environmental behaviours than domesticated nature experiences. Giusti, Barthel, & Marcus (2014) suggest that preschools with more routine urban nature experiences correlate with children that are more connected to nature than children from preschools with few nature experiences. Even though his research design does not allow him to conclusively say something about the difference between each nature experience (Giusti et al., 2014), Matteo Giusti suggests that wild and rural environments have a great influence on children's connection to nature and that *"the effect of such natural environments cannot be substituted with the creation of parks or recreational areas"* (Giusti, 2012, p. 52).

This raises the question whether there is a difference in engaging children in *wild* or *domesticated* nature. Is there an added value of taking the children to wild nature outside the city, or is domesticated nature in urban parks enough to connect children to nature? The type of nature children experience may influence children's connection to nature and environmental stewardship behaviours. This can eventually influence their attitudes and behaviours as an adult. This study aims at further investigating the proposition of Giusti (2012) that parks and recreational areas cannot substitute the benefits of experiencing wild nature outside the cities.

1.2 Research objective

This study explores the possible effects of type of nature on children's connection to nature and environmental stewardship. The objective of this research is to contribute to the knowledge about different effects of wild and domesticated nature and to future efforts aimed at reconnecting children to nature. This will be done by finding out whether there is a difference in connection to nature and environmental stewardship between children who regularly experience domesticated nature, like parks in the city, and children who regularly experience wild nature, like forests and floodplains outside the city.

Only a limited number of studies has been done at investigating the different effects of domesticated and wild nature (Bixler et al., 2002; Giusti, 2012; Wells & Lekies, 2006). However, none of these has directly researched the differences between experiencing wild or domesticated nature and how this might be related to possible differences in connection to nature and environmental stewardship. The current research will therefore fill a knowledge gap in the literature.

Knowing whether different types of nature influence connection to nature and environmental stewardship differently can be valuable information for after-school childcare centres that aim at reconnecting children with nature. Current green childcare centres as well as childcare centres that want to go green can benefit from this information by deciding which type of nature to focus on. This is also valuable information for municipalities or others responsible for designing green areas in and around the city.

The research questions that will be answered in this study are given in chapter 2.6, after the explanation of the main concepts and theories.

1.3 Outline

The concept and theories used in this research are explained in Chapter 2. This chapter also includes a conceptual framework and ends with the research questions. Chapter 3 explains the research methodology used. The results are presented in Chapter 4 (nature experiences) and Chapter 5 (connection to nature and environmental stewardship) and a synthesis of these results is presented in Chapter 6. The results and methods are discussed in Chapter 7 and the main conclusions and recommendations are given in Chapter 8.

Chapter 2. Theoretical framework

Different concepts and theories are used to understand the relation between children's nature experiences and their connection to nature and environmental stewardship. This chapter will elaborate on these concepts and theories.

2.1 Connection to nature

Adults have long been the subject of research on connection to nature. Several quantitative scales have been developed in an attempt to measure this concept, differing in focus from unidimensional cognitive or affective to multidimensional, including both and sometimes more dimensions (Tam, 2013). Affective affinity refers to positive feelings about nature, like love for nature and feeling good, free and safe in nature (Kals, Schumacher, & Montada, 1999). According to Kellert (2002), cognitive refers to thinking and problem-solving skills and affective to emotional and feeling capacities. One of the first measures to acknowledge the importance of emotional affinity has been the Emotional Affinity Towards Nature Scale developed by Kals et al. (1999). It emphasizes the emotional connection, like love for nature and a feeling of oneness with nature, and is, therefore, unidimensional. The 16-item scale measures, among others, feelings of freedom, feelings of safety and feeling good in nature. Another unidimensional affective measure is the Connectedness to Nature Scale developed by Mayer & Frantz (2004). Connectedness to nature is about feeling affectively connected and belonging to nature and can be measured with a 14-item scale. Schultz (2001, 2002) developed a cognitive measure called Inclusion of Nature in Self. It is based on the extent to which people include nature into their self-concept and can be measured with a single graphical measure. Another unidimensional concept is Commitment to Nature, developed by Davis, Green, & Reed (2009). It draws on the interdependence theory (Rusbult, 1980 as cited in Tam, 2013) to measure relationship commitment. They propose that as humans depend on nature, they are also committed to nature, meaning a psychological attachment and long-term orientation toward nature. This concept can be measured using an 11-item scale. The Nature Relatedness Scale was developed by Nisbet, Zelenski, & Murphy (2009). It is a multidimensional scale, comprising of three aspects of individual's connection to nature: affective, cognitive and experiential. It measures nature relatedness, which is a construct that describes individual levels of connection to nature. It focusses on our interconnectedness with nature and our appreciation for and understanding of this. The scale captures people's identification with nature, their nature-related worldviews, their familiarity with nature, their comfort with nature and their desire to be in nature (Nisbet et al., 2009; Tam, 2013). A short version of this scale, the NR-6, was developed later for use when time is limited (Nisbet & Zelenski, 2013).

Few quantitative scales have explicitly been designed for use by children. A problem with these measures, may be that they lack the depth of fully depicting children's connection to nature, as children's vocabulary does not allow for the nuances that are used in the measures developed for adults. The Connection to Nature Index developed by Cheng & Monroe (2012) was designed especially for children and measures their affective attitude towards nature. However, it appears to have a cognitive component as well (e.g. *"people cannot live without plants and animals"*). The index consists of four different dimensions, namely enjoyment of nature, empathy for creatures, sense of oneness and sense of responsibility. The Connection to Nature Index is measured with a 16-item scale appropriate and tested for use by 8-12 year old children (Bragg, Wood, Barton, & Pretty, 2013; Cheng & Monroe, 2012). For a Dutch study, De Vries, Langers, Donders, Willeboer, & van den Berg (2013) developed a measure to assess children's attitude towards nature before and after their schoolyard was transformed to a more natural one. Their measure consists of 6 dimensions of which some were based on the Disgust Sensitivity scale (Bixler & Floyd, 1999; Bixler et al., 2002). The dimensions included in the measure are fear for nature, dare in nature, nature is awful, nature is dirty, nature is fun and nature is pathetic. It measures comfort in nature, joy and empathy. Giusti, Barthel, & Marcus (2015) developed an image-based measure that non-verbally evaluates 5-year old children's affinity with the biosphere. Two dimensions of connection to nature were measured, namely emotional affinity and cognitive affinity. A third dimension, attitudinal affinity, was defined

to qualitatively explore children's desire to play in nature. Emotional affinity included the "*capacity for emotional perspective-taking and empathic concern for nature*" (Giusti et al., 2014, p. 21). Cognitive affinity included children's awareness of the "*ecological resources required for human sustenance*" and "*their ability to recognize the negative impact that pollution has on ecosystems and the biosphere*" (Giusti et al., 2014, p. 22).

In his review on the different connection to nature measurement methods, Tam (2013) showed that multidimensional concepts were consistently better at describing a person's connection to nature. This suggests that connection to nature is more something multidimensional than it is unidimensional cognitive or affective. Therefore, the current research will approach connection to nature as something multidimensional, consisting of a cognitive element, focussing on knowledge and interest, and an affective element, focussing on emotions and feelings toward nature.

After identifying the main themes of the concepts of connection to nature discussed above, several overarching themes were identified by looking for similarities between the different concepts. Themes that are mentioned by several concepts, are comfort, joy, empathy, oneness, knowledge and interdependence. The themes were then ordered into three main dimensions, two mainly affective, namely 'feeling in nature' and 'feelings about nature', and one mainly cognitive, namely 'knowledge and awareness'. Feelings about nature and knowledge and awareness are grouped into human-nature relationships. Indicators for the six themes were identified by careful investigation of the content of the measures corresponding with the above-mentioned concepts. Items were selected on appropriateness for 7-10-year-old children and validity, i.e. if they were considered good representations of the themes. In this study, connection to nature is understood to be the cognitive and affective bond children have with nature, which can be expressed in feelings in nature, feelings about nature and knowledge and awareness of nature.

Feelings in nature

This affective dimensions comprises of the feelings a child can have when being in nature. Two themes can be distinguished: comfort and joy. Comfort refers to the extent to which a child feels comfortable in nature. Children that are more connected to nature, will show less fear of, for example, insects and stinging nettles (de Vries et al., 2013). Enjoying spending time in nature and feeling happy and peaceful in nature are other characteristics that have been used before in other measures (Cheng & Monroe, 2012; Nisbet et al., 2009).

Feelings about nature

The second affective dimension includes two themes: empathy for creatures and a feeling of oneness. This dimension is about the feelings children can have about nature. Empathy for creatures describes an ability to empathize with non-human life. Children that are more connected to nature, will probably feel more empathy towards non-human life (Cheng & Monroe, 2012; Giusti et al., 2014). They will, for example, feel sad when animals are hurt (Cheng & Monroe, 2012) and find it sad to destroy the shell of a snail or to pull the legs off a spider (de Vries et al., 2013). A feeling of oneness describes the feeling that humans are part of the natural world (Cheng & Monroe, 2012; Kals et al., 1999; Mayer & Frantz, 2004; Nisbet et al., 2009; Schultz, 2002).

Knowledge and awareness

This cognitive dimension is about knowing what can harm and help nature and awareness of nature's importance. It includes two themes: knowledge of good and bad and realizing interdependence. Children who are more connected to nature, probably know more about what can help nature and what can harm nature. For example, knowing that pollution can harm nature and that picking up litter can help nature (Cheng & Monroe, 2012; Giusti et al., 2014). Being aware of the human-nature interdependence includes, for example, knowing that humans cannot live without plants and animals (Cheng & Monroe, 2012; Davis et al., 2009). It can also include acknowledging the rights of animals and plants and not placing humans above them (Nisbet et al., 2009).

Several factors can influence connection to nature. Direct experiences in nature are often seen as most influential in connecting children to nature (Chawla, 1999, 2007; Cheng & Monroe, 2012;

Kellert, 2002; Louv, 2005; Wells & Lekies, 2006). Almost as important are adult role models, especially close family members (Chawla, 1999, 2007; Cheng & Monroe, 2012). These adults are not only important as role models, showing appreciative attention to the natural world, but also because they have the power to decide where a child can and cannot play and can motivate children to engage in natural activities or not (Chawla, 2007). Cheng & Monroe (2012) identified four possible predictors of connection to nature. They showed a correlation between connection to nature and family values towards nature, previous experiences in nature, knowledge about nature and nature near home.

In this research, influential adults (e.g. parents), experiences with nature and nature near home are considered influential factors. Knowledge about nature, which was defined as an influential factor by Cheng & Monroe (2012), is already included in the dimensions of connection to nature and will therefore not be treated as a separate influential factor. Influential adults are mostly parents. However, they can also be the staff of the childcare centres, as these adults also regularly spend time with the children and can also be role models to some children. Experiences with nature include the experiences children have with nature at the childcare centre as well as the experiences with nature during free play after school, family time in nature and lessons at school. Nature near home is a special kind of nature experience, which greatly influences the child's daily contact with nature. Children can, for example, differ in whether their homes have a garden and whether there is nature in their streets.

2.2 Environmental stewardship

According to the Oxford Dictionary, stewardship is "*The job of supervising or taking care of something, such as an organization or property.*" (Oxford Dictionaries, 2017). Environmental stewardship, therefore is the job of supervising or taking care of the environment, the earth. Pro-environmentalism, or environmental stewardship as it will be called in this research, is often split into different components. Scholars, for example, studied environmental attitudes and behaviours (Collado, Corraliza, Staats, & Ruiz, 2015), environmental attitudes and willingness to conserve biodiversity (Soga, Gaston, Yamaura, Kurisu, & Hanaki, 2016), attitudes and behaviour (Evans et al., 2007), knowledge and attitudes (Mulder, Schacht, Caro, Schacht, & Caro, 2009), only behaviours (Andrejewski, Mowen, & Kerstetter, 2011; Richardson, Sheffield, Harvey, & Petronzi, 2015) or only attitudes (Ewert, Place, & Sibthorp, 2005). Therefore, environmental stewardship seems to be more than just showing pro-environmental behaviours.

The New Ecological Paradigm Scale (NEP, previously New Environmental Paradigm) is the most common used instrument for assessing adult's environmental attitudes or worldviews (Dunlap, Liere, Mertig, & Jones, 2000). The scale consists of 15 items and covers several subjects, such as limits to growth, balance of nature, human domination and belief in an ecological catastrophe. Several years later, a NEP scale appropriate for 10-12 year old children was developed (Manoli, Johnson, & Dunlap, 2007). After rephrasing the original NEP and testing this new scale, the final version consisted of 10 items discussing subjects such as rights of nature, eco-crisis and human exceptionalism.

Environmental behaviours are influenced by different things and what shapes them is complex (Kollmuss & Agyeman, 2002). Merely knowing or even agreeing something is harmful for the environment is not a guarantee for pro-environmental behaviours. This has also been observed in children (Evans et al., 2007). Connection to nature and experiences in nature during childhood have often been linked to pro-environmental attitudes and behaviours, mostly as adults (Chawla, 1999; Cheng & Monroe, 2012; Mayer & Frantz, 2004; Nisbet et al., 2009; Wells & Lekies, 2006). Especially an emotional bond with nature appears to be an important motivation (Kals et al., 1999; Schultz, 2000). Dorm residents with a higher Connectedness to Nature score (Mayer & Frantz, 2004) used less electricity compared to residents with a lower score, suggesting that an emotional connection is a powerful predictor of pro-environmental behaviours (Frantz & Mayer, 2014). Andrejewski, Mowen, & Kerstetter (2011) measured children's willingness to engage in environmental-friendly behaviours during the previous week. For example, turning off lights, recycling, conserving water, picking up litter and talking about the environment. The results of their study suggest that connection to nature is a partial mediator of the influence of spending time in nature on environmental stewardship behaviours.

In this research, connection to nature includes several elements that can also be found in pro-environmental attitude and knowledge measures (e.g. human dominance over nature, knowledge of the effects of pollution). It is therefore likely that the knowledge component of connection to nature ("knowledge and awareness") is necessary for and will positively influence showing pro-environmental behaviours.

This research will mainly focus on the children's awareness of their own influence, knowledge about what pro-environmental behaviours are and which pro-environmental behaviours they show themselves. Environmental stewardship is therefore understood to be knowing how to take care of the environment, as well as actually taking care of the environment through pro-environmental behaviours.

2.3 Environmental features and affordances

Wild or domesticated nature areas differ in their appearance and in the possibilities for activities they offer the children. However, defining what is 'wild' nature and what is 'domesticated' nature is not straightforward. Especially in the Netherlands, former and current human interventions helped shape the natural environments in and outside cities. Therefore, this study acknowledges that "natural" includes a certain amount of human influence through, for example, (recreational) use or management. This is also the reason that differentiating between 'wild' and 'domesticated' nature is difficult, as most domesticated nature still has wild elements and most wild nature is influenced, and to a certain extent shaped, by past and present human activities. *Wild nature* will be defined as nature that functions (mostly) without human influence and is largely unplanned and unstructured by humans. This kind of nature is mostly found outside cities, for example forests, floodplains and heathlands. Here natural processes are still visible and free to take its course. *Domesticated nature* will be defined as nature that is strongly under human influence. It is mostly planned and structured to fit human use. This kind of nature is mostly found within cities, for example urban parks, meadows and gardens. However, these definitions are not that black and white. Within domesticated natural areas in cities there may be patches of wilder nature that are not intensely managed. Therefore, discriminating between wild and domesticated nature is more nuanced than a true black and white difference.

To help describe these nuanced differences between wild and domesticated nature, the concept of the ten outdoor classes of Lerstrup (hereafter environmental features) was chosen (Lerstrup & Konijnendijk van den Bosch, 2017). They defined which environmental features were present at forest sites visited by Danish preschools and identified ten classes of environmental features: 1) open ground, 2) sloping terrain, 3) shielded places, 4) rigid fixtures, 5) moving fixtures, 6) loose objects, 7) loose material, 8) water, 9) creatures and 10) fire. Variation, size, change and abundance were important in describing the quality of the environmental features (Lerstrup & Konijnendijk van den Bosch, 2017). Variation within the environmental features made it more attractive, for example different kinds of trees instead of only standing trees and diverse loose objects instead of only one kind. Features in different sizes offer possibilities for children of different ages and with different skills. Therefore, elements should be present in different sizes. Environmental features were appreciated more if they were able to change, for example when new elements were created as a result of rain, like mud, and with seasonal changes in the abundance of (small) creatures and vegetation. Lastly, affording features should be available for all children and should therefore be present abundantly. Wilder natural areas are thought to score better on variation, size, change and abundance than more domesticated natural areas and thus have natural environmental features of a higher quality.

Different environmental characteristics offer different possibilities for nature activities. To understand the possibilities for activities at play locations of each childcare centre, the concept of *Affordances* developed by Gibson (Gibson, 1979) will be used. The affordances of the environment are possibilities of action available for the child. For example, climb-on-able objects or walk-on-able surfaces. Whether certain environments afford something depends not only on the feature, but also on the child itself, e.g. its age, interests and skills (Gibson, 1979; Lerstrup & Refshauge, 2016).

Possibilities for activities at a certain location are determined by the affordances the environmental features offer. Based on the concept of affordances developed by Gibson (Gibson, 1979) and on observations and informal interviews with children and teachers, Lerstrup & Konijnendijk van den Bosch (2017) identified key activities for each environmental feature. These key activities were unique for the corresponding environmental feature. Other activities, however, are afforded by multiple environmental features or can be done with a combination of features. For example, loose objects and rigid fixtures may together afford the activity building huts. Therefore, activities within the features are not exclusive and sometimes rely on multiple features. An important note to make is that even though environmental features afford for certain activities, this does not always mean children do these activities. To discover all activities the environment affords, time and freedom for exploration is needed, as well as introduction by peers or teachers (Lerstrup & Konijnendijk van den Bosch, 2017).

All environmental features can be found in either natural areas and playgrounds. Features that can be found in natural areas, like forests, are often mimicked in playgrounds, for example slides as sloping terrain (Lerstrup & Konijnendijk van den Bosch, 2017). However, this study is interested in the nature experiences children can have at certain locations and how these differ between childcare centres. To enable a comparison of these nature experiences, this study refers to the environmental features as natural elements only and not man-made elements. Three new environmental features were included to meet the need for features that described non-natural locations: indoors, street and playground equipment. The following section will briefly describe the 13 classes of environmental features, based on descriptions given by Lerstrup & Konijnendijk van den Bosch (2017).

Open ground describes a class containing natural open surfaces. These surfaces can be smooth as well as less smooth and flat as well as slightly sloping. Sloping terrain can be found in ditches as well as (sandy) hills. Shielded places can be structures made by the children, e.g. huts, or places fully or partly enclosed by natural elements like vegetation. Rigid fixtures refer to stable objects that might be moved on, for example trees. Moving fixtures are objects the children can move with or within, for example branches of trees. Loose objects describe a class with a diverse composition of elements. It refers to objects that can be picked up, carried or gathered. Loose materials include mouldable, loose material, like soil, mud and snow. Water refers to permanent bodies of water, like ponds and rivers, but also to temporary puddles of water, for example resulting from rain. Creatures are a special kind of loose objects, which are not present permanently but come and go as they please. Creatures do, however, provide special activities and were therefore classified as a separate class. Fire is also a special class that is not present permanently. Additionally, it has to be supervised by staff. Indoors is a new class and is not so much an environmental feature but more a cluster of all inside locations that were available for the children during their afternoons at the childcare centre. This class was added to meet the demand of indicating whether children had the possibility to withdraw to an inside location or not. Street is also a new class and is the non-natural equivalent of open ground. The last new class is playground equipment, which is the non-natural equivalent of rigid fixtures (e.g. monkey bars), moving fixtures (e.g. swing) and sloping terrain (e.g. slides).

2.4 Direct and indirect nature experiences

Different types of nature might afford for different experiences in nature. Several scholars argue that an experience can be indirect as well as direct. In general, for example, a direct experience would be tasting a new food, whereas the indirect equivalent would be only reading about it (Millar & Millar, 1996). In environmental education specifically, a direct nature experience would be participating in nature-based activities and an indirect experience would be reading about, talking about and learning about nature and watching nature on screens, but without actual contact (Duerden & Witt, 2010; Soga et al., 2016).

Stephan Kellert (2002) elaborated on these different types of nature experiences and distinguished three kinds of experiences of nature, namely direct, indirect and vicarious (or symbolic) experiences. According to him, *direct experiences* include actual physical contact with natural elements and non-human species that are largely independent of human intervention and control, even though they might be influenced by human manipulation and activity (Kellert, 2002). These

experiences are mostly unplanned instead of organized and can, therefore, be seen as spontaneous play or activity. Examples are activities in backyards, forests, creeks and neighbourhood parks. *Indirect experiences* also include actual physical contact with nature, but mostly in a more planned or programmed setting (Kellert, 2002). Nature, in this case, is usually the result of human manipulations and control, like domesticated animals, plants, and habitats. Locations can, for example, be zoos, botanical gardens, natural history and science museums and flower and vegetable gardens. Domesticated animals and plants, like pets and potted plants, are also an indirect experience. *Vicarious or symbolic experiences* are the type of experiences that do not involve actual physical contact with nature (Kellert, 2002). This can be a representation of nature through television, film, computers, books and magazines. These representations can either be realistic or symbolic.

In the definition of Kellert there seem to be two components that determine whether an experience is direct or indirect: the context of the interaction with nature and the location the experience takes place. The interaction can be free and unstructured, or more restricted and structured. Direct experiences occur in natural areas that are largely independent of human control, and indirect experiences occur in natural elements that are usually the result of human manipulation. The direct and indirect experiences as used by Duerden & Witt (2010) and Millar & Millar (1996) seem to rather depend on one component: the type of interaction with nature. Whether nature is experienced through senses and direct contact determines whether the experience is direct or not.

In this research, the aim of differentiating between types of nature experiences is to determine the role nature plays in the children's activities at the play locations of the childcare centres. As the location in which the experience takes place will already be described by the environmental features, the description of the type of nature experience does not have to include this. Therefore, the definition of a direct and indirect nature experience in this research will only consist of one component, namely the type of interaction with nature, meaning whether nature is experienced through senses and direct contact or not. A *direct nature experience* will be defined as an activity with nature, i.e. in which nature is in the spotlight and is directly experienced through the child's senses. An *indirect nature experience* will be defined as an activity without direct interaction with nature, i.e. nature is on the background and is not directly experienced through the child's senses. A "nature experience" will be therefore defined as a direct or indirect "*human interaction with non-human species and natural environments*" (Giusti et al., 2014, p. 19) and thus refers to the activities with and without nature children do at the play locations of the childcare centres and elsewhere. Whether an experience is direct or indirect is independent of the environmental context in which they occur, both can be found at all locations where some sort of natural elements are present. However, how direct or how indirect an experience is, depends on the intensity of the interaction with nature, which can be influenced by the environmental features present.

Table 2.1 links types of nature experiences to activities afforded by the environmental features discussed in the previous paragraph. Most activities were adopted from the results of Lerstrup & Konijnendijk van den Bosch (2017). A few activities that were thought to be missing were added. However, the table only gives an indication of the activities a certain environmental feature may afford, but presumably does not contain the full range of possible activities.

2.5 Conceptual framework

From the literature reviewed above a conceptual framework was created, describing the relation between nature experiences and other influential factors, connection to nature and environmental stewardship (Figure 2.1). Connection to nature consists of three dimensions, each having two themes, which are described by several indicators. Influential adults (e.g. parents), nature experiences and nature near home can positively influence connection to nature. Nature experiences refer to the indirect or direct nature experiences at the childcare centres, but also to nature experiences at school or at home. Lastly, environmental stewardship is positively influenced by connection to nature.

Table 2.1 Classes of environmental features with examples of natural elements and affordances (activities) with and without nature. Bold activities are key activities as defined by Lerstrup & Konijnendijk van den Bosch (2017).

Environmental features	Examples of natural elements	Activities with nature (direct experiences)	Activities without nature (indirect experiences)
Open ground	Fields, spaces between trees, forest paths	Games with nature, fantasy with nature; exploration, running, walking	Fantasy without nature, games without nature, soccer/sports, roughhousing, socialize, driving
Sloping terrain	(dry) Ditches, steep slopes, hills	Games with nature fantasy with nature, rolling, sliding, clamber , climbing, running, jumping over, building over, hiding in, sitting in, exploration	Fantasy without nature, games without nature, socialize
Shielded places	Dense vegetation, places between or behind trees, huts	Games with nature, fantasy with nature, exploration, hide, as frame	Fantasy without nature, games without nature, socialize
Rigid fixtures	Climbing trees, big stumps, fallen trees, crooked trees, big stones, bridges	Games with nature, fantasy with nature, climbing, balancing, jumping , sitting on, lying on, looking out from, building on	Fantasy without nature, games without nature, socialize
Moving fixtures	Living trees, branches and logs, trees for hammocks and rope	Games with nature, fantasy with nature, building with, swinging, swaying, seesawing, spinning , balancing, sitting in, lying on	Fantasy without nature, games without nature, socialize
Loose objects	Sticks, pieces of wood, rush, leaves, flowers, fruit, nuts, fungi, bones, stones	Games with nature, fantasy with nature, building with, picking, sorting, making crafts with, gathering, arranging, modifying, as tools, as props, as treasures , throwing, bending, breaking, tasting, eating	-
Loose material	Clay, mud, sand	Games with nature, fantasy with nature, building with, getting dirty, digging, moving, moulding, smearing	-
Water	Rainwater, (under) ice, ditches, flooded areas, small streams	Games with nature, fantasy with nature, swimming, exploration, getting wet, pouring, mixing, splashing, floating , gathering, throwing into	-
Creatures	Bugs, frogs, worms, eggs, bones, other big and small animals	Look for , catching, following, handling , holding, learning about, caring for , tracking	-
Fire	Places for a bonfire	Cooking, feeding , poking with sticks, looking after, sitting by	-
Indoors	-	-	Games without nature, fantasy without nature, crafts without nature, socialize
Street	-	-	Running, driving, games without nature, fantasy without nature, soccer/sports, socialize, roughhousing
Playground equipment	-	-	Games without nature, fantasy without nature, socialize, climb, balance, sway, swing, seesaw, jump, slide

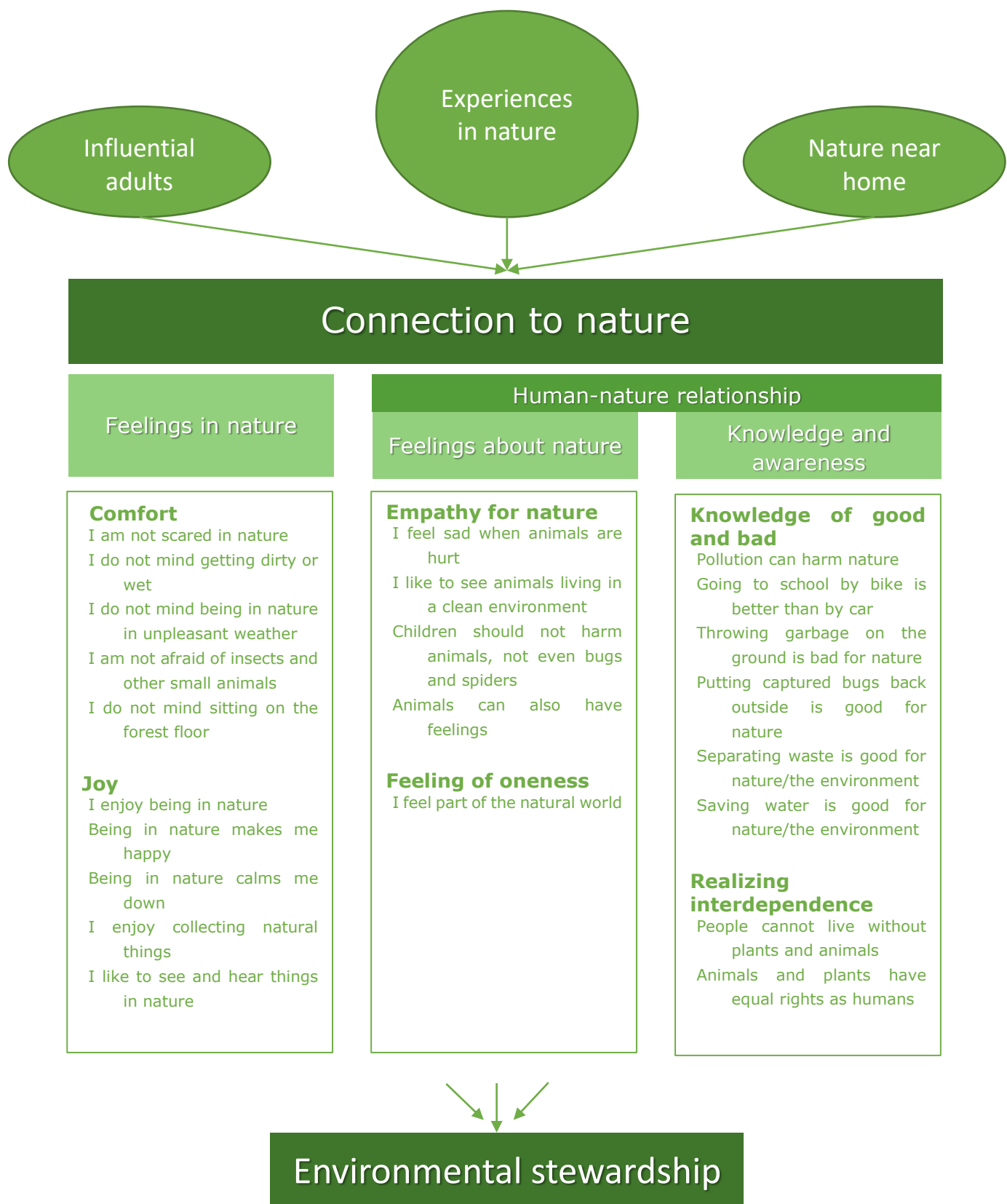


Figure 2.1 Schematic representation of the relation between factors that influence connection to nature, connection to nature and its dimensions and indicators, and environmental stewardship.

2.6 Research questions

The main research question of this research is:

How can children's connection to nature and environmental stewardship be understood from wild or domesticated nature experiences during after-school childcare?

To answer this question, the following sub-questions have been identified:

- How can play locations of an after-school childcare centre visiting wild or domesticated nature be characterized in terms of environmental features and activities?
- What is the connection to nature of children going to after-school childcare centres visiting wild or domesticated nature?
- Which environmental stewardship behaviours are identified and expressed by children going to after-school childcare centres visiting wild or domesticated nature?
- How can connection to nature and environmental stewardship of children going to after-school childcare centres visiting wild or domesticated nature be understood by influential adults and other nature experiences?

Chapter 3. Research methodology

The methodology used in this research is based on a case study design and is a mix between qualitative and quantitative methods. The qualitative part of this study helps with gaining an in-depth understanding of the nature experiences, connection to nature and environmental stewardship of the children at both childcare centres. By spending a lot of time with the children and observing where they play and what they do, I tried to understand the nature experiences the children have at each childcare centre. The quantitative part of this study helps with understanding on which parts the children's connection to nature might differ. Supplemented with the qualitative data, an in-depth understanding of connection to nature can be gained.

The methodology of this research can roughly be divided in three parts. The first part deals with the investigation of the play locations and the nature experiences the children have there. This is done through observations and informal conversations with children and adults. The second part aims at understanding the children's connection to nature and environmental stewardship, which is done through individual interviews with children and is supplemented by a questionnaire for their parents. The third part investigates the possible influences of parents and other nature experiences through a questionnaire for the parents of the children that were interviewed.

3.1 Case study

The case study approach is a good method to get an in-depth understanding of a phenomenon in a real-life context (de Vaus, 2001). This study will comprise of two descriptive case studies which will be compared. This comparative approach will enable me to research whether there is a difference in connection to nature and environmental stewardship between experiencing wild or domesticated nature. Before comparing two cases, it is important to analyse and understand each case separately (de Vaus, 2001). The cases in this study will be two after-school childcare centres. One after-school childcare centre case was selected to represent wild nature, and another one was selected to represent domesticated nature. The phenomenon studied in these cases is the effect of being in nature on children's connection to nature and environmental stewardship. A disadvantage of using case studies is the difficulty of generalising findings, due to the specific characteristics of each case (de Vaus, 2001). An advantage is that internal validity can be increased by a triangulation of methods and sources.

The criteria for selecting cases were the following:

- Children must be outside all the time, inside locations are only used during extreme weather conditions (persistent hard rain, hail, thunderstorms, etc.),
- Children must spend (most of) their time in a natural setting of some kind, for example a forest, floodplain or urban park.

Childcare centre Struin has been selected to represent nature experiences in wild nature and childcare centre Wijs has been selected to represent nature experiences in domesticated nature.

Struin

Struin is a green childcare centre located in Nijmegen (www.struin.nl). It opened in 2007 as the first nature childcare centre in the Netherlands, inspired by similar concepts in Germany and Scandinavia. They are open five days a week. On busy days, the three departments (Goffert, Lent and Ooij) take approximately 170 children to nature areas outside the city, using group bikes and cargo bikes. At the nature location, they first eat something and then go into nature in small groups of approximately 8-10 children per teacher, depending on the age of the children. During the afternoon, there is always a moment where the staff teaches the children something about nature and during their time of free play the staff is always open to teaching them more.

Struin does have access to an inside location, but only use this during extreme weather conditions. Only department Ooij has a home base which includes an inside location. The other departments

rent classroom at local schools as backup for when the weather is really extreme. Even when children return to the school at the end of the day, they have to stay outside. This way children are outside all the time and get used to playing in the rain and snow. Its slogan is a Norwegian proverb: "Bad weather does not exist, bad clothes do!". Conventional play equipment is not available; children can only use natural materials to play with. They avoid playgrounds and do not bring anything apart from small sleds in winter. This way children get to know the area very well and are able to create their own paths and special places.

Wijs

Wijs is a green childcare centre located in several places around Utrecht (www.bsowijs.nl). The location that is studied in this research is department Leidsche Rijn, which runs for almost three years. Of all Wijs departments, Leidsche Rijn has least access to natural areas outside the city and therefore primarily stays in the city. In this research, childcare centre Wijs department Leidsche Rijn will be referred to as (childcare centre) Wijs.

After children are picked up from school, they are taken to a natural area or playground within the city by an electric kids wagon or a cargo bike. There are open three days a week. On the busy days, Tuesday and Thursday, they accommodate two groups of approximately 20 children. On Mondays they have one group, on Tuesday two groups separated by age and on Thursdays two groups separated by school. Each group goes to a play location and stay there, together, for the rest of the afternoon. At the end of the day children return to their home base, the Parasites, located in an old orchard in the city. Here they can either play inside or outside. When weather conditions are really bad, they also move to the Parasites for shelter. The teachers mostly take some conventional play equipment with them, like balls. Children are also allowed to play in playground and use the play equipment there.

Differences

One of the main differences between Struin and Wijs is their policy regarding conventional play equipment. At Wijs, bringing play equipment, like balls, and visiting playgrounds is allowed, whereas at Struin, they avoid this. Another difference is the group size. At Struin children are divided into smaller groups and go into nature with this small group with one teacher. Wijs however, keeps the children in larger groups. Their access to inside locations also differs. Most Struin department rent an external inside location and only use this in the case of extreme weather conditions. Wijs does have a home base with access to an inside location and uses this more often, even when weather is not as extreme.

In Chapter 4 differences and similarities regarding policy and organized activities, observed activities and characteristics of play locations will be discussed.

3.2 Data collection

Different qualitative and quantitative methods and multiple sources were used. These mixed-methods will give insight in the children's nature experiences, connection to nature and environmental stewardship. This research used informal interviews with teachers and children, observations of play locations and activities, individual interviews with children and a questionnaire for parents. Each method had its own focus, although it occasionally also provided information about one of the other subjects. Observations of the play locations and the activities and informal conversations with teachers were used to describe the children's nature experiences. Individual interviews with children and an online questionnaire for parents were used to describe the children's connection to nature and environmental stewardship and to gain insight in the possible influence of influential adults and other nature experiences. The following sections will discuss each method in more detail.

Both childcare centres were visited for 13 afternoons. Table 3.1 and Table 3.2 summarize which locations were visited when and for which purpose. The locations that were visited are discussed in detail in Chapter 4.

Table 3.1 Details of observations at Struin. Weather conditions are taken from weather station Volkel (KNMI, 2017)

	Date	Location(s)	Weather	Department	Objective
1	20-10-2016	Apple field	8.6°C, clouds, rain/dry	Goffert	Observations
2	26-10-2016	Heumensoord & Struinland	9.2°C, clouds/sun, dry	Ooij (holiday)	Observations
3	3-11-2016	Kops Plateau	6.2°C, clouds, dry	Ooij	Observations
4	4-11-2016	Groenlanden	7.4°C, clouds/sun, dry	Ooij	Observations
5	15-11-2016	Heumensoord	9.6°C, clouds, light rain	Goffert	Observations, testinterviews
6	15-12-2016	Struinland & Stadswaard	6.5°C, clouds, dry	Ooij	Observations
7	20-12-2016	Bemmelsewaard	-0.3°C, thick fog, dry	Lent	Observations, 3 interviews
8	22-12-2016	Sprokkelbos	5.4°C, clouds, dry	Lent	Observations
9	12-1-2017	Sprokkelbos	4.7°C, clouds, dry/rain	Lent	2 interviews
10	16-1-2017	Gofferpark	-2.2°C, clouds, dry	Goffert	Observations, 5 interviews
11	26-1-2017	Hengstedal & Heerlijkheid Beek	-2.3°C, sun, dry	Ooij	Observations, 3 interviews
12	27-1-2017	Struinland	1.3°C, clouds, dry	Ooij	Observations, 2 interviews
13	2-2-2017	Stadswaard	8.3°C, clouds/sun, dry	Ooij	Observations

Table 3.2. Details of observations at Wijs. Weather conditions are taken from weather station De Bilt (KNMI, 2017)

	Date	Location(s)	Weather	Objective
1	7-11-2016	Car wreck	4.2°C, clouds, dry	Observations
2	14-11-2016	Orange Playground & The Stones	3.1°C, clouds, rain/dry	Observations
3	17-11-2016	Building playground Voorn	9.3°C, clouds, dry	Observations
4	22-11-2016	Orange Playground & Skatepark	11.0°C, sun, dry	Observations, 1 interview
5	24-11-2016	Parasites	6.6°C, sun, dry	1 interview
6	28-11-2016	Building playground Voorn	-0.3°C, sun/clouds, dry	1,5 interview
7	29-11-2016	Pirateship	-3.1°C, sun, dry	Observations
8	1-12-2016	Butterfly Park	7.9°C, clouds, dry	Observations, 2 interviews
9	6-12-2016	Schoolyard Beatrixschool & Parasites	0.1°C, sun/clouds, dry	2 interviews
10	8-12-2016	Building playground Voorn	8.2°C, sun/clouds, dry	1,5 interview
11	9-1-2016	Butterfly Park	4.8°C, clouds, light rain/dry	Observations, 1 interview
12	19-1-2017	Schoolyard Beatrixschool & Building playground Voorn	-2.2°C, sun/clouds, dry	2 interviews
13	23-1-2017	Parasites	1.6°C, clouds, dry	1 interview

3.2.1 Observations

The main goal of the observations is to answers the first research question: *How can play locations of an after-school childcare centre visiting wild or domesticated nature areas be characterized in terms of environmental features and activities?*

In this research, observations are used to gain insight in the children's nature experiences. The goal of the observations is twofold: observing the natural elements at the play locations and

observing the activities that are done by the children. Observing is a suitable method for this research, as it provides information about the characteristics of the play locations and the kind of activities the children do here. With its naturalistic character, meaning no manipulation or stimulation of behaviour is done by the researcher (Punch, 2005), observations will help understand the normal behaviours of the children. During the observations, I was sometimes a non-participant observer and sometimes a participant observer. I mostly observed the children from a distance and tried to disturb them in their usual behaviour as little as possible. Sometimes, however, I joined a smaller group of children to their specific play spot (mostly at Struin, as they often go into nature in small groups), meaning my presence was more obvious and I sometimes interacted with the children and the teacher. At Wijs I was mostly able to observe all the children and the entire location. At Struin, however, children were divided in smaller groups and I mostly only joined one group. Locations were also bigger, meaning that I was unable to observe the whole location during one visit. Not being able to observe all activities and all environmental features during one visit is a limitation of using observations. Also, during visits in which interviews were done, less time could be spent on observing the location and the activities. Nonetheless, these short observations also resulted in valuable information.

Observations are done semi-structured and consist of two parts, a natural component and a social component, i.e. observing the environment and observing the activities. For this an observation scheme was made (Appendix A). Observations of the environment are done in two steps. First, making a general description of the area. What kind of area is it (e.g. playground, forest), how many human influences are visible and what natural elements are present? Second, the area has to be judged on the presence or absence of the ten classes of outdoor features as described by Lerstrup & Konijnendijk van den Bosch (2017), which were open ground, sloping terrain, shielded places, rigid fixtures, moving fixtures, loose objects, loose material, water, creatures and fire. The non-natural environmental features indoors, street and playground equipment were added later to meet the demand of characterizing non-natural features. Observations of the social component, i.e. the activities that are done by the children, are ordered in two components, namely direct experiences with nature, i.e. activities with nature, and indirect experiences with nature, i.e. activities without nature (Kellert, 2002). The content of the activity as well as who initiated the activity (the children or the teacher) will be noted. Of several observations, more elaborate fieldnotes were made.

Which locations could be observed was decided by the childcare centres. They decided based on e.g. weather and planned activities which location would be visited that afternoon. Therefore, several locations were visited multiple times and other locations were never visited. This resulted in observations of 11 Struin locations and 7 Wijs locations. At Wijs, children visited a skate park once, but no observations were done here because this was not an official and regular play location. Wijs children also often played on a schoolyard when they had to wait for other children. These schoolyards were also not analysed, because they were not an official play location. An informal interview with a staff member from each childcare centre resulted in information about locations that were not visited and about their pedagogical policy in general.

3.2.2 Individual interviews with children

The main goal of the interviews is to answer the second and third research question: *What is the connection to nature of children going to after-school childcare centres visiting wild or domesticated nature?* and *Which environmental stewardship behaviours are identified and expressed by children going to after-school childcare centres visiting wild or domesticated nature?*

Interviews with children are done to gain insight in their connection to nature and environmental stewardship. Individual interviews were chosen because these would provide the most information about the connection to nature and environmental stewardship of the individual child, without the child being influenced by answers of peers. A risk of using individual interviews, however, is that children might feel less comfortable alone than with friends and might be more likely to give social desirable answers.

The aim was to interview 20 children at each childcare centre. However, due to time constraints and the limited number of children at Wijs that met the requirements, 28 children were interviewed

in total. At Wijs 13 children were interviewed and at Struin 15 children (five from each department). One interview at Struin was only done half. The average duration of the interviews was 20 minutes, with the longest being approximately 31 minutes and the shortest (full interview) being approximately 14 minutes. Participants were selected by the (department) leaders of the childcare centres, but had to meet certain requirements. Children had to be 7-10 years old. This age is selected because children from 6 years and older have had the change to develop their (affective) connection to nature and environmental stewardship behaviours (Kellert, 2002). The children must be going to this childcare centre for at least one year, so the nature experiences have had time to influence the child. The children preferably go to this childcare centre no longer than three years, to make conditions for both childcare centres equal, as Wijs does not exist longer yet. However, not all Struin department leaders chose children that fulfilled this requirement. An e-mail with information was sent to the parents by the leaders of the childcare centres (Appendix B), asking them to give permission for their child to join the research. Permission was given either through a reply on the e-mail to the childcare centre leaders or via the online questionnaire. Several participants were relatives. At Wijs, W1 and W2 are siblings and W3 and W10 are too. At Struin, S7 and S9 were twins, as were S6 and S8. More characteristics of the participants are discussed in Chapter 5.

Interviews were structured and included qualitative as well as quantitative questions (Appendix C). Three test interviews were done and after this questions were refined. During the interview, 8 themes were discussed. Table 3.3 summarizes which themes provide information for which concept. The following section will discuss the different themes in more detail.

Table 3.3 Relation between concept, themes within the interview and corresponding question numbers in Appendix C.

Concept	Theme	Question
Nature near home, other nature experiences	Nature in the child's daily live	1.1-1.5
Connection to nature		
• Introduction	What is nature	2.1-2.2, 2.4-2.5
	Meaning of nature	3.1
• Feelings in nature	Meaning of nature	3.2
	Ideal play location	4
	Activities in nature	5.1-5.2
• Human-nature relationship		
• Feelings about nature	What is nature	2.3
	Judging pictures	7
	Discussing dilemma's	8.1, 8.3
• Knowledge and awareness	Judging pictures	7
	Discussing dilemma's	8.1-8.5
Environmental stewardship	Nature friendly behaviour	6.1-6.2

Nature near home and other nature experiences

The theme 'nature in the child's daily live' (question 1.1-1.5 in the interview) aims at identifying the presence of nearby nature and possible other nature experiences the child may have next to the afternoons at the childcare centre. These questions will help determine the relative importance of the nature experiences at the childcare centre.

Connection to nature: introduction

Before starting an in-depth discussion with the children about the different connection to nature dimensions, several general questions were asked to get a better understanding of how they see and value nature in general. The theme 'what is nature' (question 2.1-2.2, 2.4-2.5) aims at gaining insight in what children identify as nature. Next to some open questions, children are asked to judge four pictures on whether they think they are nature or not. These pictures show different levels of domesticated nature that children might encounter in their daily lives (Figure 3.1). The first question of the theme 'meaning of nature' (question 3.1) aimed at better understanding the importance of nature to the children.

Connection to nature: feelings in nature

The second question of the theme 'meaning of nature' (question 3.2) is related to the connection to nature dimension 'feelings in nature' and aims at understanding the importance of nature in the child's life and how the child feels when (s)he is in nature'. A sheet of paper with words was used to help the children express their feelings. These words are based on the Self Confrontation Method (SCM) of Hermans, which often is used as method for self-reflection (Dale & Wagner, 2003; Hermans, 1986; Schreurs, 2009). The words can be grouped into four categories, which were each presented in their own colour: green words are positive or pleasant feelings, blue are feelings about contact or union with others, red are feelings about self enhancement, and yellow are negative or unpleasant feelings. Children were free to either use these words to explain their feelings, or tell something themselves.

The aim of the theme 'ideal play location' (question 4) also relates to understanding the importance of nature in the child's life. It asks children to describe their ideal outside play location. How much and what kind of nature the children describe may say something about how important nature is to the child, how the child feels in nature and what kind of nature the child prefers to be in.

The theme 'activities in nature' (question 5.1-5.2) aims at understanding the children's feelings in nature and preferences for activities and locations in nature. Children are asked to rate on a 'feelings scale' (Figure 3.2) how they would feel when they would do the activity shown in the pictures (Figure 3.3). Answers are coded to numbers, where 1 is the most negative smiley and 5 is the most positive smiley. Children with a higher average score like nature activities more than children with a low average score. Pictures were selected ensuring a diversity in weather conditions. Obvious emotions on the face of the child on the picture were avoided, to prevent these emotions from influencing the children's responses. The pictures represent different levels of comfort and joy in nature, as described in Chapter 2. The first picture (Figure 3.3) was chosen to see whether children feel comfortable with laying on the forest floor and whether they would enjoy exploring nature. The second picture tests whether children feel comfortable with walking through tall grass without sleeves, or whether they are afraid of, for example, stinging nettles or bugs. The children in picture 3 are catching bugs in a pond, which tests whether children feel comfortable with sitting in a pond with their clothes on and whether they enjoy catching animals. Picture 4 will give insight in whether children dare to hold an earthworm or whether they are afraid of or disgusted by it. The fifth picture tests whether children dare to climb in trees and whether they enjoy this nature activity. Picture 6 shows a child running in the rain, giving insight in whether children feel comfortable with being outside in the rain, or whether they prefer to go inside. The seventh picture shows very dirty children playing in mud, which will give insight in whether children feel comfortable with being this dirty and whether they enjoy playing in mud. The last picture tests whether children feel comfortable with being outside in the snow, when it is cold. Questions in the second part of this theme aim at letting the children express their preference for a 'wild' or less 'wild' activity in nature, namely staying on the paths or going off the paths, and for playing on the grass or in the bushes. This also gives insight in whether they feel comfortable in nature and enjoy playing in nature.

Connection to nature: human-nature relationship

The themes 'judging pictures' and 'discussing dilemma's' are related to the connection to nature dimensions 'feelings about nature' and 'knowledge and awareness'. For the theme 'judging pictures' the children are again asked to use the feelings scale (Figure 3.2), this time to show how they feel when they see certain pictures of environmental degradation (Figure 3.4). Scores are reversed, meaning the most negative smiley is scored 5 and the most positive smiley is scored 1. Children with high average scores show more empathy for nature. The pictures are selected to test the children's empathy as well as knowledge about environmental degradation. Picture 1 (Figure 3.4) tests whether children know garbage is harmful for nature and whether they feel bad for nature. The second picture tests whether children know chopping trees can be good for us, but can be bad for nature, and whether they feel bad for nature. Picture 3 tests whether children know exhaust fumes and a road through the forest can be harmful or dangerous for nature, and whether they mind about this. The last picture tests whether the children feel empathy for a killed animal, or whether they only show positive feelings because humans need or like the meat.

The theme 'discussing dilemma's' also aims at understanding the children's feelings about nature and knowledge and awareness. By discussing several dilemmas with the children, I hope to get insight in their empathy for nature, knowledge of good and bad and realization of interdependence. To prevent socially desirable answers, dilemmas were formulated in a way that it seemed like both options were very common, meaning some children did this, and other did that. Knowing that there are other children that share their feelings hopefully motivates the children to give an honest answer.

Environmental stewardship

The theme 'nature friendly behaviours' aims at understanding whether children think their actions affect the environment, which nature friendly behaviours they can come up with and which nature friendly behaviours they do themselves. This gives input for understanding their environmental stewardship.



Figure 3.1 Pictures theme 'what is nature'.



Figure 3.2 Feelings scale.



Figure 3.3 Pictures theme 'activities in nature'



Figure 3.4 Pictures theme 'judging pictures'

3.2.3 Questionnaire for parents

The main goal of the questionnaire is to answer the fourth research question: *How can connection to nature and environmental stewardship of children going to after-school childcare centres visiting wild or domesticated nature be understood by influential adults and other nature experiences?* And to provide additional information about the children's connection to nature and environmental stewardship.

This questionnaire has several purposes: gain an understanding of the parent's connection to nature and how this might influence the child's connection to nature and environmental stewardship, supporting the data from the individual interviews with the children and provide information about other nature experiences the children might have. A total of 18 parents filled in the questionnaire, representing 20 children. From Struin 10 parents completed the questionnaire, representing 11 children. From Wijs 8 parents completed the questionnaire, representing 9 children.

The questionnaire for parents was made with Qualtrics, consists of three parts and contains both qualitative and quantitative questions (Appendix D). The first part contains general questions about the child. The second part explores the parent's connection to nature. For this the NR-6 (Nisbet & Zelenski, 2013) is used. The last part asks the parents to reflect on their child's connection to nature and environmental stewardship. The questionnaire also gives insight in other nature experiences in the children's lives, for example, how often they visit nature with their parents.

3.3 Data analysis

Observations were structured in observation schemes. A description was made for each location that was visited. The environmental features were summarized in tables, which made it possible to compare the abundance of environmental features between locations and between childcare centres.

The interviews were recorded and subsequently transcribed. The transcripts were summarized in an excel sheet, making it possible to compare important elements in the three dimensions of connection to nature. As the concepts of this research were already clearly defined in the research questions and theoretical framework, labels were defined beforehand. During the labelling process, only a few labels that were missing were added. Several questions were converted into quantitative data, resulting in scores for importance of nature (7-point Likert scale, question 3) preferences for activities in nature (5-point Likert scale, question 5) and scores for feelings about environmental degradation (5-point Likert scale, question 7). Questions 5 and 7 could be considered as a scale and to test for internal consistency Cronbach's coefficient was used (Cronbach, 1951). The results from the parental questionnaire were also summarized in an excel sheet to enable analysis of the data.

After analysing the play locations, nature experiences and the children's connection to nature and environmental stewardship, these subjects were combined to discover the possible effect of type of nature and type of nature experiences on connection to nature and environmental stewardship. The same was done with the parental connection to nature, to see whether this influences the child's connection to nature and environmental stewardship.

3.4 Ethical justification

In this research, under aged children are the study objects. Permission for observations was asked from the board of both childcare centres. For the individual interviews, permission from parents was needed. This was obtained through the leaders of the childcare centres. Children were never forced to complete the interview and were allowed to stop whenever they wanted. Twice a child wanted to stop, and only one of these children did not want to complete the interview at a later time. Anonymity of parents and children was guaranteed both during the research and in this thesis.

Chapter 4. Nature experiences

This chapter answers the first research question: *How can play locations of an after-school childcare centre visiting wild or domesticated nature areas be characterized in terms of environmental features and activities?* Information in this chapter is derived from my own observations during the afternoons I have spent at Struin and Wijs, but also from informal conversations with staff members about their pedagogical policy and their activities in other seasons. In this chapter the pedagogical policy and organized activities of the childcare centres will be discussed first. Second, observed activities will be discussed and lastly environmental features will be described.

4.1 Policy and organized activities

Struin

Struin wants to make the children familiar with the natural areas around Nijmegen. To achieve this, they visit each area several times a year. Every department has one home base and several exciting new areas for variation. They try to alternate familiar places with new places, considering children who prefer structure and steadiness but also children who prefer to explore and to be challenged. The home base is often the wildest natural area. For department Lent this is the Bemmelsewaard, for department Ooij this is the Ooijpolder and recently also the Struinland, and for department Goffert it is Heumensoord. Struin aims at finding nature areas that are as natural as possible. They prefer areas where natural processes are still visible and where a large variation of plants and animals is present.

At Struin children are divided in groups based on their age and their skills: ducks (age 4-7), ibises (age 7-9) and kites (age 9-12). Each level has its own rules, adapted to their age and skills. For example, ducks are allowed to move 30 meters away from the teacher, ibises 100 meters and kites 1000 meter, given that no activities are done that require extra supervision. Struin aims at letting children experience how nature works. They teach children things related to edible and poisonous plants, names and characteristics of plants and animals and they explain why certain environmental stewardship behaviours are important, like not throwing garbage in nature and going by bike instead of by car. Struin does not take conventional play equipment, like balls, with them, with the aim of letting children fully experience nature and be creative. They do take materials that support interaction with nature, like pocketknife and rope, which can be used to build structures in nature. When in nature, they do not limit their play and exploration to the paths, but prefer to go off the paths because there is more to explore there. Matthijs de Gruijter, director and founder of Struin, identified being able to encounter special plants and animals and observe natural processes as the greatest advantage of being outside in wild nature compared to playing in a park (pers. com. 13-09-2016).

Struin's policy is to start each afternoon with a nature activity related to a specific theme. This is done in the smaller groups. All children are expected to join this activity. These activities can for example be catching amphibians, gather edible or poisonous plants or making an off-road exploration tour. This activity is done for a minimum of 15 minutes, but the children are free to continue the activity when the time is up. Whether they do this depends a lot on the type of activity and the area they are in. For its activities, Struin optimally uses the seasonal changes. In winter, the focus is on playing to stay warm, but also on exploring the terrain, searching for dead animals or animal tracks and watching birds. The 15-minute activity is often not done in winter. In spring, there is more attention for nature, for example exploring spring flora and amphibians, making salads of edible plants and catching fish, crayfish and water bugs. They also give attention to the changing river dynamics by following the retreating waterline looking for animal tracks and loose objects. In summer, they often visit locations that provide shade and water. They swim a lot and if it is really hot they just sit in the shade and chat or make crafts with nature. Another activity that is done a lot in summer is picking fruit, like apples and plums. In autumn, the children catch insects and mice and look for autumn leaves or make crafts with nature.

Wijs

According to one of the staff members (personal communication, 24-1-2017) Wijs is more an outside childcare centre than a nature childcare centre. Their goal is to be outside, because being outside is healthy, there are fewer stimuli and it stimulates self-reliance. The activities they do outside are of less interest, as long as they are fun for the children and stimulate their development. They often do outside what they could have done inside, like drawing or crafts with non-natural materials. Bringing conventional play equipment is therefore normal.

In winter, Wijs spends more time in playgrounds and less time in urban nature, because the parks are very muddy. In summer, they spent more time in urban nature, like parks. Children also spent time playing on the school's playground, for example when they have to wait for children from another school to arrive. This is done year round and can range from only a few minutes to an hour. Most schoolyard contained only limited natural elements and mostly consisted of a paved area with playground equipment.

For its organized activities, Wijs works with monthly themes. These themes are chosen broadly so they can include a wide range of activities. Examples of themes are crazy sports (November), arts (December), occupations (January) and construction and demolition (February). Activities can range from excursions to guest speakers or simply a small but fun activity prepared by the teachers. In summer, activities are more focussed on gathering and crafts, while in winter focus is more on keeping active to stay warm. In winter, they also have one month with a lot of excursions and trips, as winter is a tough month and this might make it easier for the children. Except for the excursions, children are not required to join the activities, but are encouraged to try out new things. Examples of activities are an excursion to a waste disposal company, a visit from a journalist, a skateboard workshop, creating their own beauty salon, sports, crafts and games. Next to all general activities and excursions, the staff also tries to teach the children wild nature skills like sawing, working with a pocket knife (after permission from parents) and building huts.

Comparison

Apart from the differences in play locations, there is another striking difference between Wijs and Struin. The aim of both childcare centres differs, resulting in a different approach by the staff and different organized activities. Struin aims at letting children experience nature and its staff therefore organizes activities that involve direct contact with nature and guides the children in their nature experiences. At Wijs, however, the focus is on playing outside and not so much on experiencing nature. Therefore, the staff organized activities that are fun for the children, but do not necessarily include contact with nature.

4.2 Observed activities

This difference in policy and organized activities is also reflected in the common activities that were mentioned by the staff and the activities that were observed during the observations.

Struin

According to the staff, activities initiated by the children themselves are often games like playing tag or hide-and-seek. They also enjoy catching frogs, but this activity is mostly initiated by spontaneously encountering a frog.

During the observations, I have seen that Struin indeed gives a lot of attention to nature. When on our way from the school to the play location, it happened several times that the teacher stopped the bike to show the children something in nature, for example ducks in a pond or horses in the floodplains. The teachers also take the time to teach children about nature. For example, how mushrooms work and how to identify frogs.

When the sun start coming through, one of the teachers asks the children whether they know what happens when the sun breaks through after the rain. One of the children correctly notes that then the mushrooms start growing. Next is a conversation about the fly agaric, the corresponding song and a story about

where the name comes from. A plan is made: go on a mushroom hunt. (...) Once arrived on the path we find a mushroom. The teacher explains how mushrooms are structured and where you can find the seeds. (Fieldnotes Struin 20-10-2016)

The children find another frog. One of the children picks up the frog and holds it gently and proudly. The teacher grabs a determination card to figure out together which frog it is. In the meantime, a girl finds a little moth she wants to catch, the teacher helps her catch it. (Fieldnotes Struin 4-11-2016)

The teachers also teach the children about the dangers of natural areas and how to handle them. For example, how to deal with wasps and to have respect for cattle in the floodplains.

We park the bikes in front of a gate. The children know very well that they have to wait by the gate. The teacher asks the children which things they have to pay attention to in this area. The children quickly mentioned that they had to pay attention to the cows, the bulls and the water. The teacher tells them that therefore it is important that they stay together as a herd and do not run ahead, until they arrive at the play spot. (Fieldnotes Struin 15-12-2016)

This last example shows some teacher even give examples when it comes to environmental stewardship, in this case air pollution.

We are waiting for a traffic light. Because the road is rather narrow and the bike is rather wide, we have to wait behind a car. The teacher makes a remark that before we get to nature, we first have to breathe in some exhaust fumes. One of the children asks what he means and he explains that you can see that there are exhaust fumes coming out of the car before us. He says that he thinks that is not healthy so therefore he did not park the bike close to the car. (Fieldnotes Struin 26-10-2016)

Table 4.1 Number of activities that were direct or indirect experiences. Cells that contain multiple numbers were observed multiple times.

Locations	Direct experiences	Indirect experiences
Apple field	11	4
Bemmelsewaard	8	0
Goffertpark	1	0
Groenlanden	5	0
Heerlijkheid Beek	4	0
Hengstdal	4	2
Heumensoord	7; 7	1; 1
Kops Plateau	4	3
Sprokkelbos	11	1
Stadswaard	11; 4	0; 1
Struinland	18; 5; 10	3; 1; 1
Total	110	18
Percentage	86%	14%

Activities that were observed almost always included nature, for example climbing in trees, catching animals, playing hide and seek, sliding off a sand hill, playing games with and in trees, gathering things and building things with nature. Children, however, also just socialized or roughoused with each other, not necessarily using nature. More examples of observed activities per play location are given in Appendix E. Direct experiences with nature were observed most, 86% of the observed activities were direct experiences with nature (Table 4.1). Although the number of children per activity and type of experience was not counted, I got the impression that most the children engaged in activities with nature, thus having direct nature experiences. Only some children had indirect nature experiences.

Wijs

According to the staff, activities initiated by the children themselves are often games like playing hide and seek and fantasy play. The older children like building things and dragging things around and do fantasy play in this. When they visit (domesticated) nature, the teachers mostly observe fantasy play and gathering. As the observations were done in winter, a lot of the natural areas they usually visit during summer were not observed. Activities that are often done at these urban natural areas are, for example, rolling of slopes, playing by the ditch, hunt for rabbits, do treasure hunts, look for bugs, do sports, sit on a plaid and draw, craft or read, free play with sticks and stones, building things, play with water and get dirty and swim.

During the observations, I have indeed seen that there is not a lot of attention to nature education, but more to fun play and sports. Even when there were opportunities, not all teachers gave a lot of attention to nature.

At one moment, I see a boy on his own, digging through some leaves. He finds a mushroom and triumphantly shows it to one of the teachers. The teacher, however, is busy with the street curling she prepared and plays with some children, so she does not give it a lot of attention. The boy goes back and finds some more. This time he brings them to another teacher, who sends him to another teacher, because that teacher knows a lot about it. This teacher indeed shortly explains some things to the boy. The boy continues searching for a while and makes a small mushroom collection near one of the bikes.

(Fieldnotes Wijs 7-11-2016)

The amount of freedom that was given to the children seemed to differ per location. At some locations, there were no restrictions, at some there were.

At one moment, two of the older girls and a younger girl come to ask if they can go into the little patch of bushes. The teacher says they can, but one of the teachers had to come with them. So one of the teachers goes with them. She was holding back a bit and wanted the children to stay with her. Some other children also joined and together they walk around on a small desire path in the small patch of bushes. When the teacher realizes the patch of bushes was this small, the children are allowed to walk around on their own and she waits for them at the border of the bushes. (Fieldnotes Wijs 14-11-2016)

Table 4.2 Number of activities that were direct or indirect experiences. Cells that contain multiple numbers were observed multiple times.

Locations	Direct experiences	Indirect experiences
Car wreck	5	7
Playground Voorn	5	6
Butterfly park	7	4
Orange playground	0	1
Parasites & orchard	4; 1	3; 3
The ship	7	5
The Stones	7	4
Total	36	33
Percentage	52%	48%

Activities that were observed were mostly games, sports and using the playsets. More examples of observed activities per play location are given in Appendix E. Direct and indirect experiences with nature were observed almost equally, 52% of the observed activities were direct experiences with nature and 48% of the observed activities were indirect experiences with nature (Table 4.2). However, not all indirect experiences were noted separately, but for example as 'using playsets' instead of separate descriptions of the use of the independent playsets (e.g. using swings, using monkey bars, etc.). As a lot of children showed activities that were clustered under the term 'using playsets', the percentage of indirect experiences is probably higher. Whether children included nature in their play differed

per location. At the car wreck, the butterfly park and the stones children did interact with nature by for example explore the bushes, gathering or building and crafts with nature.

Although the number of children per activity and type of experience was not counted, I got the impression that most the children engaged in activities without nature, thus having indirect nature experiences. Whether children chose activities with nature seemed to depend on the location. I got the impression that in playgrounds, most children did not directly interact with nature, because they preferred to play with the conventional play equipment. Only a few children sometimes interacted with nature for a short period. This was especially observed in building playground Voorn. Here, the playground equipment and carts appeared to be preferred by the children, even though some natural elements were present.

Comparison

At Struin, most children had direct nature experiences, 86% of the observed activities where activities with nature. At Wijs, however, only 52% of the activities where direct experiences with nature. Struin children thus seem to have more direct experiences with nature.¹ I also got the impression that more Wijs children chose to play with playground equipment, balls, or games without nature than directly interact with nature. At Struin, this was the opposite. Most children engaged in activities with nature and only very few children engaged in activities without nature. During several observations at Wijs, more nature experiences seemed to be afforded by the natural environmental features than were observed. The presence of natural environmental features therefore does not guarantee that children will directly interact with them and do the activities these features afford.

4.3 Environmental features

This difference in observed activities suggest a difference in environmental features. This paragraph describes the environmental features of play locations that were visited.

Struin

The locations Struin visits often are depicted in Figure 4.1. Most areas are nature areas bordering the city. Some of the areas, however, are areas in the city, for example numbers 2, 13, 15, 24, 25 and 26. Number 2 represents two small parks that are only used when the weather is rough and the staff wants to be able to be back at the inside location fast. The Hunnerpark (13) is sometimes used by department Ooij when it snows, as it has high slopes for sledging. The Patersbosje (15) and the Limospark (25) are parks that are sometimes used when there is not a lot of time and they want to be in a natural area fast. Park Brakkenstein (26) contains a botanical garden which they sometimes use to teach the children about spring flora. Locations 3, 5 and 14 are locations that were designed or managed by humans. Number 3 is a play forest, a little forest especially designed and managed for play, by having structures like huts and bridges. Number 5 is the Groene Klaslokaal, which is a natural area specially designed for use by school classes. The area is interesting for department Lent as this is the only area where they can make fire and pick apples. The Struinland (14) is the home base of Struin. The land is designed as a rough natural area where children are challenged.

During my observations, 11 areas were visited, namely 3, 6, 10, 12, 14, 16, 20, 21, 25, 27 and 28. Descriptions and pictures of the areas can be found in Appendix E. The environmental features of the observed locations are summarized in Table 4.3. All locations contain the environmental features open ground, sloping terrain, shielded places, rigid fixtures, moving fixtures, loose objects, loose material and creatures. Several locations did not have a pond, ditch or river and thus only occasional rainwater puddles. Making fire was only allowed at a few places, namely the Kops Plateau and a special fireplace at the Struinland. The Struinland was the only place the feature indoors was present. However, the indoor locations is designed and decorated in a way that it is not attractive

¹ Comparing these percentages should be done with care, as the number of locations and observations differs between both childcare centres and some locations where observed more than once. Also, the real percentage of indirect nature experiences at Wijs is probably higher due to the clustering of separate activities (using swings, using slide, etc.) in one activity (using playsets).

for the children to play inside. They are also not always allowed to go inside. The Goffertpark is the only location where the feature street was present. Playground equipment was present at Heumensoord and Sprokkelbos, but only natural playground elements. Virtually all locations were very diverse and contained multiple environmental features.

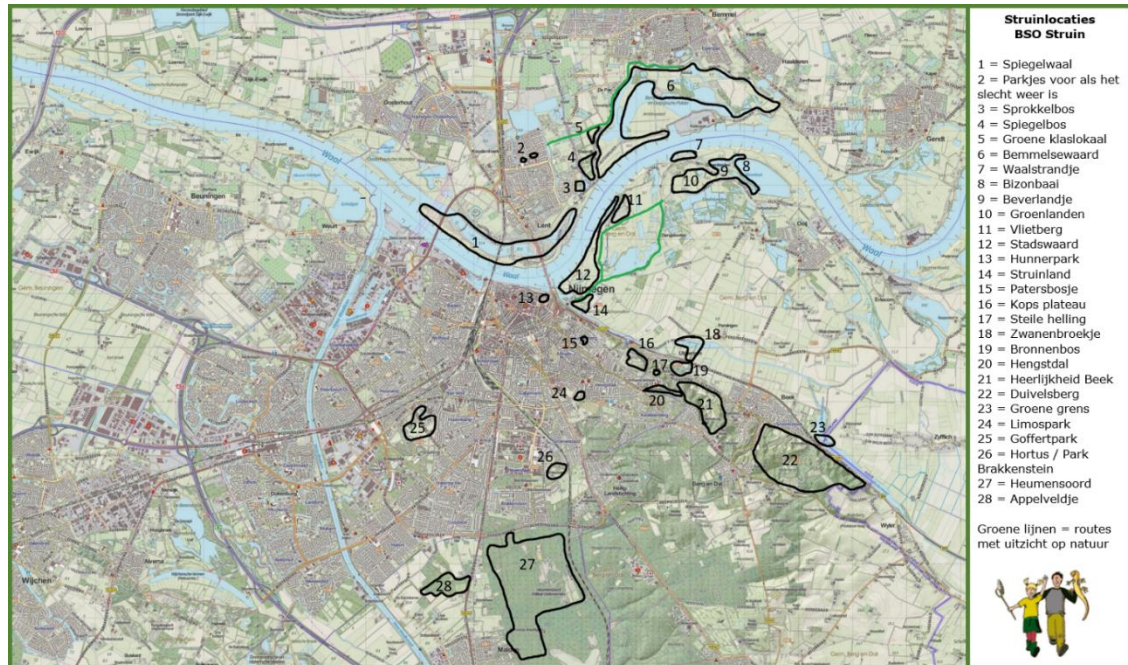


Figure 4.1 Play locations Struin. Green lines represent cycling routes with a view over nature and educational value.

Wijs

The locations Wijs visits often are depicted in Figure 4.2. As observations were done in winter and they visited less urban natural areas this time of year, a lot of the more natural areas were not observed. One of the locations they visit a lot in summer is the Vlindertuin (21). It is a park with a lot of flower beds, sloping grassland, water with a small pier and climbing trees. Another location is de Hoge Boom (17), which is a high tree on a small field surrounded by bushes. Playground Albatros (15) is a kind of nature playground where there is water and mud. It is surrounded by houses. Lastly, the Strijkviertel (10) is a kind of city beach. The lake contains fish and is surrounded by pastures, industry and sports fields. They often visit this lake during warm periods.

During my observations, 7 play locations were visited, namely 1, 2, 3, 9, 11, 13 and 19. Descriptions and pictures of the areas can be found in Appendix E. The natural features of the observed locations are summarized in Table 4.4. Open ground, loose objects, loose material and creatures were present at all locations. Not all locations had sloping terrain, shielded places, rigid fixtures, moving fixtures and water. When sloping terrain was present, it was often only with minimal height differences. Making fire was only allowed at the childcare centre itself (parasites & orchard). Several locations contained the feature street and almost all locations contained the feature playground equipment. Only one location did not contain any of the non-natural environmental features. Not all locations were very diverse in natural elements.



Figure 4.2. Play locations Wijs.

Comparison

The differences in (when applicable) abundance, diversity, changeability and size of the environmental features of both childcare centres is discussed below, followed by a general analysis.

Open ground. At both childcare centres, all locations contained open ground. However, at Wijs these areas were often more open and bigger. Several Struin locations only had small patches of open ground, scattered through the area. The open ground areas at Wijs locations were often fields of grass that are managed by humans. This means that these areas are not very changeable. For example, before the grass gets too high in spring and summer, it is mown. The Struin locations, however, are not managed. Open ground can become more open or less open throughout the year and only some are limited by grazing.

Sloping terrain. Sloping terrain is more abundant, varied and changeable at Struin. Sloping terrains at Wijs are often small and low height differences in grass, which are not very challenging and do not change over time. At Struin, however, height differences are present in different forms, for example sandy hills. These sandy hills can be different every visit, due to play of other children or the weather. Height differences vary from small to big, providing challenges for every age class and skill level.

Shielded places. All Struin locations contain shielded places, for example in tall grass, bushes and huts. Only a few Wijs locations contain shielded places. The locations that did contain shielded places, often offered a variety of places. However, these places were still less varied and abundant compared to the shielded places at Struin locations.

Rigid fixtures. Almost all locations at both childcare centres contained rigid fixtures of some kind. Only one Wijs location did not have rigid fixtures, as it only had two thin and small trees that were not suitable for play. Rigid fixtures at Struin are mostly very abundant, varied and changeable. There are also different sizes, making it challenging for all children. The rigid fixtures at Wijs are often less abundant and varied. Most rigid fixtures are smaller trees, which afford for less activities than bigger trees.

Table 4.3 Characteristics of the observed play locations from Struin. Red indicates absence, light green minimal presence and dark green full presence.

Location	Open ground	Sloping terrain	Shielded places	Rigid fixtures	Moving fixtures	Loose objects	Loose material	Water	Creatures	Fire	In-doors	Street	Play-ground equipment
Apple field	One large and several smaller areas	A few elevated areas in the forest	Several places in the forest	Lot of trees and stumps	Lot of trees and branches	A lot and very diverse	A lot: sand, mud and organic material	Occasionally rainwater puddles	Bugs, birds, large and small mammals				
Bemmelsewaard	Several large areas	Small (sandy) hills	A lot: bushes, tall grass, trees	Lot of trees and stumps	Lot of trees and branches	A lot and very diverse	A lot: sand, mud and organic material	Big ponds, the Waal	Bugs, birds, large and small mammals				
Goffertpark	Large area	Quite high and steep hill	Several places in the forest patches	Several trees and stumps	Several trees and branches	A lot and very diverse at some spots	Average at specific places	Small pond	Bugs, birds, small mammals. Petting farm.			Paved paths	
Groenlanden	Several small areas	Height difference at several places	A lot: bushes, tall grass, trees	Lot of trees and stumps	Lot of trees and branches	A lot and very diverse	A lot: sand, mud and organic material	Pond	Bugs, birds, large and small mammals				
Heerlijkheid Beek	Several small areas	Extreme height differences	A lot: bushes, trees	Lot of trees and stumps	Lot of trees and branches	A lot and very diverse	A lot: sand, mud and organic material	Pond	Bugs, birds, large and small mammals				
Hengstdal	One large area	Some height difference at the border	Several places in the forest	Several trees and stumps	Lot of trees and branches	A lot and very diverse	A lot: sand, mud and organic material	Occasionally rainwater puddles	Bugs, birds, small mammals				
Heumensoord	Several large and small areas	A lot of slightly elevated patches	A lot: bushes, tall grass, trees, village of huts.	Lot of trees and stumps	Lot of trees and branches	A lot and very diverse	A lot: sand, mud and organic material	Occasionally rainwater puddles	Bugs, birds, large and small mammals	?			Natural playground present, mostly not used
Kops Plateau	Several large and small areas	Some height difference at several places	A lot: trees, bushes	Lot of trees and stumps	Lot of trees and branches	A lot and very diverse	A lot: sand, mud and organic material	Occasionally rainwater puddles	Bugs, birds, small mammals	Allowed, no specific fireplace			
Sprokkelbos	Several small areas	Height difference at several places	Several places in the forest	Lot of trees, big stumps, bridges	Lot of trees and branches	A lot and very diverse	A lot: sand, mud and organic material	Pond	Bugs, birds, small mammals				Very minimal, a few natural structures
Stadswaard	Several large areas	Several (temporary) sandy hills	A lot: bushes, tall grass, trees	Several trees and stumps	Several trees and branches	A lot and very diverse	A lot: sand, mud and organic material	The Waal, ditches	Bugs, birds, large and small mammals				
Struinland	Several large areas	Height difference at several places	A lot: willows, bushes, village of huts.	Several small trees, big trunk, bridges	Several small trees	A lot and very diverse	A lot: sand, mud and organic material	Pond, ditch, water pump	Bugs, birds, large and small mammals	Specific fireplace	Struin house, only for extreme weather		

Table 4.4. Characteristics of the observed play locations from Wijs. Red indicates absence, light green minimal presence, dark green full presence.

Location	Open ground	Sloping terrain	Shielded places	Rigid fixtures	Moving fixtures	Loose objects	Loose material	Water	Creatures	Fire	Indoors	Street	Playground equipment
Car wreck	Several large areas	Only a little by the ditch	Several places in the bushes	Several small trees of different kind	Average: small trees in the bushes	A lot and very diverse	Average: sand, mud, organic material	A few ditches	Bugs, birds, small mammals			Wide asphalt street	Statute of crashed cars
Building playground Voorn	Several large areas	Minimal height differences	Few low bushes	Minimal: few small trees, but not climbable	Minimal: few small trees, bushes	Not a lot and not very diverse	Lots of sand	Not in winter. In summer a pump	Bugs, birds		Small building, not always allowed	Lots of paved areas	Lot of equipment: swings, slides, monkey bars, etc.
Butterfly park	Several large areas	Minimal height differences	A lot of places in the bushes	A lot: bushes, trees, stones, stumps	Average: bushes, trees	A lot and average diversity	Average: sand, mud, organic material	Ditch	Bugs, birds, small mammals				Several structures scattered through the park
Orange playground	Several large areas		A few low conifers	A few low conifers, tree branches out of reach	Several trees, but no low branches. conifers	A lot and average diversity	Some sand	Occasionally rainwater puddles	Bugs, birds, small mammals				Lot of equipment: swings, slides, monkey bars, etc.
Parasites & orchard	Several large areas	Minimal height differences		Fruit trees	Minimal: tree branches	Average and not a lot of diversity	Average: sand, mud, organic material	Occasionally rainwater puddles	Bugs, birds, small mammals	Special fireplace	The parasites	Paved street through orchard	Several non-natural materials, but no structures
The ship	Several large areas	Minimal height differences		Only two thin and small trees		Not a lot and not very diverse	Sand	Ditch with shallow layer of water	Bugs, birds			Cycling path between playground and field	Lot of equipment: swings, slides, monkey bars, etc.
The stones	Several large areas		Several places in the bushes	Big stones, patch of small trees and bushes	Minimal: patch of small trees	A lot and very diverse	Average: sand, mud, organic material	Wide ditch	Bugs, birds, small mammals				

Moving fixtures. All locations but one Wijs location contained moving fixtures. The abundance of these moving fixtures was lower at Wijs locations compared to Struin locations. Most Struin locations had lots of different trees, branches and bushes, whereas most Wijs locations had patches of bushes and trees that were much smaller and less diverse.

Loose objects. Loose objects were present at all locations and were changeable, for example with seasonal changes. Virtually all Struin locations had a high diversity and abundance of loose objects. Wijs locations, however, often had a high abundance of loose objects, but these objects were often less diverse.

Loose material. Loose material was also present at all locations and was changeable with, for example, the weather, creating mud from sand or clay. At Wijs this loose material was sometimes only present in the form of sand in playgrounds. This kind of sand differs from the more natural kind because it is less dirty and harbours less life. At Struin, however, virtually all locations contained natural sand and organic material.

Water. At both childcare centres were locations that did contain water and locations that did not contain water. Therefore, access to water is about equal. At Wijs ditches were seen most, while at Struin ponds were seen most.

Creatures. Creatures were present at all locations in the form of insects and birds. Several locations also contained small or large mammals. Small mammals were present at almost all locations, except two Wijs playgrounds. Large mammals were only present at Struin locations. Creatures at all locations were very changeable, as different seasons bring different kinds of animals, especially insects.

Fire. Both childcare centres had a location where they were allowed to make fire. At Wijs this was only at their home base, at Struin there was (at least) one forest location in which making fire was allowed.

Indoors. Both childcare centres have access to an inside location at their home base (Struinland and Parasites & orchard). The feature indoors is present at one other play location of Wijs. However, children are not always allowed to go inside. The inside locations at Wijs are more diverse than the inside location at Struin, as they contain a lot of toys and other play or creative materials.

Street. The feature street is only present at one Struin location. At Wijs however, four locations contain this feature.

Playground equipment. Play equipment at Struin is only present in the form of natural play equipment, meaning the equipment is made of primarily natural materials, like wood. This was only seen at two locations, of which one the equipment was very natural and did not contain non-natural elements. The other location that contained playground equipment was Heumensoord. However, this part of the area is often avoided by the staff. At Wijs, there was only one location that did not contain playground equipment. Two locations did not have conventional playground equipment, like swings and slides, but did have other non-natural structures that could be used for play. For example, a statue of cars.

In general, environmental features at Struin are of higher quality, meaning they are more abundant, varied and are of different sizes. They are also more often changeable, because they are under the influence of the weather instead of the restrictive management of humans. However, the comparison made is only based on observed locations. Therefore, it might provide an incomplete analysis, as a lot of the more natural play locations of Wijs were not visited during the observations, because of seasonal restrictions. Hence, differences might be smaller than this section suggests. Nonetheless, Wijs children do spend a lot of time in these less natural play locations, so they do make up a large part of their nature experiences.

Play locations not only differ in environmental features, but also in surface area. Locations visited by Wijs are mostly playgrounds and parks and are therefore often closed off by a road or a fence

(Figure 4.2). Hence, of a lot of these locations, children visit the same part all the time. At Struin, however, play locations often cover a bigger surface, sometimes as big as an entire forest (Figure 4.1). Therefore, children can decide each time which part of the play location they want to go to that afternoon. As the areas also have a wilder character and are not regularly managed, they are more susceptible for change. This and the fact that they can vary in which part they visit, makes the area more interesting, as something new might be found every time.

The naturalness of the play locations of both childcare centres also differs. Wijs locations more often contain non-natural environmental features (indoors, street and playground equipment). At Struin these are only present three times, whereas at Wijs they are present as much as twelve times. Only one Wijs location was fully natural and did not contain any of the non-natural features. The few non-natural features present at Struin locations are only minimally present (e.g. wooden play equipment). At most Struin locations, minimal human influences are visible and audible, giving the impression of being fully surrounded by nature. The observed Wijs locations, however, are always in an urban setting, surrounded by houses and cars.

4.4 Differences and similarities

At both childcare centres, the children had the opportunity to play with and without nature, thus having direct and indirect experiences with nature. However, both the observed as well as the potential activities (policies as well as affordances by the environment) differed between childcare centres.

The environmental features at Struin are often more diverse and hardly contain any non-natural elements. As Struin staff does not bring any conventional play equipment, like balls, with them, children only have nature and each other to play with. Therefore, apart from social interaction and games, Struin locations almost only afford experiences with nature. Also, because they are always in a natural area with minimal city influences, children always experience nature around them, even when they just sit on the grass and chat. Therefore, indirect experiences at Struin are less indirect than indirect experiences at Wijs. At Wijs, however, non-natural environmental features are present more often, thus affording more experiences without nature. Furthermore, the staff almost always brings a ball and sometimes more conventional play equipment. Thus, even at fully natural locations, children at Wijs can choose whether they want to have experiences with nature or without nature. Thus, nature experiences at Struin are mostly direct experiences, whereas nature experiences at Wijs can be either direct or indirect.

Whether children will or will not interact with natural environmental features can be hampered or enhanced by the staff. At Struin the staff helps the children to focus on nature and supports the children in their direct experiences with nature. The staff of Struin therefore plays a crucial role in the direct nature experiences the children have, by focusing their attention on nature, taking them on exploration tours through nature and helping the children with identifying and understanding the nature they encounter. Struin children also have a lot of freedom and therefore experience nature differently and sometimes without direct adult supervision. Staff from Wijs, however, focusses more on having fun with playing outside and focusses less on nature education. Children also have less freedom and cannot explore nature by themselves or with their friends without direct adult supervision.

In conclusion, Wijs seems to be more an 'outside' childcare centre, whereas Struin is a 'nature' childcare centre. The difference lies in the fact that Struin supports the children in having direct experiences with nature in wild nature areas and Wijs focusses on letting the children have fun with playing outside, irrespectively of the naturalness of the area. The abundance, diversity, size and changeability of the environmental features together with the observed and afforded activities suggest that nature experiences at Struin are more intense and varied than at Wijs.

Chapter 5. Connection to nature and environmental stewardship

This chapter will answer the second and third research question: *what is the connection to nature of children going to after-school childcare centres visiting wild or domesticated nature, and which environmental stewardship behaviours are identified and expressed by children going to after-school childcare centres visiting wild or domesticated nature?* Data that is used in this chapter is derived from the individual interviews with children and the survey for parents. This chapter consist of four paragraphs: setting the scene, experiencing nature, human-nature relationships and environmental stewardship. Quotes from Struin children are referred to with an S and quotes from Wijs children with a W. Occasionally, interview questions are given in bold font. Children's responses are given in italic font.

5.1 Setting the scene

This paragraph discusses general information about the participants, their parents and their nature experiences. Information was derived from the questionnaire for parents and question 1.1-1.5 (nature in the child's live) in the individual interviews with children.

The children

A total of 28 children were interviewed during this research. Table 5.1 shows the characteristics of these children. An equal number of boys and girls were interviewed. The average age of all children is 8.3 years. Most children have gone to Struin or Wijs for approximately one to three years (Table 5.2). Several Struin children, however, have gone there for three to six years already. Almost all children visit Struin or Wijs only once or twice per week. Therefore, children can also experience nature outside the childcare centre. Things that can influence the frequency and content of these other nature experiences are for example parents, nature nearby, lessons at school and media. The other influences are discussed in the rest of this section.

Table 5.1. Characteristics of the children

	Wijs	Struin	Total
Number of children	13	15	28
Boys	8	6	14
Girls	5	9	14
Average age (years)	8	8.5	8.3
Days per week	1.7	1.5	1.6

Table 5.2. Number of children that go to the childcare centre for a certain number of years

	Wijs	Struin	Total
Approximately 1-2 years	2	1	3
Approximately 2-3 years	6	1	7
Approximately 3-4 years		3	3
Approximately 4-5 years			0
Approximately 5-6 years		5	5

The parents

Parents had different reasons to send their children to these childcare centres. Most parents appreciated the active nature of the childcare centres, free play, the fact that children are outside the whole afternoon and the benefits of this for their child's development. Only a few parents refer to learning about nature and learning respect for nature.

Parents are known to be able to influence their child's connection to nature. The average connection to nature (NR-6 Scores) of the children's parents was 3.4 out of 5 (Table 5.3). The reliability of the used scale is good (Cronbach's Alpha=0.898). The lowest score was 1.8 and the highest score was 4.3. The average score of how much the parents encouraged their children was 3.9 out of 5 (Table 5.4). The reliability of this scale is questionable (Cronbach's Alpha=0.652), but the scale only consists of three questions. The lowest score was 3 and the highest score was 4.7.

Table 5.3. Average score (1-5) for each statement and total NR-6

NR-6 statement	Wijs	Struin	All
My ideal holiday destination is in the middle of nature	4.5	4.1	4.3
I always think about how my actions can influence nature	3.4	3.4	3.4
My connection to nature is part of my identity	3.3	3.3	3.3
I often see (wild) animals, wherever I am	3.4	2.8	3.1
My relationship with nature is an important part of who I am	3.4	3.1	3.2
I feel very connected to all living things on earth	3.5	3.4	3.4
Total NR-6 Score	3.6	3.4	3.4

Table 5.4. Average score (1-5) for each statement and total encouragement score

Encouragement statement	Wijs	Struin	All
I talk about nature with my children a lot	3.3	3.4	3.3
I encourage my children to spent time with nature	4.0	3.9	3.9
I encourage my children to take account of nature	4.6	4.2	4.4
Total Encouragement Score	4.0	3.8	3.9

Several (other) scales were used in the parental survey, related to the parent's own and their child's connection to nature. Parents with higher NR-6 scores rated the importance of nature to their child higher (Pearson correlation, $N=18$, $p=0.005$). They also rated their own perception of their child's connection to nature higher than parents with a lower NR-6 score (Pearson correlation, $N=18$, $p<0.001$). Therefore, parents who are more connected to nature also think nature is important in their child's life and their child is connected to nature. However, there was no significant correlation between the child's own reported importance of nature and the parent's connection to nature (Pearson correlation, $N=18$, $p=0.372$). There is also no significant correlation between the parent's perceived importance of nature to their child and the child's own reported importance of nature (Pearson correlation, $N=18$, $p=0.428$). Hence, how parents describe the importance of nature to their child and their child's connection to nature may not always be a true reflection of reality.

Although parents from Wijs seem to be slightly more connected to nature and encourage their children slightly more, there were no significant differences between both childcare centres (Figure 5.1 and Figure 5.2). The NR-6 scores did not differ significantly (ANOVA, $F=0.345$, $p=0.565$) and how much the parents encouraged their children to interact with nature (Encouragement Score) also did not differ significantly (ANOVA, $F=0.3$, $p=0.592$).

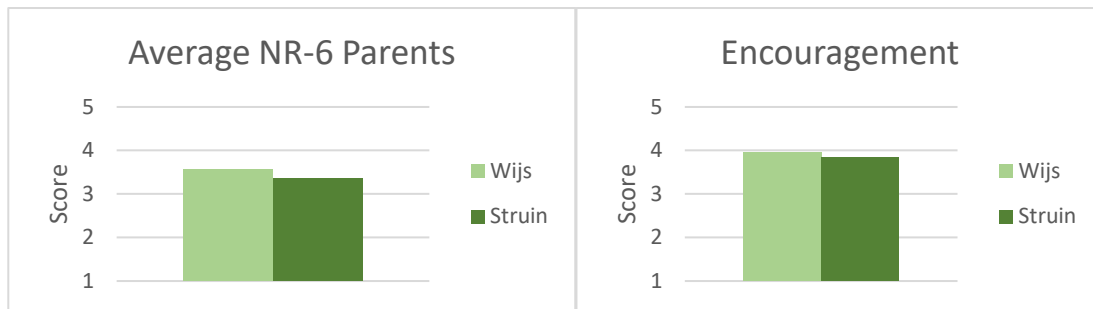


Figure 5.1. Average NR-6 scores of parents.

Figure 5.2. Average scores of how much parents encourage their children to connect with nature.

Nature experiences

Parents also influenced how much family time was spent in nature. In the survey parents were asked how often they visited nature with their family. Most children visited a natural area at least once a month. One parent said they went once every two months and another said once every six months. There was only one parent who said they hardly ever consciously visited nature. Parents who were more connected to nature did not always visit nature more often and vice versa. Some children spontaneously described natural areas at relatives, for example gardens of grandparents. These locations may also be important in the child relationship with nature.

How often children visited nature with their families differed between childcare centres. Struin children more often visited nature weekly (W: 1 child, S: 3 children) and visited nature at least once a month (W: 3 children, S: 6 children; excluding the children that go weekly). This difference might be the result of the accessibility of natural areas close to the cities. Around Nijmegen there are several forest and floodplains that are easily accessible from the city. From Utrecht Leidsche Rijn, nature areas like forest are further away and are therefore less accessible. This is also illustrated by the following quote from a parent who would prefer to visit nature more often.

"I feel we live on the wrong side of Utrecht, so that going into nature is difficult. I feel the park is only green and not 'nature'." Parent W8

Children can also experience nature in weekends and on afternoons they do not spent at the childcare centre. Therefore, children were asked about nature nearby and favourite play locations after school. All children said their houses had a garden and almost all children said there was (a little) nature in their neighbourhood. Children described trees, lawns and playground as natural areas. Only a few children said there was no or not a lot of nature in their neighbourhood. Most children liked to play outside after school, for example in playgrounds. Some children said they liked both and it depended on how they felt. Several children always preferred to play inside. There were no clear differences in the amount of nature in the neighbourhood and the preference for play location after school between Struin and Wijs children.

Other important sources of nature experiences and learning about nature are lessons at schools and experiencing nature through media. A lot of children said they did not get education about nature at their school. Some said they did. Most of them had lessons from books or videos, but a few also went outside sometimes. A lot of children sometimes or regularly watched TV shows or movies about nature at home. Things children said they learned from watching these were, for example, how important nature is for the world, how dangerous animals can be, how the earth originated and facts about animals and plants. Other sources of vicarious nature experiences are books and magazines. A parent said their child loved nature magazines and one child said she became a vegetarian because of things she saw in a book and in a painting. This illustrates that these vicarious nature experiences can have a strong influence on the child's life. Whether children experienced nature at school, had

lessons about nature from books or media or enjoyed watching nature movies themselves did not seem to differ between childcare centres.

"Yes I became a vegetarian myself. My parents are not, but I think... I once saw a painting, and my mother said 'look this is how chickens are killed' and I had read a book about how cows and horses are killed and then I became so sad, I did not like meat anymore." (W1)

Nature experiences during the afternoons at the childcare centre appear to play an important role in the children's lives and make up a big part of the total amount of nature experiences the children have. As it is a (bi)weekly experience, most children spent more time in nature at the childcare centre than they do with their parents. Nature nearby, play locations after school and lessons at school seemed to make up a smaller part of the child's nature experiences. Nonetheless, the role of media and other vicarious nature experiences should not be underestimated as source of knowledge about nature.

5.2 Definition and importance of nature

The previous section discussed the types of nature experiences the children had in their lives and how this differed between children from the different childcare centres. Before questions related to the connection to nature dimensions were discussed with the children, a few general subjects were discussed as a baseline to discover how they define nature and how important nature is to them. This information was derived from questions 2.1-2.2, 2.4-2.5 (what is nature) and 3.1 (meaning of nature) in the individual interviews.

5.2.1 Defining nature

The following section discusses what the children define as nature and how this differed between childcare centres. When asked about their associations with nature, children mentioned trees, forests, plants, animals and grass most. Most elements that were mentioned were general (e.g. trees, plants) or specific natural elements (e.g. deer, frogs, nettles). A few children said something related to play, pollution, specific locations in nature or overarching terms (e.g. life). Children who mentioned something related to pollution said things about keeping nature clean and exhaust fumes.

Children were also asked to indicate whether they thought each of four pictures shown to them was nature (see Figure 3.1 on page 18 for pictures). These were pictures of a playground, a tree in a neighbourhood, a park with flowerbeds and a backyard. Answers children gave were converted to three categories: yes, no and in between. The in between category contains children who specifically mentioned they doubted or thought some elements were nature and some were not, but also children who did not specifically say yes or no to a picture. This is depicted in Figure 5.3, Figure 5.4, Figure 5.5 and Figure 5.6.² For most children the playground was not (entirely) nature, whereas the tree, the flower park and the backyard were often said to be nature. When children were asked to place the pictures in order from most natural to least natural, the playground was mostly mentioned last and the tree or flowers were mostly mentioned first. Children could have different reasons for thinking a picture was nature or not. The presence or absence of human-built elements like houses were for some children the reason to think a picture was not nature. For several children, the presence of individual natural elements was enough to think something was nature. Children referred to, for example, the presence of grass and tree(s). For some children, it mattered whether these natural elements were landscaped by humans or not.

Of the children who said the playground was not nature, most said so because there were too few trees, there were too many people, trees were chopped to make space for the playground equipment

² These figures should be interpreted with care, as they are the result of my interpretation of the children's answers when a clear yes or no was missing and because the sample size is unequal (Struin n=15, Wijs n=13).

or because there was playground equipment present. All children who did say the playground was nature, explained this by referring to the separate natural elements (grass, trees, etcetera) and to the fact that there are a lot of trees around the playground. Some children were in doubt, because the playground itself was not nature, but the surroundings were.

"Because it is very busy there and in nature it is always quiet. And because there is just a big playground." (S4)

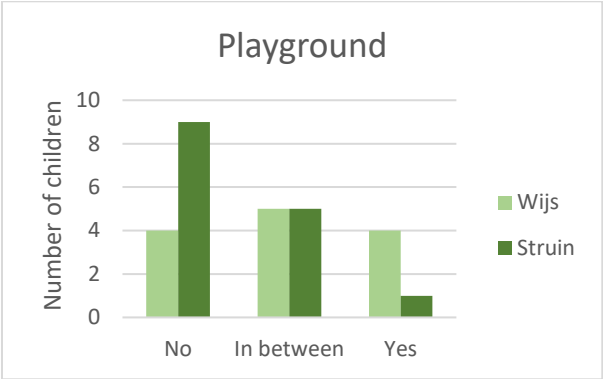


Figure 5.3. Number of children who said the picture of the playground was nature, in between, or no nature.



Figure 5.4. Number of children who said the picture of the tree was nature, in between, or no nature.

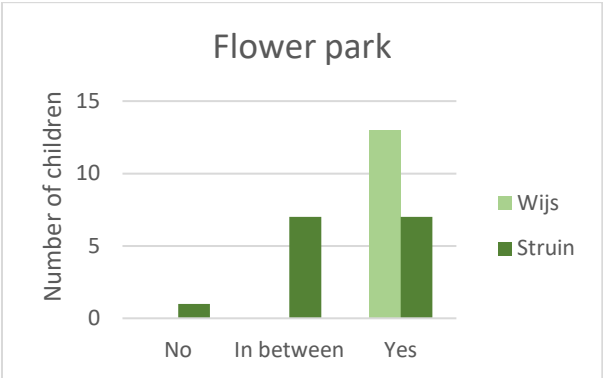


Figure 5.5. Number of children who said the picture of the flower park was nature, in between, or no nature.

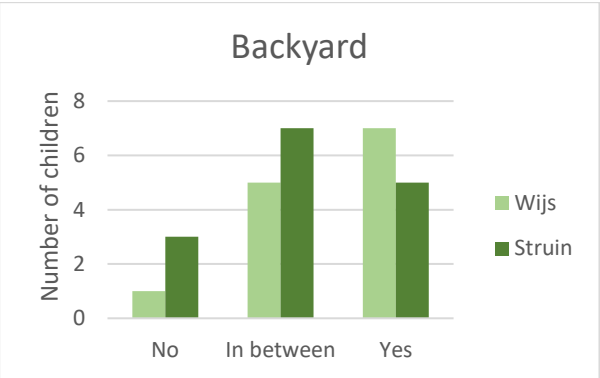


Figure 5.6. Number of children who said the picture of the backyard was nature, in between, or no nature.

Most children who said the tree was not nature, said so because they thought there were not enough trees or bushes, there were houses and cars present or it is man-made. Children who said it was nature always referred to the individual natural elements. The children who were in doubt mostly said they thought the different natural elements that were present were nature, but the houses were not. The flower garden was nature because of the individual natural elements. Most children who doubted did so because there were a lot of natural elements, but it was man-made, or because there were buildings in the background. There was only one child who said it was not nature:

"This is more like a garden, I also do not think that is nature. (...) Because it is a garden and it looks very much like a garden of a palace (...) and there are not so much trees and nature for me is always with trees like forests and really big pastures. (...) And it is also busy there." (S4)

The majority of the children who said the backyard was nature referred to the individual natural elements. All children who said the backyard was not nature said so because they thought gardens were no real nature. Children who doubted referred to the individual natural elements, but thought the house did not belong in nature.

Slight differences between childcare centres can be seen in what they define as nature. All children who referred to associations related to play belong to Wijs, for example "play in nature", "playgrounds" and "building things". The number of different associations is almost equal (W: 31, S: 28). Wijs children do, however, seem to mention slightly more different specific natural elements than Struin children did (W: 13, S: 9). Struin children tended to keep it more general and referred slightly more to overarching elements and specific locations than Wijs children, like "life", "everything that lives in nature", "jungle" and:

"well actually almost everything except the things that are made by humans" (S9)

Whether they identified the pictures as nature also differed between childcare centres. Struin children more often said the playground was not nature, compared to Wijs children (Figure 5.3). Virtually all these children said so because they thought the playground equipment was not nature, for example because it was made of non-natural materials or it was man-made.

"Because the playground is made by humans" (S9)

Wijs children who thought the picture of the tree was not nature, referred to the lack of trees. At Struin, however, most of these children were bothered by the presence of houses. Wijs children seemed to mind the houses less.

"Because there are only a few trees in this picture" (W8)

"Well actually not, because there are houses" (S5)

"You do see houses, but that also belongs there. (...) Not to nature but... in the area" (W12)

All Wijs children said the flower garden was nature (Figure 5.5). Approximately half of the Struin children did too, but the other children were in doubt or said it was not nature. Most of these children did mention the natural elements, but also said that it was man-made and was therefore not really nature. Two Struin children who did think it was nature also mentioned something about it being landscaped by humans, but did think it was nature. One Wijs child said the same. This child was the only Wijs child saying something about it being landscaped nature.

"It is not really wild nature, it is a little bit planted, a bit self-made nature actually. (...) Well you see it has a different shape, exactly that shape is made, and that is... nature is a bit wild, so, this is perfectly straight, I do not think that is very much nature, wild nature" (S13)

When asked whether the backyard was nature, Wijs children more often referred to the individual natural elements as reason for the picture being nature. Several Struin children again mentioned that gardens are man-made. Some think this can be nature, others were in doubt.

"Not nature because it is really, really a garden" (S4)

The main difference between Wijs and Struin children appears to be the levels of non-natural elements, e.g. houses, they tolerate and whether they acknowledge or mind that something is man-made or not. Struin children seem to be more critical, they often make the distinction between wild nature and nature made by humans, whereas Wijs children more often think individual natural elements already make something nature. The associations of Wijs children also contained more individual natural elements. This might suggest that Wijs children see nature in their different elements, whereas Struin children more often see nature in a full system. For example, Wijs children more often associated nature with 'tree', whereas Struin children more often used the term 'forest'.

5.2.2 Importance of nature

Children were asked to score on a 7-point Likert scale how important nature was to them and were asked to explain why they felt this. Virtually all children said nature was important to them. Most children said nature was very important and only two children said nature was only a little important. The reasons children gave were related to feelings, knowledge or a combination of both. Some children said nature was important because it is nice to be in nature, because nature is beautiful or because it is fun to play in nature. Other children said nature is important because we need it to live, for example to get oxygen, because it is healthy for us to play in nature or because animals live there.

"Without nature you cannot play outside, and without nature you cannot... do walks in the forest, and do walks in the mountains, and you cannot ski, you can do almost nothing." (S7)

"Because I love the animals very much and it is just very beautiful, all of nature" (S1)

"Well you get oxygen from the trees and you get fresh air, you can live a bit better from that. Nature actually brings life." (S13)

During the whole interview, several children used the word 'beautiful' to refer to natural elements or nature in general. A few children seemed to really enjoy and appreciate nature's beauty as something important for them.

"You enjoy the beautiful things. (...) [nature is] Very important! (...) it is beautiful for the people." (W7)

"Because I love the animals very much and it is just very beautiful, nature and all. And you see (...) the birds flying through the air and the clouds and that is just wonderful to see." (S1)

"I just think it is very beautiful to walk through it and I find nature very beautiful because it does everything it wants." (S6)

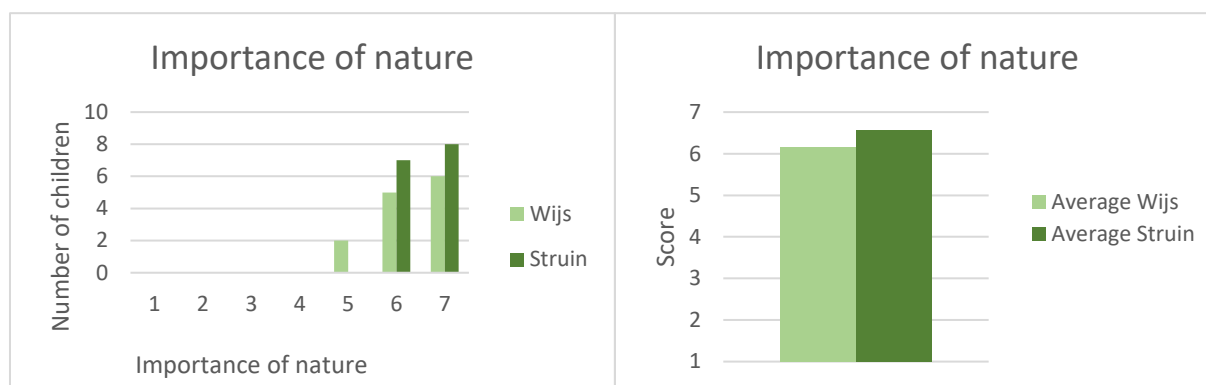


Figure 5.7. Number of children who chose a certain score (left) and average importance score per childcare centre (right). Scores were given on a 7-point Liker scale and ranged from very unimportant (1) to very important (7).

Figure 5.7 (right) suggests that Struin children rate the importance of nature to them slightly higher than Wijs children. However, this difference was not significant (ANOVA, $F=1.690$, $p=0.205$). Only two children said nature was only a little important (Figure 5.7, left), both these children belong to Wijs. Struin children seem to have chosen 'very important' more often than Wijs children. Therefore, significant differences might not have been found due to the small sample size.

5.3 Feelings in nature

The previous paragraph discussed some general information about what the children define as nature and how important nature is to them. The following paragraph will discuss how the children feel when they are in nature and is related to the connection to nature dimension 'feelings in nature' (Figure 2.1). Relevant themes within this dimension were 'comfort' and 'joy'. First, general feelings children have when they are in nature will be discussed. Then the children's feelings of comfort and joy during certain activities or on certain locations will be discussed.

Children were asked to describe their ideal outside play location, can give insight in how they feel in nature and what they like or enjoy in nature. Most children described a fully natural location or a combination of natural and non-natural elements (Figure 5.8). Only two children described a location without nature. Elements that were mentioned a lot were slides and other playground equipment, and trees, shrubs and grass.

Struin and Wijs children differed in the kind of elements they described and in the naturalness of their ideal play location. Struin children mentioned treehouses and huts (W: 0 children, S: 6 children), presence of animals (W: 0 children, S: 3 children) and climbing trees (W: 1 child, S: 5 children) more often. Wijs children more often mentioned non-natural elements, like rollercoasters (W: 3 children, S: 0 children). The naturalness of the ideal play location also differed per childcare centre. Struin children more often chose a natural setting with non-natural elements, for example a forest with a slide or cableway, and Wijs children more often described a non-natural location with natural elements, like a playground with also some trees or sticks (Figure 5.8). Several Wijs children only described nature after asking them whether they felt it was important in their ideal play location. More Struin children than Wijs children described a fully natural location. Struin children also seem

to prefer a more diverse natural area. They do not only refer to trees, shrubs, grass and flowers, as Wijs children do, but also to hills and mountains, which were not mentioned by Wijs children.

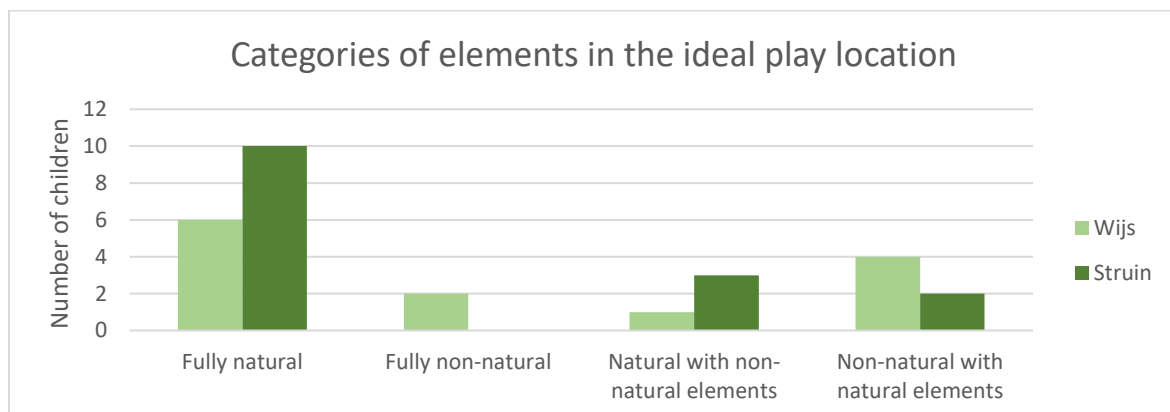


Figure 5.8. Number of children that described ideal play locations with a specific amount of naturalness

Children were also asked to describe how they feel when they are in nature, using words based on the Self Confrontation Method (SCM) or by explaining this themselves. Feelings that were not from one of the categories were assigned to one of the SCM categories closest to it. The feelings children described mostly belonged to the green category of the SCM, which is the category with positive or pleasant feelings (Figure 5.9). The blue (Contact or Union with Others feelings) and red (Self Enhancement feelings) categories are second and only a few children chose feelings from the yellow (Negative or Unpleasant feelings) category. The green category contained the feelings that were mentioned most: 'happy' ("blij", W: 7, S: 7), 'free' ("vrij", W: 7, S: 8) and 'pleasant' ("fijn", W: 9, S: 8). Most dominant feelings in the blue category were 'that I belong' ("dat ik erbij hoor", W: 3, S: 1) and 'friendship' ("vriendschap", W: 3, S: 2). Friendship could be with nature but also with other children. Feelings that were mentioned most in the red category were 'proud' ("trots", W: 1, S: 2) and 'self-confident' ("zeker van mezelf", W: 3, S: 1).

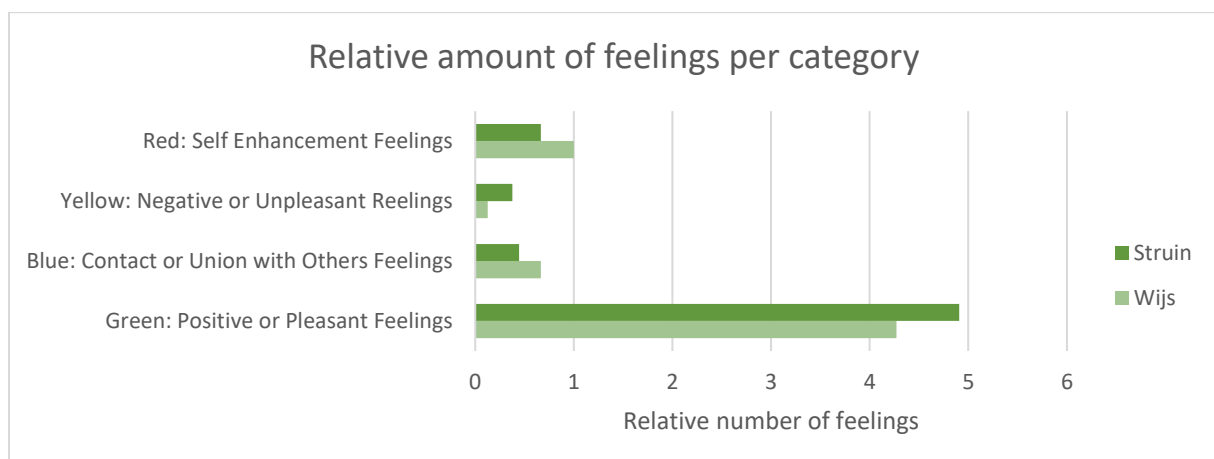


Figure 5.9 Number of feelings mentioned in each category of the Self Confrontation Method, divided by the total number of feelings in that category.

Struin children seem to mention slightly more positive feelings and Wijs children seem to mention slightly more self-feelings (Figure 5.9). Struin children mentioned 'enjoying' ("genieten", W: 3, S: 6) and 'quiet (inside)' ("rustig (van binnen)", W: 2, S: 4) more often. Wijs children mentioned 'that I belong' ("dat ik erbij hoor", W: 3, S: 1), 'at ease' ("op mijn gemak", W: 5, S: 3) and 'self-confident' ("zeker van mezelf", W: 3, S: 1). More often. At Struin two children chose an option from the yellow category, namely that they felt worried. They explained that they sometimes worry that nature might be destroyed by humans:

"But I also worry that other things will come here. (...)" "You mean that nature is taken away here?" "Yes. Especially... and some animals are already threatened like the elephant and the tigers." (S1)

"Uh that the factories constantly let out smoke, and that this then goes to the North pole and then the ice rocks melt." (S5)

5.3.1 Feelings about activities in nature

To understand how children feel when they do certain activities in nature, they were asked to rate eight pictures of activities in nature on a 5-point Likert scale and explain why they would like or dislike the activity (see Figure 3.3 on page 19 for pictures). The activities differed in activeness, dirtiness and wildness to be able to get insight in the themes 'comfort' and 'joy'. As shown in Figure 5.10, the activity climbing trees was appreciated most and the activities fishing in a pond, holding an earthworm and playing in mud was appreciated the least. A common characteristic of these latter pictures is dirt and disgust. The main reasons to dislike the activities fishing in a pond and playing in mud is an aversion of getting dirty or wet. A fear or disgust of the worm was mostly mentioned when children disliked the holding an earthworm activity. Of the activities that were appreciated more, most did not require a high comfort level like the former and latter activities. There does not seem to be a general rule for when children enjoy an activity or not. Reasons are often related to just enjoying the activity and being active, enjoying the possibility of interacting with animals or enjoying the possibility of exploring and learning about nature. Children appear to have different reasons to like or dislike an activity, but they all seem to be related to feeling comfortable in the situation and enjoying the activity.

Comfort and joy levels within an activity differed between the children. Some children appreciated an activity because they enjoyed finding and catching bugs and other animals, some disliked the same activity because they did not enjoy these things. Some children also appreciated an activity because they enjoyed exploring and discovering nature, while others disliked the activity because they felt it was boring and they would, for example, rather play than explore and discover nature. This is illustrated by a Struin girl and Wijs boy. The Struin girl, together with two of her close friends, would rather play. These girls' desire to play rather than investigate may also be something in their personality rather than a disinterest in nature.

"Because then you lay on the ground and you are looking very long for only one bug or so. I can actually play outside the whole time instead of laying here." (S8)

"Because I think it does not look very fun. Only green and you can get lost." (W4)

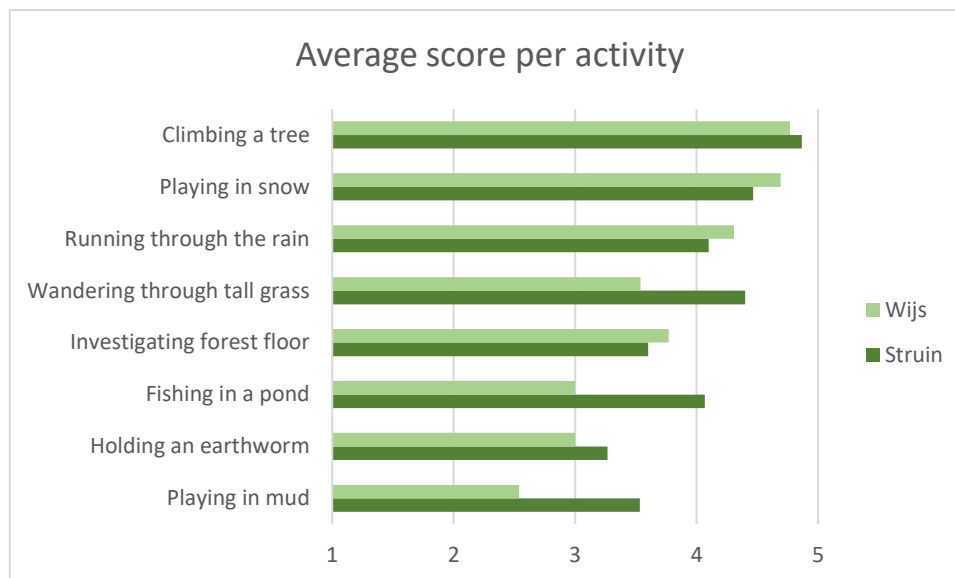


Figure 5.10. Average scores per activity for each childcare centre. Scores were given on a 5-point Likert scale and ranged from really dislike (1) to really like (5).

Other children disliked an activity because they felt too uncomfortable to enjoy the activity. Being uncomfortable with dirt was a reason mentioned often, but children react to dirt in different ways. There are children who do not like to get dirty, children who like to get dirty, and children who do not love to get dirty but accept it because the activity is fun. Most children who said they did not like fishing in the pond so much did also not like playing in the dirt. Next to this fear or aversion of dirt, children could for example be afraid of or disgusted by bugs, be afraid of or have an aversion to being touched by plants and be afraid of dangers. For example, virtually all children enjoyed climbing trees, but a few children mentioned dangers like falling out of the tree.

"Because maybe bugs will crawl on me." (W10)

"I think climbing trees is fun, but when I am this high and I am not secured then not. And when it is not a playground and I do this by myself and I am not secured to such a thing then I can fall out of the tree." (W3)

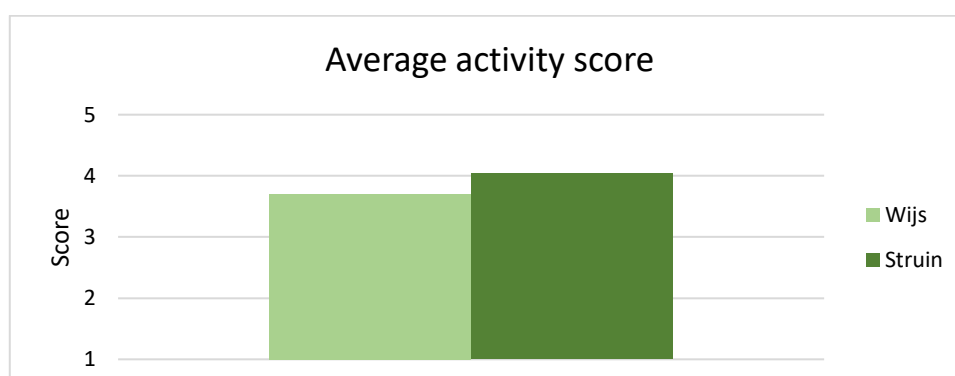


Figure 5.11 Average score of 8 activities in nature. Scores were given on a 5-point Likert scale and ranged from really dislike (1) to really like (5).

The eight pictures that were rated by the children can be seen as items in a scale measuring whether children like activities in nature. Item scores were summed and averaged into a scale score.

The reliability of the scale is acceptable (Cronbach's Alpha=0.739). Struin children seem to like activities in nature slightly more than Wijs children. However, this is not a significant difference (ANOVA, $F=1.798$, $p=0.192$). Nonetheless, there were several differences between Struin and Wijs, which are discussed in the rest of this section.

When looking at Figure 5.10, the main differences between Struin and Wijs appear to be in the activities wandering through tall grass, fishing in a pond and playing in mud (see Appendix F for distribution of the scores). These activities require a certain comfort level of the children. Struin children seem to be more comfortable with dirt, bugs, and dangers. Struin children enjoy dirt more often and show an aversion to dirt less often than Wijs children. There were, however, also some Struin children who showed an aversion to getting dirty and some Wijs children who liked to get dirty. At Struin, some children did not even mention something about getting dirty, as they only said the activity seemed fun. These children did not seem to judge the activity in terms of dirtiness. At Wijs, all children referred to getting dirty or wet in some way, either positive or negative. Most Wijs children scored fishing in a pond and playing in mud with a neutral or negative smiley. It seems that even though at both childcare centres there are children who do not like to get dirty, Struin children mind the dirt less.

The way Struin and Wijs children handle fears and dangers also seems to differ. Wijs children show more aversion to or fear of bugs and being touched by plants. Two Wijs boys show a fear of getting lost when wandering through tall grass. Three Struin children, however, said finding your own way through the tall grass was fun. What some children from Wijs found scary, some children from Struin saw as fun and challenging.

"The neutral one, why?" "Because when I am completely in the forest, I cannot find the way anymore." (W2)

"Because sometimes you do not remember which way to go, so you first have to go back to the trail you have left yourself." (S5, rated the activity 'really fun')

Possible dangers related to climbing trees also seem to be handled differently. Three children from Wijs mention something related to danger, for example falling out of the tree or getting stuck. These children do like climbing trees, but seem to have certain fears about the dangers related to it. At Struin also three children mention something about the dangers, but none of these children show a fear of these dangers. For example, two children mentioned something about the thickness of the branches and said they preferred thicker branches because it was safer. One boy even liked the possibility of falling out of a tree.

"Only it does not seem so nice to me to stand on such thin branches so high" (S6)

"Because I sometimes fall out of the tree and I find that funny" (S5)

"That I do think is fun (...) but you can also get stuck on branches or fall badly and that I find less fun." (W11)

Reasons for enjoying the activities also differed. Whereas a lot of Struin children saw a lot of fun possibilities in wandering through tall grass, like exploring and finding things, several Wijs children mentioned that they would rather play instead of walk or thought the activity was boring. None of the Wijs children mentioned that it might be fun to find bugs or to explore new paths.

Searching for and catching bugs and other animals is also appreciated more by Struin children. For many Struin children, this was the main reason for liking the fishing in the pond activity. Only two Wijs children also thought this would be fun to do. This is also the case for investigating the forest floor, more Struin children mention enjoying to find bugs as a reason to like the activity. Struin children also seem to like exploring and strolling through nature more.

In conclusion, it seems that feeling comfortable in nature determines for a great part whether the child likes or dislikes the activity. For some activities, levels of comfort were needed that exceeded the comfort zone of the child, making it difficult for the child to enjoy the activity. However, a child could also simply dislike an activity because the activity itself was boring or not challenging enough. The importance of comfort and joy for liking an activity seems relevant for both childcare centres. Also, not all children who felt less comfortable in nature were poorly connected to nature. Some of the children who expressed a great love for nature and who enjoyed spending time in nature, absolutely hated to get dirty and to play in mud. Some children also expressed a love for nature and spending time in nature, but did not like looking through a magnifying glass observing bugs, they rather played.

5.3.2 Feelings about locations in nature

The themes 'comfort' and 'joy' may also influence the children's preference for locations in nature. To get insight in where children felt more comfortable and which locations were enjoyed more, children were asked whether they preferred to be on or off the paths in a forest and whether they preferred to play on grass or in bushes. Most children preferred to go off the paths in the forest (Figure 5.12). Going off the paths seemed to offer more possibilities than just staying on the paths, for example exploring, creating your own paths and finding sticks or climbing trees. Preference for playing on grass or in bushes is less clear. It differs per child and per childcare centre what is preferred (Figure 5.13). Grass is mostly preferred because it offers space for play or because of a fear or aversion for bushes. Bushes are mostly preferred because you can hide in them and make huts.

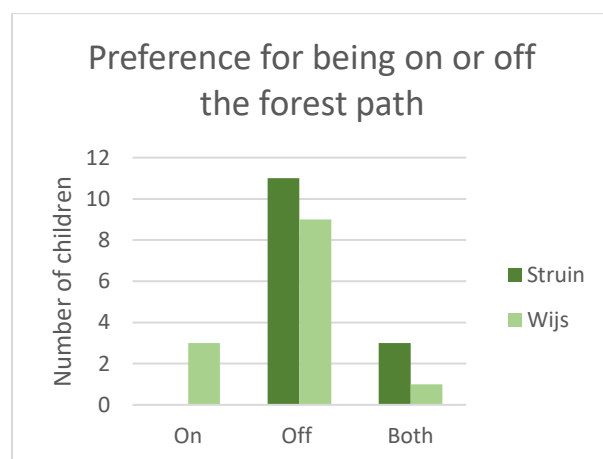


Figure 5.12. Number of children that chose to rather play on the path, off the path or both.

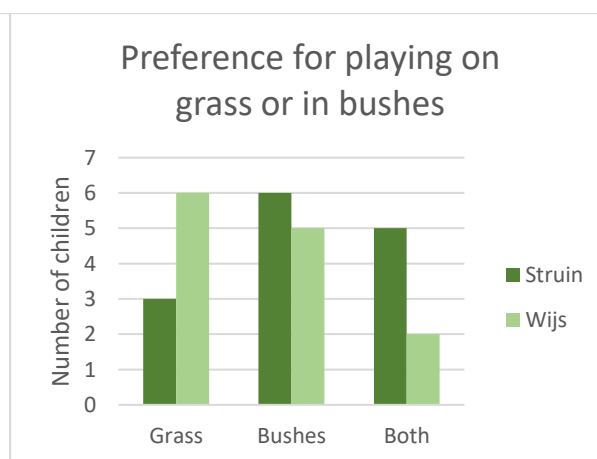


Figure 5.13. Number of children that chose to rather play on the grass, in bushes or both.

Preference for being on or off the forest path differed between childcare centres. Most Wijs children preferred going off the paths, but some specifically said they preferred to stay on the paths. Struin children never preferred staying on the paths over going off the paths. Reasons for their

choices also differed. Struin children mentioned exploring and discovering more as reasons to go off the path. They also refer more to going off the paths because then you see more of nature. Reasons for Wijs children to stay on the path were always related to a fear of danger or getting lost. Struin children never mentioned these fears and only preferred to stay on the paths when it was better for nature or when it was not allowed. All these children, however, said they preferred going off the paths and are therefore categorized in 'both' in Figure 5.12.

"On the paths, because then you cannot get lost." (W8)

"Well just like with skiing, if you go off the paths it is dangerous. And... yes there are bugs everywhere, yes I do not really like that." (W11)

"Uh yes actually I prefer going off the paths, but if that is not allowed, then it is not allowed. Then I do find that a pity, but well..." (S10)

"Well the paths are so empty... I you, for example, go off the paths then you see how nature actually grows. Because here it is just open ground and I find that less fun than if it is really overgrown and you have to squeeze through it." (S13)

When comparing their preference for playing on the grass or in bushes (Figure 5.13), Wijs children more often prefer playing on the grass only. Struin children seemed to enjoy bushes or a combination of grass and bushes more than they would enjoy just playing on the grass. For children from both childcare centres the bushes were an exciting place. The reasons for Wijs and Struin children to enjoy the bushes seemed to differ a bit, although they also show similarities. Struin children mentioned hiding in nature or playing hide and seek more and Wijs children mentioned building huts more. For some Struin children, grass did not seem so exciting:

"Yes there [the bushes] you can play hide and seek. And you can, yes you can just... sit in it, let me put it that way. Grass is grass (...) Yes grass, just grass." (S13)

For four Wijs children, a fear of something was the reasons to prefer the grass. For example, a fear of stinging bushes, bugs or being out of sight. Only one Struin child preferred the grass because of a fear of stinging bushes. Another Struin child also mentioned ticks as a reason to stay out of the bushes, but only in summer.

"Uh yes also... grass there are not so much bugs and in the bushes there are, you do not know what is in there, ticks or so." (W11)

"Yes in summer I rather play on the grass, because then there are ticks in the bushes. And in winter, yes I think both." (S6)

Overall, it seems that Struin children more often choose the 'wilder' option, namely going off the forest paths and playing in the bushes. They more often show an interest in exploring nature and show less fear of nature. However, this is not a general rule, as there are also Wijs children who enjoy exploring nature and are not afraid of nature, and Struin children who dislike bushes.

5.4 Human-nature relationships

So far we have seen how important nature is to the children, how they feel during experiences in nature and what their preferences for locations and activities are. The next paragraph will discuss more general feelings towards nature, like empathy and a feeling of oneness, and knowledge about nature. This is related to the connection to nature dimensions 'feelings about nature' and 'knowledge and awareness' (Figure 2.1). Relevant themes within the dimension 'feelings about nature' were 'empathy for creatures and 'feeling of oneness'. Relevant themes within the dimension 'knowledge and awareness' were 'knowledge of good and bad' and 'realizing interdependence'.

The four pictures that were used to discuss empathy and knowledge about environmental destruction (see Figure 3.4 on page 19 for pictures) could not be treated as a scale, because reliability was unacceptable (Cronbach's Alpha=0.145). Therefore, the four pictures will be discussed separately in this paragraph.

5.4.1 Feeling of oneness and knowledge of interdependence

Children were asked whether they feel part of nature and whether they thought humans dominated nature and could live without nature. Virtually all children said they feel part of nature, think humans and nature are equal and think humans cannot live without nature. Several children had trouble explaining their answers.

Reasons for the children's answers were very diverse. Children already felt part of nature simply because they spent a lot of time outside or enjoyed being in nature. A few children also mentioned a love for nature, caring for nature and a sameness between humans and animals. For two children, a feeling of oneness with nature was not something static, but depended on their location. The second quote belongs to a Wijs child that was interviewed in the Orange playground, a playground with a lot of grass, and several bushes and trees. She indicated that she did feel a little bit part of nature there, but probably would not feel this way on the location they would visit that afternoon, the cross track.

"Sometimes. When I am, yes, outside, then I do. When I am inside not so much." (W6)

Yes, now a little bit, but well, but now we are going to the cross track and that is not really nature, so. (...) Yes sometimes, now I do, now I feel a little bit connected with nature, but..." **"Not always?"** "No." **"That depends on where you are?"** "Yes". (W1)

Virtually none of the children said humans were masters over nature and could do whatever they want with it. Explanations for why humans and nature are equal were very diverse. Most reasons were related to a partnership with nature, where nature has an intrinsic value (e.g. right to be your own boss, nature also contains living creatures which are equally important as humans). Other reasons were for example the fact that nature was here before us, nature and humans have the same rights and the fact that we depend on nature. One child said he thought nature was more important than humans, because nature was here before us and we need nature. A few children said humans were sometimes masters over nature, for example because they decide which trees are planted where and which trees are chopped down, or because they take care of a piece of nature. Several children relate human dominance over nature to the disappearance or destruction of nature.

"Humans and nature equal. No one can be the boss of everything around you. (...) You are the same as other living things. So you are also exactly, almost exactly the same as the other things so then you do not have to act like the boss." (S7)

"Because they both have a life and if you chop off my head I will die and if you chop off the head of a tree it will die too, I just think that it is equally important." (W1)

"I think that humans and nature are equal. Because when humans are the boss of nature then it could be that this [the natural are we were in at that time] would not be here anymore." (S1)

"They may also just get a chance to live." (S10)

Human dependence on nature was mostly based on things we get from nature and cannot live without. Oxygen (or fresh air) was mentioned most, followed by food, water and other resources. A few children thought it would also not be nice for humans when nature was gone, because nature is pretty and is good for humans too. Most children were able to imagine what could go wrong if there was no nature anymore, but some children had trouble with this and could not mention specific problems. Only two children thought we might be able to live without nature for a little while, but they did acknowledge that this would be really hard.

As answers to these questions were very diverse, not a lot of clear differences were found between childcare centres. Wijs children more often felt part of nature because they spent a lot of time outside (W: 4 children, S: 0 children) and the two children who said it was location-dependent also belonged to Wijs. Struin children more often referred to feeling one with nature because they took care of nature or felt humans should take care of nature (W: 1 child, S: 3 children). The only two children who compared humans with animals belonged to Struin.

"I do not know, a little bit. Yes if we, we have to take good care of nature, otherwise it is all gone, that is not so nice." (S10)

"Because humans are also animals." (S11)

There does not seem to be a difference in the children's reasoning about human dominance over nature, as children's answers were very diverse. Answers to whether humans can live without nature were also very diverse, but a few differences can be seen. The only two children who thought we might be able to live without nature belonged to Wijs. Struin children mentioned our reliance on nature for food and water more often (W: 3 children, S: 8 children).

5.4.2 Empathy for creatures

Being able to show empathy for nature is essential for feeling connected to nature. Children were asked whether we could kill spiders and keep bugs captive and how they felt about seeing a picture of a pig on a spit. Almost all children agreed that killing a spider was something bad and all children agreed that you cannot keep bugs captive forever. Most children said killing spiders was not good or should not be done. Some said it was allowed sometimes and only a few said you could kill a spider. All children agreed that you could not keep bugs captive forever. Some of the children said you could keep them captive for a little while. Most children showed negative or neutral emotions when seeing the picture of a pig on a spit because they felt it was bad for nature.

Most children felt killing the spider was sad for the spider, for example because killing spiders is sad, spiders also have a life and we would not like getting killed either. Children also mentioned that spiders eat mosquitos and can therefore be useful to keep around. Several of these children, however, did say that they or their parents sometimes killed spiders they found in their homes. Some children said that it was allowed to (sometimes) kill a spider, for example when you are afraid of it or when it is bothering you. Many of them did, however, acknowledge that it was sad for the spider when it was killed. A few children felt killing a spider was unnecessary.

Keeping bugs captive in a container forever was considered bad, mostly because it was sad for the bugs or because they would die. Children felt it was sad because the bugs could not have a nice life anymore, because they would not like it to be kept captive or because they could not see their families anymore. Some children did think you could keep them captive for a little while, for example to investigate them.

When seeing the picture of the pig on a spit, most children said it was sad or bad for the animal. Several children also said that even though it is sad for the animal, we need it to live. Two children had chosen themselves to be a vegetarian because they felt sad for the animals. Two other children mentioned organic meat or meat from animals who have lived a good life as precondition for eating the pig. Most children showed empathy for the animal, but not all. A few children did feel it was nice for them because they liked meat but did not like to look at the picture because they felt it looked disgusting. They did not show any feelings of sadness for the animal, they just did not feel comfortable with looking at the picture. The general opinion of most of the children is nicely summarized by this child:

"(...) it is actually good for humans but bad for nature." (W9)

Children from Struin seemed to show more empathy for bugs and spiders and seemed to be better at relating to its feelings. The children more often said killing the spider was sad, spiders also have a life and if we were the spider we would also not like it (total W: 3 children, total S: 11 children). Several children thought it was sad for the bugs, some explained that the bugs would not like being trapped and some mentioned that then they could not have a nice life anymore (total W: 3 children, total S: 10 children). Two Wijs children mentioned that bugs should be released so that they could be with their families, which was not mentioned by Struin children. Wijs children more often said keeping bugs captive was bad because then the bugs could die (W: 7, S: 4). Something that was only mentioned by a Struin child, was the fact that spiders are also animals and should therefore not be killed. Another Struin child said that spiders are equally important as humans.

"No spiders are just as important as humans. Every animal is equally important." (S7)

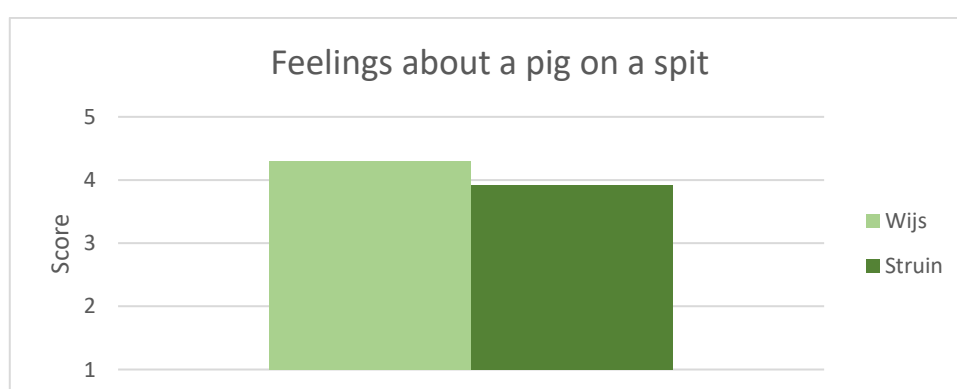


Figure 5.14 Average score given to the picture of a pig on a spit. Scores ranged from 1 (very positive feelings) to 5 (very negative feelings).

Children from Wijs seemed to show more empathy for the pig on the spit (Figure 5.14), as they reacted more strongly to this picture. Wijs children showed more negative emotions and less neutral

emotions (Appendix F) and more often felt it was sad for the animal. The number of vegetarians and children that mentioned organic meat was the same at both childcare centres.

5.4.3 Empathy and knowledge concerning environmental degradation

Next to empathy for creatures, empathy for and knowledge of general harmful scenes in nature was discussed with the children. Three pictures (garbage in nature, chopped forest, highway through the forest) and one dilemma (bike vs. car) were used to test the children's empathy for and knowledge of environmental degradation. The children's explanations for their feelings about the pictures were analysed for whether children felt bad for nature, bad for themselves, good for nature or good for themselves.

Virtually all children showed negative emotions when seeing garbage in nature and said this was bad for nature. When seeing a picture of chopped trees, most children showed negative emotions and said it was bad for nature. Some however, also said it was bad for them or even fun or necessary for them. The picture of the highway caused children to show the full range of emotions; positive, neutral and negative. Several children thought it was bad for nature, but some children also felt it was fun for them. When given the option between going to school by bike or by car, most children said going by bike was better.

Almost all children know garbage in nature is bad because it can harm nature. Several children worry about animals dying because of this pollution, thereby showing empathy for nature. Only a few children feel it is also not nice for them, for example because it can get in our food or because it is not nice to play around.

"Well that is not good for nature, the animals eat it and then another animal eats it and that another animal and eventually it also ends up on our plate and then it is also bad for us." (S12)

"Because then the animals are going to eat this and then they will die because of the plastic." (W7)

Reasons for showing positive or negative feelings when seeing the chopped trees differed more between children. The majority of the children said it was bad for nature. Several children worried about animals, because they might lose their homes or die. A few children said it was something bad for them, for example because they could not climb the trees anymore or because less fresh air was available. A few other children felt it was nice for them, for example because it was a fun place to play. Several children said it was a little bit positive, because we need the wood. All these children, however, also said it was not good for nature. In general, most children who said something about it being nice or not nice for them, also said something about the harmful effects on nature, but not all children did this. Some only said something about the effects on themselves. Furthermore, children seemed to be able to feel empathy for the trees and assign feelings to it, as some children said they thought the trees would not like being chopped down.

"Trees should not be chopped down, then there is no life anymore for the animals. And it is just a forest, that hurts you know, for those trees. So I find that not nice at all." (S9)

"Because they have cut down all the trees. (...) Then you cannot climb in them anymore." (W8)

How children respond to seeing a highway through the woods also differed. Several children said it was bad for nature, for example because of the exhaust fumes, because animals can get hit or because trees were chopped down. Several children said it was nice for them, for example because

they would have a nice view when riding in the car. Some children said it was not that bad, because there were still a lot of trees left or because we simply need roads. Some of these children also mentioned negative effects on nature, but not all.

"I find it really bad that there is a highway straight through the forest. (...) Because I find it bad for the animals because all the trees that used to be there are chopped down and thus where all animals lived. And... I find it bad for the animals around, because of the polluting gasses and the garbage that people leave behind, if they have a bag of chips or a bag from McDonalds, we have seen that just lying on the road." (S6)

"Yes because it goes through nature, the highway, and there are a lot of exhaust fumes and so, but it is also not the worst thing ever because everyone should be able to go somewhere, to work and so. So you do need it." (S12)

How children responded to the dilemma of going to school by bike or by car did not differ much between children. Only two children preferred the car, because it goes faster and they got less tired. Even though going by bike was better according to most children, going by car was sometimes acceptable. For example, when the weather was really bad or when you live far from school. Most children who mentioned how they usually went to school, went by bike. Some of them sometimes went by car, for example because they had to go to the childcare centre after school or because the weather was really bad. A lot of children explained their answer by saying that exhaust gasses from the car are bad for nature, or because the car itself was bad for nature. Some children did not refer to this and only said it was, for example, nicer or healthier to go by bike. A few children knew electric cars are better for nature than normal cars.

"yes. We are going by bike as much as possible. (...) When they go by car a lot then there will come exhaust fumes, there will be climate change, comes that the plants cannot grow there anymore (...)." (S9)

"Well... yes if you go by car than there also goes air, the air will be polluted and then the earth becomes warm. (...) Not good for nature and some animals cannot even live on the ice... eh they just sit on a block of ice and if find that very sad for them" (W12)

Several differences can be seen between Wijs and Struin children. Children from both childcare centres showed empathy and concern for nature and knew about things that could be harmful for nature. The average scores children gave to the four pictures is shown in Figure 5.15. Empathy and knowledge concerning garbage in nature did not differ much. Struin children scored higher on feelings towards chopping trees and the highway through the forest. The distribution of scores can be found in Appendix F.

Struin children reacted more strongly on the picture of the chopped trees. All Struin children showed negative emotions, whereas Wijs children also showed neutral or positive emotions (Appendix F). Most Struin children only said it was bad for nature, whereas most Wijs children said it was positive for them or for mankind, but negative for nature. For most of these children chopping trees was nice for them because we need the wood (W: 4 children, S: 3 children). A few children, however, felt it was nice for them because it was a fun area to play (W: 2 children, S: 0 children). Most children who said it was good or bad for them also said something about it being bad for nature. However, a few children from both childcare centres (W: 4 children, S: 3 children) did only say something about the positive or negative effects on humans or themselves and did not refer to possible effects on nature. At Wijs these children said it was fun for them to play and stay in sight of

their parents and not fun for them because you could not climb anymore and had less fresh air. At Struin it was not fun because it was less nice to play, there would be less fresh air, we need trees to live and it is less pretty. It was good because it is needed sometimes or we need the wood.

"Yes that is allowed (...) Because you can just nicely play through, over, climbing on tree trunks (...)." (W5)

"Not good at all. (...) Because then a forest it chopped down. I find it fun to play in the forest and then there will be less oxygen because that comes from the trees." (S4)

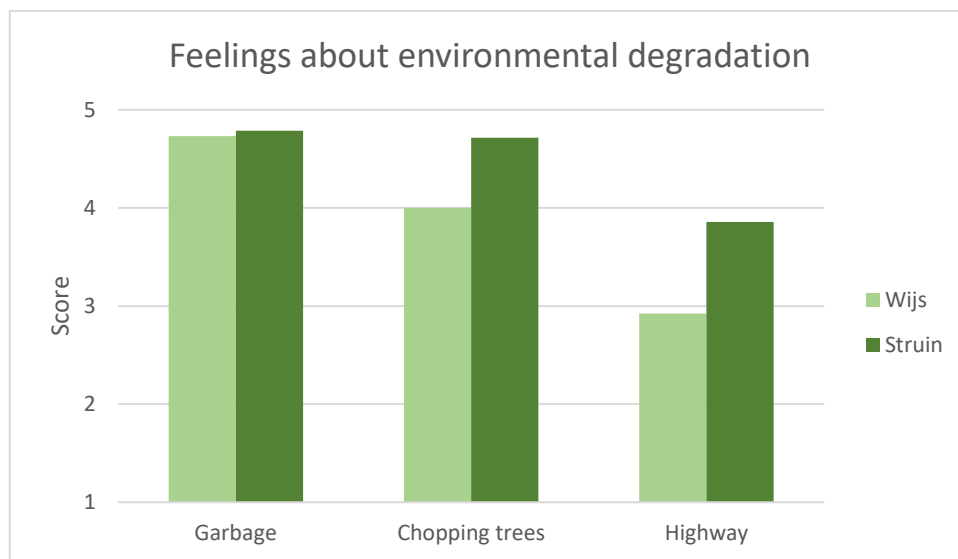


Figure 5.15 Average score given to the pictures of garbage in nature, chopped trees and highway through the forest. Scores ranged from 1 (very positive feelings) to 5 (very negative feelings).

The majority of the Struin children chose neutral or negative emotions when seeing the highway through the woods, whereas the majority of the Wijs children chose neutral or positive emotions (Appendix F). Only one Struin child showed positive emotions when seeing this picture and as much as five Wijs children showed positive emotions. Struin children seem to be better able to identify why a highway through the forest might have negative consequences for nature. All Struin children but one said the highway was harmful for nature. Reasons used by Wijs children who were aware of negative influences on nature were the harmful effects of exhaust fumes (W: 4 children, S: 7 children), the danger for animals to get hit (W: 2 children, S: 2 children) and removal of nature for the road (W: 1 child, S: 0 children). The first two were also mentioned by Struin children, but they also mentioned chopping down trees (3 children), less space for animals (2 children), separating a forest (2 children), disappearance of nature (1 child) and garbage thrown in nature out of cars (1 child). Both Struin and Wijs children think it is good that there is still nature left around the highway. For Wijs children, however, this is a reason to say the highway is not that bad, whereas all Struin children also refer to the harmful impacts of the highway. Something that was only mentioned by four Wijs children was that they liked the picture because when you were driving in the car, you had a nice view. None of these children said something about possible harmful influences on nature.

"(...) so if you then drive like that you can also see a lot of nature (...) Actually it is pretty good because there is still a large part of forest that has not yet been chopped down." (W9)

"I think that in itself is not so bad but I find it this one [score 4] because there is also still some forest around it, but actually this is also from the animals actually." "You mean the road?" "Yes. And then there is all gas coming out and that goes then also everywhere. But I do find it nicer if there is still forest around it." (S1)

The children's knowledge about why a bike was better than a car did not differ much between childcare centres. Most children at both childcare centres were able to mention that going by car was harmful for nature or the environment because of air pollution. However, slightly more Wijs children were unable to show they knew cars were bad for nature (W: 4 children, S: 1 child). Only some of these children, however, were probed for what they thought was better for nature. The others might have known this when this questions had also been asked to them. Nonetheless, these children did not directly associate the dilemma with air pollution by cars. Some did think going by bike or walking was better, but only because cars could hit things.

"I think the car is the best because then you are there very fast." "What do you think is better for nature?" "Actually walking (...) because then you can only destroy plants." (S5)

"With the car you are bit faster, only on the bike there is a bit more nature. (...) Because in the car you are inside. Then you are just in a space, but on the bike you are on a space, and not in a space, and then it is more nature." (W2)

"That with the car is not good and that you should go by bike, because then you are sporty." "Only therefore?" "Hm... and walking is also possible. I always go to school walking. And sometimes by car because I have to" (W3)

5.4.4 Differences and similarities human-nature relationship

Struin and Wijs children did not differ much in their opinions about a feeling of oneness and in their knowledge of interdependence. They also both showed knowledge about and empathy towards nature. Something that did seem to differ is the children's perspective for why something is good or bad. When looking at the children's responses to the four pictures together (garbage, deforestation, highway, pig), most reasons mentioned were related to whether it was positive or negative for nature (W: 41 times, S: 49 times). Reasons related to whether something was positive or negative for themselves were mentioned more by Wijs children than Struin children (W: 26 times, S: 18 times). This suggests that Struin children more often take the perspective of nature in determining whether they consider something as good or bad.

5.5 Environmental stewardship

So far we have looked at the connection to nature of the children. This chapter explores the children's environmental stewardship. Children were asked whether they thought their actions on a normal day could affect the environment, what they associated with nature-friendly behaviours and which nature-friendly behaviours they sometimes did themselves. This paragraph also includes data from the parental questionnaire to discuss possible parental influences.

5.5.1 Knowledge and behaviour

The majority of the children had a hard time expressing whether they thought their actions on a normal day had an effect on nature. Some children thought it did, some thought it did not and some were not sure. Their explanations were mostly related to whether they spend time in nature or whether nature was directly involved in their actions or not. Children also struggled with naming things they thought were good for nature and the environment and things they did themselves. A few children understood the question wrong and responded with general good things in nature, like

water. After asking them about actions humans could do, they were mostly able to name a few environmental friendly behaviours. Only two children were unable to come up with any associations. The average number of associations the children could come up with was 2.5. Most of these were related to air pollution and cars. Children could name on average 1.3 environmental friendly behaviours they sometimes did themselves. Most of these were related to cleaning up garbage and caring for plants. As seen in the previous paragraph, some children had chosen to become vegetarians, which is also an environmental friendly behaviour, even though they did not mention it as such when asked about their behaviours. A few children were not able to name anything they did themselves.

"And I also do other things but I cannot explain that very well." (S4)

Several children thought their daily lives did influence nature, for example because they spend a lot of time outside. But some doubted also, because they mostly did things without nature. Others said it did not have any effect, for example because they spend a lot of time inside or because most things do not involve nature. They do not seem to make the connection with the effect normal actions like brushing their teeth (using water) may have on nature. Only a few of the older children could make this connection, by referring to air pollution or using light and energy. But they also mentioned positive effects, like cleaning and separating waste. These children were all nine years old, suggesting this knowledge increases with age. Not all the older children did, however, show this knowledge.

"Well no... (...) Well then you do a lot of things but you do nothing to nature." (W7)

"Hmm a little bit, not so much. (...) Well I am mostly nicely playing with S9 and I don't think that this has so much effect on nature." (S7)

"Ehm a little bit. (...) I often play outside and so and somethings I also go into nature." (S14)

"Well for example when I am in the car with my father go into the car, in the weekend, that has of course also an effect on nature. (...) Well that nature gets polluted." (S6)

Associations with environmental friendly behaviours related to air pollution and cars included for example electric cars, less or no factories and less (driving) in cars. Even though later on in the interview virtually all children said they thought going by bike was better than by car and most of them usually went to school by bike, only one child named this as an own environmental friendly behaviour. This may suggest that these children are still too young to make these connections or do this subconsciously. When children mentioned something about trees and plants, they mostly mentioned chopping less trees. However, when describing their own behaviours, they often mentioned watering the plants and not breaking off sticks or flowers. In their associations, children also mentioned things related to not destroying nature, for example not making fire and not damaging nature. Children also mentioned associations related to animals, for example taking care of them and not killing them.

When referring to garbage in their associations, most children mentioned things to minimize or prevent garbage in nature or on streets, for example not throwing things on the streets or in nature. A few children, however, also associated it with cleaning up garbage. However, when asked about their own behaviours, a lot of children mentioned cleaning up garbage as something they sometimes do themselves. Preventing littering, e.g. not throwing things on the ground, is only mentioned by a few children, just as separating waste. Even though a lot of children mentioned that they sometimes

picked up garbage, this was never seen during observations. Although observations were not aimed at this and may therefore have missed it, the following example shows the children's intentions may not always be what they do in practice.

When walking towards them, two girls just finished making a chain of shells, with help of the teacher. Other children were poking in the sand or water with sticks. I noticed a plastic gingerbread wrapping in the sand, close to where the girls, among which S2, had made their chain. Both the girls and the teacher did not look at it when they walked by. S2 just said during her interview that she sometimes picked up trash. The piece of plastic was laying there very obviously in the remote nature area. It felt strange to me that both the girls and the teacher did not do something. (Fieldnotes Struin, 20-10-2016)

Another child who said she sometimes picked up litter, explained that she did not do it always. She did not love nature less, she just did not always like going through all the trouble.

"Uh well, cleaning up the cans you see. I used to do that a lot. When I encountered a can somewhere 'mom can I clean that up and throw it in the bin', I used to do that every time I saw something. But now I don't do it as much anymore, but still I love nature very much. Then I think, not right now, I just want to relax and not quickly put on my coat and go outside again." (S1)

For one boy, whether something was bad for nature seemed to be related to whether it was convenient for him or not. Things he liked or needed were special cases in his eyes and were therefore not harmful for nature.

"That there are no factories anymore. Well, candy factories do, and peanut butter factories do, also, and chocolate spread factories also, because these I think do not let off smoke." (S5)

Also, knowing that certain behaviour was harmful for nature did not necessarily mean this behaviour was not done anymore.

*"Because I sometimes enjoy doing a competition who can throw the farthest and I then often to that with these kinds of cans. But on the other hand I think hmm that is not so good because it needs to be cleaned up. **And what do you think about it remaining in nature?** That is a bit nature pollution, so I think that is just not so good." (S4)*

When looking at the differences between Struin and Wijs, more Wijs children think their daily actions do not have an effect on nature (W: 4 children, S: 2 children) and more Struin children think they do (W: 5 children, S: 8 children). Not all children who thought it did were able to identify possible negative or positive influences. All but one of the children who could identify possible effects of their daily lives on nature belong to Struin (W: 1 child, S: 4 children). One Wijs child does hint on some possible effects, but did not think he had a lot of impact on nature. Some of the older Struin children seemed to be more aware of their possible influences on nature, as illustrated by the following quotes.

"Because of driving the car nature is getting dirtier. And by taking care of the plants nature is getting eh, well bigger. And of course to clean up nature, eh, as garbage collector nature gets cleaner again." (S8)

"Yes... there is of course with light and so, with energy and so, but... it can have effect but... everyone in our class also does something good about it, we separate waste with the class and so, so that goes pretty well actually." (S12)

"Well... I am mostly at school and after that I have sports and some other things for school. And then sometimes I am outside and then... well I do something, but I don't know if this... I do help in the garden so that is something... Hm yes, but I do not harm anything or so" (W12)

Wijs children more often mentioned associations related to animals (W; 7 children, S: 2 children). Associations related to cleaning up garbage were only mentioned by Struin children (W: 0 children, S: 5 children), whereas associations related to preventing littering was mentioned almost equally. Struin children also mentioned associations related to wastage (W: 0 children, S: 5 children), for example not using too much energy, light or water or throwing things away with no reason. When looking at the things the children do themselves, Struin children also mention cleaning up garbage more often. One child even says he tries to motivate people not to litter. At Wijs, there is also a child that tries to motivate people to be nice for nature, namely not to break off branches.

"When I see someone throw something on the ground I say clean that up because it is bad for nature. Sometimes they just walk away and ignore me but sometimes they do it. And I also sometimes clean stuff up myself, with a plastic bag and sort of nippers." (S13)

"Sometimes I try to persuade people of things they do then. (...) Well then they try to break of a branch or so, while that actually is not necessary or so." (W12)

5.5.2 Parental influences

Parents were also asked to indicate which environmental friendly behaviours their child showed. They were mostly better at coming up with environmental behaviours their child did than the child itself. Sometimes the child and the parents named the same, but sometimes their answers differed. Parents more often mentioned behaviours related to recycling, separating waste and wastage of water and energy. These things were mostly not mentioned by their children. This suggests that children might copy behaviour from their parents without making the association with the environmental friendly purpose of these behaviours.

Whether parents include environmental friendly behaviours in their lifestyle and communicate this to their children may affect the environmental stewardship knowledge and behaviour of their children. For example, eating organic meat, saving water and energy, separating waste and going by bike instead of car. This is illustrated by the quote below. However, even though the parents say the child copies their behaviours, she was unable to name these behaviours during the interview when asked about associations with environmental friendly behaviours and the things she did herself.

"W3 understands that we separate our waste, do not shower too long, do not leave the light on unnecessary etcetera. She then also shows this behaviour." (Parent W3)

Another example of how the parent's behaviour may influence the child's behaviour is when finding a spider in the house. Several children told what they or their parents did in this situation. When parents put the spider outside, children will perceive this as normal. When parents usually kill the spider, children can either perceive this as normal, or do not like it.

‘Yes. My mother and I also always do that.’ (S6)

“That I never find nice because this also, that are animals. My mother makes them, my mother and my sister actually kill him.” (S4)

“(...) but dad actually always catches him with a cloth and then he just does it on each other (...) and then he throws him in the garbage bin. (...) Yes I think that is also just all right.” (W5)

Therefore, the attitude and behaviour of parents can have a great influence on the child's behaviours, especially because the child is not always able to come up with these behaviours by itself. Copying behaviour from parents may eventually help the child understand these behaviours.

Chapter 6. Synthesis

This chapter combines the results of the observations discussed in Chapter 4 and the results of the interviews and questionnaire discussed in Chapter 5. Table 6.1 summarizes the most important results concerning nature nearby, influential adults, nature experiences elsewhere and at the childcare centre, environmental features, connection to nature and environmental stewardship. This chapter will analyse the relations within and between these concepts.

Table 6.1 Summary of the most important results

	Struin	Wijs
Nature nearby	All children said their house had a garden. Almost all children described (a little) nature in their neighbourhood.	All children said their house had a garden. Almost all children described (a little) nature in their neighbourhood.
Influential adults	Parents did not differ significantly in their connection to nature and encouraging their child to interact with nature. Parents with a higher connected to nature also rated their own perception of their child's connection to nature and the importance of nature to child higher. There was, however, no correlation between parental connection to nature and the child's own reported importance of nature.	
	Struin staff could also be seen as influential adults. They guided the children in their nature experiences by focussing their attention on nature and teaching them about nature.	Wijs staff guided the children in having fun outside, mostly not with nature but with sports or games.
Nature experiences at home and school	Most children visit nature areas with their families at least once a month. Several children visited these areas weekly. Some children preferred to play outside after school and some children preferred to play inside. Most children did not experience nature at school. Some had lessons about nature from books or media. Several children (sometimes) watched nature programmes on TV.	Most children visit nature areas with their families at least once a month. A few children visited these areas less. Some children preferred to play outside after school and some children preferred to play inside. Most children did not experience nature at school. Some had lessons about nature from books or media. Several children (sometimes) watched nature programmes on TV.
Nature experiences at the childcare centre	Observed activities were almost always with nature, thus direct experiences.	A lot of observed activities were without nature, thus indirect experiences. The amount of direct experiences seemed to depend on the naturalness of the play location and the presence or absence of playground equipment. More activities with nature were afforded by the environment than were observed.

Environmental features	<p>Most locations did not contain non-natural features. If playground equipment was present it was natural or avoided.</p> <p>Natural environmental features were of high quality, meaning they were very abundant, very varied, of a lot of different sizes and very changeable.</p> <p>Environmental features mostly only afforded activities with nature.</p>	<p>Most locations contained one or more non-natural features, mostly playground equipment.</p> <p>Natural environmental features were often not of high quality, meaning they were not very abundant, not very varied, not of much different sizes and not very changeable.</p> <p>Environmental features afforded activities with and without nature.</p>
Connection to nature	<p><i>Importance and definition of nature</i> Children were critical about whether something was nature or not. This depended on the number of non-natural elements present and whether the natural elements were manmade. All children rate the importance of nature to them important or very important.</p> <p><i>Feelings in nature</i> Mostly comfortable in nature, only occasionally fear of or aversion to dirt, dangers and bugs. Often mention catching animals and exploring as fun.</p> <p><i>Feelings about nature</i> Feel part of nature. Show a lot of empathy for nature. More often reason from a nature point of view.</p> <p><i>Knowledge and awareness</i> Humans do not dominate over nature and cannot live without nature. More knowledge about environmental issues.</p>	<p><i>Importance and definition of nature</i> Children often thought individual natural elements were enough to call something nature. Some children were influenced by the number of non-natural elements present. Most children rate the importance of nature to them important or very important.</p> <p><i>Feelings in nature</i> Not always comfortable in nature, more often fear of or aversion to dirt, dangers and bugs. Do not often mention catching animals and exploring as fun.</p> <p><i>Feelings about nature</i> Feel part of nature. Mostly show empathy for nature. More often reason from a human point of view.</p> <p><i>Knowledge and awareness</i> Humans do not dominate over nature and cannot live without nature. Limited knowledge about environmental issues.</p>
Environmental stewardship	<p>Only occasionally aware of possible own influence. Limited knowledge of environmental friendly behaviours. Limited number of own behaviours.</p>	<p>Not very aware of own possible influence. Limited knowledge of environmental friendly behaviours. Limited number of own behaviours.</p>

Environmental features, activities and favourite play locations

Observations showed that urban nature (Wijs locations), and especially playgrounds, are less varied than wild natural areas (Struin locations) in terms of natural environmental features. Wild nature therefore indeed consisted of a lot of high quality natural environmental features.

Which activities can be done at a certain location are determined by the activities that are afforded by the environmental features present. However, as shown by the observations, the fact that activities are being afforded by the environmental features does not necessarily mean that they are also done by the children. Whether children engaged in activities with nature seemed to depend on the environmental features present, specifically on the naturalness of the location as well as the presence or absence of playground equipment. When playground equipment was present, children

had more indirect nature experiences. Children seemed to engage more in activities with nature at playgrounds with a lot of natural elements.

This research has not done observations of which environmental features were preferred and used most by the children. However, the ideal play locations the children described during the interviews give insight in which environmental features are appreciated most. Playground equipment was mentioned most. Shielded places, rigid fixtures and moving fixtures were mentioned second most, followed by loose objects and open ground. The feature street was never mentioned and indoors could not be mentioned as the described play location had to be outside. A striking difference between Wijs and Struin is that Struin children much more often mentioned shielded places, rigid fixtures and moving fixtures. Playground equipment was mentioned almost equally, as were loose objects. Some Wijs children also mentioned loose materials (sand, mud). Some Struin children also mentioned sloping terrain, creatures and fire.

Connection to nature and its dimensions

In this study connection to nature contained the dimensions 'feelings in nature', 'feelings about nature' and 'knowledge and awareness'. The dimensions feelings about nature and knowledge and awareness often seem to influence each other, especially the themes empathy for nature and knowledge of good and bad. To be able to feel something is sad for nature or creatures, the children have to know certain behaviour is bad for it. For example, to be able to worry about animals not having a home anymore when seeing a picture of chopped trees, you have to know that homes of animals are destroyed by chopping. But empathy can also be a reason to think something is bad for nature, for example chopping trees is bad because it is sad for the animals. Therefore, empathy seems to be related to knowledge and judging whether something is good or bad for nature can be done based on knowledge or based on empathy, or a combination. However, this is not the case for all children. Some children might cognitively know something is bad for nature, but not necessarily feel bad about this.

The theme realizing interdependence does not seem to be clearly related to one of the other themes or dimensions. In all cases children think humans do not dominate over nature and humans cannot live without nature, therefore this does not seem to depend on feelings in or about nature. However, these dimensions might influence why the children think humans do not dominate over nature. Some children base this on knowledge, but others on feelings.

The dimension feelings in nature seems to be rather independent of the dimension knowledge and awareness. Children can love nature very much and enjoy spending time in nature, but at the same time not have a lot of knowledge of what is good and bad for nature. The other way around is also possible. A few children knew something was bad for nature, but did not appear to feel a lot of joy and comfort in nature. However, Struin children showed more comfort and joy in nature and also showed more empathy and knowledge. This suggests that the dimension feelings in nature and the human-nature relationship dimensions (i.e. feelings about nature and knowledge and awareness) do influence each other. The relation between empathy and feelings in nature, however, remains unclear. Children who felt less joy and comfort in nature could also show empathy for nature. However, as Struin children showed more empathy, children who enjoy being in nature and feel comfortable in nature are likely to show more empathy for nature. So even though feeling comfort and joy in nature does not seem to be a precondition to feeling empathy or knowing what is good or bad for nature, it might indirectly still increase empathy and knowledge.

Also, the dimension feelings in nature does seem to influence the feeling of oneness of some children, as several children referred to feeling part of nature because they enjoyed spending time in nature. However, for other children this was influenced by feelings about nature (e.g. a love for nature) or knowledge and awareness (e.g. humans and animals are the same).

These relations appeared to apply to both Wijs and Struin children.

Connection to nature and environmental stewardship

Children that seemed very connected to nature and enjoyed and loved nature very much sometimes named the same amount of associations and behaviours as children who did not seem very connected to nature. Connection to nature therefore does not seem a good predictor of environmental stewardship in this study. However, the children's vision on human-nature relationship, specifically the themes empathy for nature and knowledge of good and bad, might influence environmental stewardship. Several children mentioned associations or behaviours related to taking care of animals and plants, which might be based on empathy. Other children mentioned associations or behaviours that were bad for nature, like factories and cars, which is based on knowledge of good and bad. However, several children that did show they felt empathy for nature and knew about things that were good or bad for nature, did not show this in their associations and their behaviours. Empathy for nature and knowledge of good and bad therefore seem to influence environmental stewardship, but are probably not the only factors influencing it. This was seen in both Struin and Wijs children.

Nature experiences, environmental features and connection to nature

Struin children appear more connected to nature than Wijs children. The main difference between Struin and Wijs are the kind, characteristics and quality of environmental features that are present at the play locations and the kind of activities (i.e. direct or indirect nature experiences) that are done. Therefore, it seems likely that these differences in locations and activities influence the children's connection to nature.

Locations that contain a lot of high quality natural environmental features, i.e. that are abundant, varied, of different sizes and changeable, and no non-natural environmental features result in a lot of direct experiences with nature. When non-natural features are present, and especially when playground equipment is present, children seem attracted to this and are distracted from having direct experiences with nature. When, next to this, natural environmental features are of low quality, the direct experiences that do happen are less intense. Struin locations mostly had no non-natural features and had a lot of high quality natural environmental features. Therefore, it seems likely that these kinds of areas have the most influence on connection to nature.

The activities at Struin more often were with nature, i.e. direct experiences with nature. At Wijs, however, children had more indirect experiences with nature, i.e. activities without nature. Therefore, it seems likely that having direct nature experiences has more influence on connection to nature than having indirect nature experiences.

Considering the differences between Struin and Wijs, having more direct nature experiences in high quality natural environmental features likely results in feeling more comfortable in nature and enjoying nature more, and increases empathy for and knowledge about nature.

Connection to nature, environmental stewardship and other influential factors

Apart from the childcare centres, several other possible influential factors might have influenced the children's connection to nature and environmental stewardship, namely influential adults, other nature experiences and nature near home. Parents that were more connected to nature did not necessarily have children that were the most connected to nature. However, all children from parents that scored high on the NR-6 also seemed well connected to nature. Parents that did not seem connected to nature did not always have children that were also not or less connected to nature. Therefore, parents probably can (positively) influence connection to nature, but parents with a lower connection to nature can still have children with a high connection to nature and vice versa. One boy illustrates that parents might also influence the children's feelings in nature. During the whole interview a fear of nature or of getting lost could be seen, which might be traced back to the fact that his parents were very protective and he said he was not allowed to go far from home. However, his sister did not seem to be bothered by this.

The staff of the childcare centres might also be seen as influential adults. At Struin, the staff guided the children in focussing their attention on nature and teaching the children about nature, but at Wijs the staff did not guide the children in having direct nature experiences. As Struin children

appear more connected to nature, the approach of the Struin staff might have a bigger influence on connection to nature.

Other nature experiences, i.e. nature nearby, play locations after school and lessons at school, did not seem to be a clear predictor of a child's connection to nature. Being connected to nature and playing outside or in nature after school did not seem to be related. Children that very much enjoyed and loved nature could still prefer to play inside after school, play at an outside area without a lot of nature, or like playing in nature and playing inside equally. Also, only a few children said there was no or not a lot of nature in their neighbourhood and these were not necessarily children who seemed less connected to nature. Furthermore, parents who said they did not visit nature a lot with their child did not always have children who appeared less connected to nature and vice versa. Another important influence seemed to be vicarious nature experiences. Books and TV programmes appeared to be important sources for learning about nature for some children.

Chapter 7. Discussion

This research has investigated whether nature experiences in different types of nature result in a different connection to nature and environmental stewardship. This chapter will discuss the results and will also give a reflection on the used theories and methods and give suggestions for further research.

7.1 Discussion

7.1.1 Nature experiences

Play locations of both childcare centres were observed to determine presence and characteristics of 13 environmental features. The present study confirmed that the ten classes of environmental features described by Lerstrup & Konijnendijk van den Bosch (2017) can be used to describe and compare (natural) play locations of childcare centres. However, this research only included natural elements in their ten classes, whereas the original study also allowed for the inclusion of non-natural elements, e.g. slides and asphalt roads. Therefore, three new classes were made, which were not used in the original study by Lerstrup & Konijnendijk van den Bosch (2017).

The intensity of a nature experience can depend on the naturalness of the area and the quality, i.e. abundance, variety, sizes and changeability, of the environmental features. Direct nature experiences in areas that contain high quality environmental features that are only natural are presumably more intense than direct nature experiences in areas that contain a lot of non-natural environmental features or are surrounded by other human influences.

Observed activities in urban green spaces and playgrounds included less direct experiences with nature than observed activities in wild nature. Especially in playgrounds, direct experiences with nature were scarce, even though the environment did afford for several direct nature experiences. This suggests that children were easily distracted by non-natural play elements like playground equipment. In a study with Swedish children aged 6-11 Jansson (2008) showed that natural elements were appreciated in or around playgrounds, whereas normal playgrounds were sometimes boring. Even though the natural areas bordering playgrounds were often small, the natural features were sometimes appreciated even more than the play equipment. In the current study, children seemed to engage more in activities with nature at playgrounds with a lot of natural elements. For example, at the Butterfly Park, Wijs children more often ignored the playground equipment and played with the (relative) abundance of natural elements available. However, at playground Voorn, they hardly gave any attention to the few natural elements present and preferred to play with the carts and equipment. Therefore, children do seem to appreciate the natural elements in a playground, but this seems to depend on the abundance and diversity of these natural elements. However, in line with Jansson (2008), small natural spaces are already appreciated by the children, as the Butterfly Park contains several environmental features, but these are not big.

This research did not aim at classifying observed activities in environmental features. However, children seemed to use most of the natural environmental features. Lerstrup & Refshauge (2016) showed that (young) children in their study especially appreciated the environmental feature 'loose objects'. The importance of loose parts has long been recognised in the 'theory of loose parts' of Nicholson (1972). This theory states that *"In any environment, both the degree of inventiveness and creativity, and the possibility of discovery, are directly proportional to the number and kind of variables in it."* (Nicholson, 1972, p. 6). This suggests that more loose objects and materials can afford for more different ways to interact with nature, which might result in more direct nature experiences. Even though the current research cannot say anything conclusive about preferences for specific environmental features, activities with loose objects and loose materials were observed frequently.

7.1.2 Connection to nature and environmental stewardship

Feeling comfortable in nature determined for a great part whether children liked or disliked activities in nature. Some children simply felt too uncomfortable in the situation to be able to enjoy interacting with nature. However, being connected to nature is not directly related to a high comfort level, as was presumed. Comfort levels seemed to be something personal which not only depended on connection to nature, but might also be something specific to the character of the child. This also holds for joy, as what children do or do not enjoy may also be partly explained by their character. Some children just rather play than investigate, which does not necessarily say something about their interest in nature. Therefore, the character of the children may also influence their preferences for activities in nature. Bixler & Floyd (1999) found that disgust sensitivity influenced preference for activities in nature, where children with a high disgust sensitivity preferred activities that were less dirty, disgusting or challenging. This supports the findings in the current research.

What children defined as nature seemed to differ between childcare centres. Struin children were more critical and less often thought individual natural elements were enough to call something nature. A lot of children also took into consideration whether the natural elements were manmade and how much non-natural elements were present. Struin children also more often described nature as a whole, whereas Wijs children more often referred to nature as separate natural elements. A possible explanation for this difference might be that Struin children always visit wild nature and therefore know the difference between wild and domesticated nature and have learnt that nature is more a functioning system than loose elements. Wijs children, however, mostly encounter urban nature, which are more often loose natural elements instead of a functioning system. Struin children also more often included nature in their ideal play locations. An evaluation of an environmental education project in a forest suggests that the children who participated in the program afterwards showed a greater preference for wilder nature compared to more domesticated nature (van der Waal, van den Berg, & van Koppen, 2008). This could also be the case for Struin children.

Children did not seem to be able to come up with a lot of associations with environmental friendly actions. This might have partly been caused by the limited vocabulary and verbal skills of some children. Children were also not always able to explain why certain things were bad for nature. For example, when asked about their feelings about the picture with garbage in nature, most children knew it was bad for nature, but only a few actually explained why it was bad for nature. The same holds for their explanation for why the highway was bad or why bikes were better than cars. Most children knew cars were bad because of the exhaust fumes, but only a few were able to explain why these exhaust fumes were bad. This suggests that children of these ages do not yet see the full picture and do not fully understand the depth of certain environmental problems. The example of the boy that thought the candy and peanut butter factories were not harmful for nature (quote in paragraph 5.5.1 by S5) also illustrates that he does not yet understand what air pollution fully means.

Andrejewski et al. (2011) suggested that, in children, time spend outdoors positively influences connection to nature, which in turn positively influences environmental stewardship. Kals et al., (1999) posed that emotional affinity towards nature can be traced back to past and present nature experiences and is a powerful predictor of nature-protective behaviour. In this study, however, children did not show a lot of environmental stewardship and, except for knowledge of their own possible influence, it did not seem to differ much between childcare centres. There was also no clear relation between the children's connection to nature and environmental stewardship, as had been suggested by other authors (e.g. Andrejewski et al., 2011). This might also be the result of the fact that most children struggled with naming associations and behaviours, which might have been too much for children this age or questions were posed wrongly. However, as seen in the interviews, a lot of children have expressed concerns for nature, for example, for animals that could be hit by cars or that could die because of garbage in nature or lose their homes due to deforestation, that nature will die because of exhaust fumes of cars, extinction of species and destruction of nature by humans to make space for other manmade structures. This suggests that parts of connection to nature might influence environmental stewardship by promoting a feeling of concern for nature.

7.1.3 Influence of different nature experiences

Both nature experiences in domesticated nature as nature experiences in wild nature seem to be able to positively influence connection to nature. That urban nature experiences can influence connection to nature was also shown by Giusti et al. (2014), who showed that children with nature routines within the city of Stockholm were more connected to the biosphere than children without these nature routines. However, direct nature experiences in areas with a lot of high quality environmental features resulted in a higher connection to nature. This suggests that wild nature influences connection to nature more strongly. Bixler et al. (Bixler et al., 2002) investigated the effect of childhood nature experiences in different types of nature and preferences for education, recreation and occupation of adolescents. Adolescents who have played more often in wilderness areas (e.g. in the woods, around a pond or lake, in an overgrown field, around a stream or creek, in a farm field/pasture) before the age of 10 were more likely to prefer walking paths that were wilder than children who have played more often in yards. They also showed less fear for wildlands, for example of animals, getting lost and the weather, and had a lower disgust sensitivity score. Furthermore, they had a greater preference for occupations in outdoor and wildland environments. Their study therefore suggests that childhood nature experiences in different types of nature, i.e. wildlands or yards, streets and playgrounds, influence later interest in the environment differently. The current study showed that children who more often experienced wild nature were more comfortable (e.g. showed less fear and disgust) in nature and often preferred 'wilder' locations (e.g. off the paths, in the bushes), this is also supported by Bixler and colleagues. Wells & Lekies (2006) also suggest that experiences in wild or domesticated nature affect adult environmental attitudes and behaviours differently. Activities in wild nature before the age of 11 affected both adult environmental attitudes and behaviours, whereas activities in domesticated nature influenced environmental attitudes but only marginally influenced behaviours. This again suggests that both wild and domesticated nature experiences can have a positive influence, but wild nature experiences have a greater influence.

Why wild nature experiences have a greater influence is still uncertain. Wells & Lekies suggest that *"When children become truly engaged with the natural world at a young age, the experience is likely to stay with them in a powerful way—shaping their subsequent environmental path"* (Wells & Lekies, 2006, p. 14). Experiences in wild nature might be more intense and make a greater impression. However, the current research cannot say anything conclusive about this.

That direct experiences with nature have a greater influence than indirect experiences may seem logically and intuitively true. Therefore, it might be that not the location (wild or domesticated nature) alone determines connection to nature, but the type of nature experiences, i.e. whether these are direct or indirect, influences it too. Compared to Struin children, children at Wijs had much less direct nature experiences. With these current cases, the relation between location, type of experience and connection to nature might look something like Figure 7.1. Wild nature areas afford for more direct nature experiences. Domesticated nature areas often afforded indirect nature experiences, but also afforded direct nature experiences. Direct experiences with nature involve physical contact, the use of senses and a focus on nature. Therefore, they may change the way children feel in nature, feel about nature or what they know about nature. On the other hand, indirect experiences with nature do not involve a focus on nature and the use of senses and physical contact is less intense. Therefore, they will only have a minor effect on connection to nature, as these experiences do not have a lot of influence on how children feel in nature, feel about nature or what they know about nature. In this may also be an explanation for why domesticated nature areas are also able to connect children to nature, namely that they also afford for direct nature experiences and these direct experiences positively influence connection to nature. For (young) children, whether something is 'wild' or 'domesticated' may not matter, as long as it is nature. An example of this is an interview with a girl named Pearl in a study by Linzmayer & Halpenny (2014). She explained her love for flowers by referring to her grandmother's flower garden. However, this flower garden appeared to be nothing more than a small raised bed garden in her backyard. This suggest that children's love for nature may also result from direct experiences with domesticated nature.

All in all, this suggests that there is a lot of potential for connecting children to nature in urban natural environments, as long the focus is shifted from playing outside (as is the case in the current Wijs policy) to promoting direct experiences with nature. Even though the theory posed above might intuitively feel right, this study cannot say anything conclusive about this and more research is needed to explore the relation between the type of experience and connection to nature.

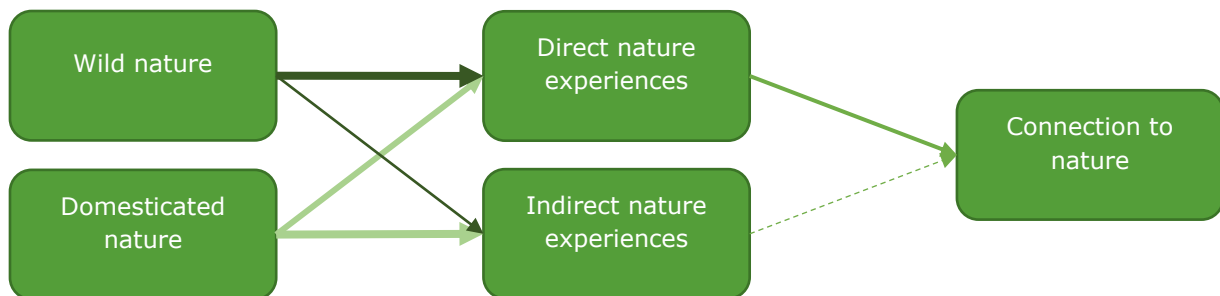


Figure 7.1 A hypothetical relation between type of nature, type of experience and connection to nature.

Lastly, vicarious nature experiences appeared to play a big role in acquiring knowledge about nature and can therefore be important for promoting connection to nature. These vicarious nature experiences allow children to encounter nature that they would normally not be able to experience directly (Bolle, 2016). A study with elementary schoolchildren also suggested that both direct experiences and vicarious experiences may influence the children's willingness to conserve biodiversity (Soga et al., 2016). In the current study, several children mentioned movies or books and how they have learnt things about nature from this. This suggest that these vicarious experiences might influence the children's knowledge of good and bad, which in turn might influence the children's environmental stewardship. However, children may become more connected to nature because they watch these shows, but they may also watch these shows because they are more connected to nature.

7.1.4 Influential adults

The influence of parents on connection to nature that had been suggested by other authors (Chawla, 1999, 2007; Cheng & Monroe, 2012) was not clear in this study. However, parents did seem to have a great influence on the children's environmental stewardship. Parents gave examples of environmental friendly behaviours which were, according to them, copied by their children. That parents can play an important role in the development of environmental attitudes was also affirmed by Villacorta, Koestner, & Lekes (2003).

The example of the young girl Pearl given earlier also included an influential adult that showed the child how to love nature (Linzmayr & Halpenny, 2014). The staff of Struin might also be influential adults for some of the Struin children, as children go to Struin regularly and are mostly assigned to the same teacher. Struin staff help the children to focus their attention on nature by pointing out interesting things in nature or by initiating activities that are aimed at exploring nature. They also teach the children about nature, ranging from names of plants and animal to how natural processes work. The influence of adults who can encourage or discourage children to do certain activities in nature has been recognized before (Postma, 2016). Chawla (2007) used the theory of joint attention to attempt to explain why adult role models are important in creating connection with nature. What these adults need to do, she writes, is *"to set an example of noticing nature in an appreciative way. By the direction and quality of their attention, they communicate nature's value and promote the child's interest in this world too"* (Chawla, 2007, p. 157). On the other hand, children should also be able to play freely without too much supervision (Postma, 2016; Skar, Gundersen, & O'Brien, 2016). Skar et al. (2016) suggest that self-initiated free play in natural environments where they can stay in one place for a long time and where there are not too many participants and planned activities, helps children to come closer to nature. It appears that this is just what Struin teachers

do, help the children with noticing nature, but still allow them enough freedom, both in space and in time, to independently interact with nature.

7.2 Reflection on theories and methods

7.2.1 Theories

The distinction between direct and indirect nature experiences based on Duerden & Witt (2010), Kellert (2002) and Millar & Millar (1996) was useful in understanding the different kinds of nature experiences children could have at the play locations and in distinguishing between experiencing directly involving nature and experiences where nature was merely used as decor.

The theory of environmental features (Lerstrup & Konijnendijk van den Bosch, 2017) was useful in making a nuanced distinction between wild and domesticated nature. Wild nature indeed consisted of a lot of high quality natural environmental features, as was presumed.

The theories of affordances (Gibson, 1979) and environmental features (Lerstrup & Konijnendijk van den Bosch, 2017) were useful in comparing possible direct and indirect nature experiences at different play locations. However, the definition of the ten environmental features of Lerstrup & Konijnendijk van den Bosch (2017) had to be adapted to be able to distinguish between environmental features that afforded direct experiences with nature and environmental features that afforded indirect experiences with nature. Therefore, three new classes were added to meet the demand for a classification of the non-natural features observed.

As no general, widely used concept of connection to nature in children was available, several existing concepts and measures for adults and children were used to create a new definition of connection to nature. The benefit of using this new concept instead of one of the existing concepts is that the new concept might be more complete, as it contained relevant aspects of several concepts. For some themes, there was a lot of overlap between the dimensions, especially between 'feelings in nature' and 'knowledge and awareness'. Therefore, these dimensions were together classified as 'human-nature relationship'. Boundaries between these dimensions were often diffuse, as the affective theme 'empathy for nature' for example also includes knowledge from the cognitive theme 'knowledge of good and bad', and judging whether humans dominate over nature ('knowledge and awareness') also includes feelings about nature, for example empathy. Separating cognitive and affective components therefore does not always seem possible and wise to do.

7.2.2 Methods

Seasonal effect

An important note to make when interpreting this research, is the fact that all observations were done in autumn and winter. Therefore, a possible seasonal effect on variety and abundance of environmental features and preferences for activities with or without nature could not be observed. It might be that urban green spaces and playgrounds are more varied and interesting during spring and summer and more natural areas are visited during spring and summer. This means that children might have more direct nature experiences then, compared to autumn and winter, because during autumn and winter the available nature is less interesting. Therefore, Wijs children might have more direct experiences with nature throughout the year than this research suggests. However, autumn and winter are a great part of the year, so nature experiences then account for a great part of the total nature experiences and therefore are important to consider.

Participant selection

Selecting comparable participants at both childcare centres was difficult. At Wijs there were not enough children to critically choose, as all children who met the age and year at the childcare centre requirements had to be interviewed. At Struin there were more children to choose from. However, I had virtually no influence on which children were selected, as this was done by the staff. Therefore, it is unsure how these children were selected and whether this was done randomly or whether these were children that would easily talk or loved nature. How representative the children from both childcare centres are is therefore slightly uncertain.

Some participants are related to each other (brothers/sisters). This means that even though data is treated as independent, this is not the case. Also, most parents consciously chose these childcare centres, for example because they felt playing outside was important for their children. Therefore, these childcare centres might attract certain children and may therefore not be entirely representative.

Observations

Observations were not done very unstructured, even though the observation form (Appendix A) allowed for structured organization of the data. Also, as afternoons available for visits to the childcare centres were limited and interviews had to be done also, less time has been spent on observing that would have ideally be done. The observations could have been improved by also looking at which environmental features were used for activities and by looking more closely at the role of the staff in the children's nature experiences. Nonetheless, the observations provided valuable information about the locations and the activities.

Individual interviews

The individual interviews contained a lot of questions about a lot of different parts of connection to nature and therefore provide a good understanding of the children's connection to nature. Combining qualitative with quantitative questions was useful. Letting the children score pictures made structured comparison between childcare centres easier and the children's explanations for their scores enabled a better understanding of their knowledge and feelings. Both the qualitative and the quantitative questions were therefore very valuable.

Several things could however be improved. First, the pictures used to test what children defined as nature (Figure 3.1) were of nature in different seasons. The picture of the tree was taken in autumn or winter, meaning it was less green than the other pictures. This might have influenced how the picture was judged by the children. Although a lot of children thought this picture was nature, more might have thought so when the tree had leaves and thus the picture was greener. Children might have also judged the other pictures differently when these would have been taken in autumn or winter and were thus less green.

Second, children were asked about their feelings in nature without specifying which nature. Therefore, Wijs children may think of being in another type of nature, perhaps more domesticated nature, than Struin children, who might think more of wild nature. Especially because results also showed a slight difference in their definition of nature. It would therefore be interesting to also look at how Struin children would feel in domesticated nature and how Wijs children would feel in wild nature. Would Wijs children still feel comfortable and would Struin children still feel free?

Third, children were not able to mention a lot of environmental stewardship associations and behaviours. This might have been because they were too young to be aware of this, but it might also have been that the questions were posed wrongly. Some children also misunderstood the question, suggesting that the phrasing of the question was indeed not optimal.

Fourth, the questions of the interview did not match perfectly with the operationalization of connection to nature, to be precise with its dimensions. This made it sometimes difficult to present and analyse the data.

Lastly, one should take into account the possibility of socially desirable answers given by the children. As children knew the interview was about nature, they might have adapted their answers to what they thought I might wanted to hear. For example, they might have described nature in their ideal play locations when they would actually not really want this.

Questionnaire

The questionnaire for parents provided valuable information about the parent's own connection to nature, frequency of family visits to nature and the environmental stewardship of the child. However, the statements where they were asked to judge their child's connection to nature did not match the questions in the individual interviews, making it difficult to use this data.

Generalizability

The fact that only two childcare centres were compared and only 28 children were interviewed limits the generalizability of the findings. Also, only one researcher coded the interviews, therefore results might be interpreted differently by different researchers. However, this research does provide valuable information about the childcare centres studied and can give direction to further research.

Chapter 8. Conclusions and recommendations

Chapter 4 and Chapter 5 presented the results of the observations of play locations, individual interviews with children and the questionnaire for parents. This paragraph will give the main conclusions, organized per research question, and ends with practical recommendations.

8.1 Conclusions

8.1.1 Nature experiences

How can play locations of an after-school childcare centre visiting wild or domesticated nature be characterized in terms of environmental features and activities?

To describe the play locations 13 environmental features were used. Play locations of Wijs were often smaller and contained more non-natural features. Not all natural environmental features were always present. When they were, they were of lower quality. Play locations of Struin were bigger and mostly contained all natural environmental features and mostly no non-natural environmental features. The natural environmental features were of high quality. Therefore, Struin locations afforded for more diverse, intense and direct experiences with nature.

Activities were characterized in terms of direct or indirect experiences with nature, meaning, respectively, activities with nature or activities without nature. At both childcare centres children could have direct and indirect nature experiences. Observations of activities showed that children at Struin had more direct nature experiences than children at Wijs and hardly had indirect experiences. At Wijs locations, often more direct experiences were afforded by the environmental features than were observed. Children often preferred to play with playground equipment or toys brought by the staff, thus having indirect experiences.

Therefore, Wijs seems to be an 'outside' childcare centre, meaning they focus on playing outside regardless of the naturalness of the area, and Struin seems to be a 'nature' childcare centre, meaning they focus on creating opportunities for nature experiences in wild nature areas. The quality, i.e. abundance, diversity, size and changeability, of the environmental features together with the observed and afforded activities suggest that nature experiences at Struin are more intense and varied than at Wijs.

8.1.2 Connection to nature

What is the connection to nature of children going to after-school childcare centres visiting wild or domesticated nature?

Most children from both Struin and Wijs seem to be well connected to nature. Virtually all children said nature was (very) important to them. Whether children defined something as nature depended on the amount of natural and non-natural elements present and whether these natural elements were wild or manmade. Struin children more often made the distinction between wild nature and nature landscaped by humans. They also tolerated less non-natural elements. Wijs children more often thought individual natural elements already made something nature.

Feelings in nature

The dimension feelings in nature contained two main themes: comfort and joy. Most children were comfortable in nature and enjoyed spending time in nature. Whether children liked an activity or a location in nature often depended on whether they felt comfortable in that situation. For some activities, children felt too uncomfortable to enjoy the activity.

Nature seemed slightly more important for Struin children. They more often described nature in their ideal play location, more often enjoyed activities that required more comfort and more often

enjoyed exploring nature and catching animals. Wijs children were more often afraid or disgusted in nature, for example of mud, getting lost or of bugs, and more often preferred playing instead of investigating.

Feelings about nature

The dimension feelings about nature contained two main themes: empathy for nature and a feeling of oneness. Virtually all children were able to show empathy for nature and feel part of nature.

The reasons why children thought environmental degradation was something bad differed between childcare centres. Wijs children more often reasoned from their own perspective and felt something was good or bad for them, whereas Struin children more often reasoned from nature's perspective and felt something was bad for nature. Struin children showed more empathy for bugs and spiders and Wijs children showed more empathy for the pig on a spit.

Knowledge and awareness

The dimension knowledge and awareness contained two main themes: knowledge of good and bad, and realizing interdependence. Not all children were able to identify why several environmental destructive behaviours are bad for nature. However, virtually all children know exhaust fumes from cars and garbage are bad for nature. Virtually all children think humans and nature are equal and think humans cannot live without nature.

Struin children were more often able to identify why certain environmentally destructive behaviour was bad for nature, for example the highway through the woods. Struin and Wijs did not differ much in their thoughts on human dominance and whether we can live without nature.

8.1.3 Environmental stewardship

Which environmental stewardship behaviours are identified and expressed by children going to after-school childcare centres visiting wild or domesticated nature?

Most children only had limited knowledge of the influence of their own behaviours on nature and possible environmental behaviours. Children knew certain behaviours that are harmful for nature, but were not always able to explain why. Most children did not mention things related to saving water and energy. As for their own behaviours, children often mention things that were small and fitted their age, like picking up or not throwing away garbage and taking care of plants and animals. Struin children seemed to be slightly more aware of their own possible influence and more often mentioned doing things instead of not doing things (e.g. cleaning up garbage instead of preventing littering).

8.1.4 Influential adults and other nature experiences

How can connection to nature and environmental stewardship of children going to after-school childcare centres visiting wild or domesticated nature be understood by influential adults and other nature experiences?

Not all parents appear very connected to nature, but most of them did think playing outside or in nature was good for their child. This did not differ between childcare centres. Parents influence how much family time is spent in nature. They also had a great influence on the child's knowledge about and customs regarding environmental behaviours. However, greener parents did not necessarily correspond with greener children, and vice versa.

Staff of the childcare centres might also be seen as influential adults who guide the children in their nature experiences by focussing their attention on nature and teaching them about nature. This was seen regularly at Struin but not at Wijs. Therefore, guidance by staff might positively influence connection to nature.

There was no clear relation between other nature experiences, e.g. nature near home, playing in nature after school, and connection to nature or environmental stewardship. However, vicarious nature experiences did seem to be able to influence connection to nature and environmental stewardship. For some children, books and TV programmes appeared to be important sources for learning about nature.

8.1.5 Differences in experiencing wild or domesticated nature

Answers to the sub-questions enable us to answer the main research question:

How can children's connection to nature and environmental stewardship be understood from wild or domesticated nature experiences during after-school childcare?

Both experiences in wild nature as well as experiences in domesticated nature seem to be able to positively influence connection to nature. Whether these experiences also influence environmental stewardship is less clear, partly because children appeared to struggle with answering questions about this and thus not a lot of information was available.

The different types of nature influence connection to nature differently, as Struin children appeared more connected to nature than Wijs children. Therefore, wild nature likely influences connection to nature more than domesticated nature. This might be because wild nature mostly consists of a lot of high quality natural environmental features, causing varied and intense nature experiences. The quality of natural environmental features in domesticated nature is lower. Also, domesticated nature often contains non-natural environmental features that distract the children from interacting with nature, whereas these are almost never present in wild nature.

The kind of activities that can be done in wild and domesticated nature also influence connection to nature differently. Struin children have more direct experiences with nature than Wijs children. Therefore, direct nature experiences (i.e. activities with nature) likely have more impact on connection to nature than indirect nature experiences (i.e. activities without nature). Hence, direct nature experiences in wild nature areas are likely to have the biggest impact on connection to nature. In domesticated nature, direct nature experiences likely also positively influence connection to nature, whereas indirect nature experiences probably do not have an impact on this.

8.2 Recommendations

8.2.1 Further research

This research has added to existing knowledge by showing that both wild and domesticated nature experiences are able to positively influence connection to nature. However, direct nature experiences in wild nature seem to have the most influence on connection to nature. However, to be sure childcare centres that take children to nature definitely influence connection to nature and environmental stewardship, a control group is needed. Therefore, this research should be repeated at a 'normal' childcare centre to determine whether these children are less connected to nature.

This research has determined connection to nature and environmental stewardship of children who now have these nature experiences. However, more studies are needed to determine the long-term effects of experiences in wild or domesticated nature and whether these experiences contribute to connection to nature and environmental stewardship as adults. Ideally, this design would be longitudinal, following the children interviewed in this study to adulthood. As these kinds of designs are difficult, another option is to, in the future, compare the connection to nature and environmental stewardship of adults who have gone to Struin or Wijs and determine how these nature experiences have contributed to this.

Furthermore, more research is needed to determine what causes experiences in wild nature to be different from experiences in domesticated nature and whether direct instead of indirect experiences are indeed equally or more important than the location these experiences take place in. The role of influential teachers should also be investigated more. Research could look at whether and how these adults change the children's nature experiences and whether they indeed help the children with focussing their attention on things they would otherwise have missed.

Richard Louv suggested that children need *"a quality attachment to land not only for their own health, but in order to feel compelled to protect nature as adults – not only as common-sense conservationists, but as citizens and voters."* (Louv, 2005, p. 155). This raises the question whether children that are taken to wild nature areas outside the city and are given the chance to connect with this land are, as adults, also more willing to protect this land or nature in general. Research on

conservation preferences of children and adults who have either connected with nature outside the cities or not might give insight in this question.

Lastly, designers or researchers should look at how domesticated nature within cities can be designed in a way that it resembles the high quality of environmental features in wild nature, so that children in cities have natural areas nearby that encourage direct experiences with nature, which in turn may positively influence connection to nature and environmental stewardship.

8.2.2 Practical implications

Direct nature experiences in wild nature seem to have the most influence on connection to nature. This has several implications for municipalities or designers that want to promote contact with nature in cities and childcare centres that are considering going green.

In cities, patches of nature should be designed that resemble the high quality of natural environmental features in wild nature areas. When excluding non-natural features like playground equipment, children are encouraged to have direct experiences with nature. An important note, however, is that children should be actively encouraged to explore and play in these patches of nature, so they know they are allowed to enter these natural areas and learn to play without conventional play equipment.

Childcare centres that consider going green should determine whether their focus is on letting children play outside, for example because it is healthy, or because they want to reconnect children with nature. In the former case, location is less relevant. In the latter case, however, the focus must be on visiting natural areas with a high quality of environmental features, that do not contain non-natural features and are ideally not surrounded by a lot of manmade structures (e.g. houses, cars). Especially playgrounds should be avoided, as they seem to distract children from interacting with nature. The aim should be to let children have direct experiences with nature, which means to not bring conventional play equipment. Guiding children in their direct nature experiences by focussing their attention on nature and teaching them about nature should also be considered.

Literature

- Andrejewski, R., Mowen, A. J., & Kerstetter, D. L. (2011). An Examination of Children's Outdoor Time, Nature Connection, and Environmental Stewardship. In *Proceedings of the Northeastern Recreation Research Symposium*.
- Bixler, R. D., & Floyd, M. F. (1999). Hands On or Hands Off? Disgust Sensitivity and Preference for Environmental Education Activities. *The Journal of Environmental Education*, 30(3), 4–11.
- Bixler, R. D., Floyd, M. F., & Hammitt, W. E. (2002). Environmental Socialization: Quantitative Tests of the Childhood Play Hypothesis. *Environment and Behavior*, 34(6), 795–818.
- Bolle, D. (2016). *Viewing the New Wildernis: Anthropomorphism, Nature, and People*. Wageningen University.
- Borge, A. I. H., Nordhagen, R., & Lie, K. K. (2003). Children in the environment: Forest day-care centers. Modern day care with historical antecedents. *History of the Family*, 8(4), 605–618.
- Bragg, R., Wood, C., Barton, J., & Pretty, J. (2013). *Measuring connection to nature in children aged 8-12: A robust methodology for the RSPB*.
- Chawla, L. (1998). Significant Life Experiences Revisited: a review of research on sources of environmental sensitivity. *Environmental Education Research*, 4(4), 369–382.
- Chawla, L. (1999). Life Paths Into Effective Environmental Action. *The Journal of Environmental Education*, 31(1), 15–26.
- Chawla, L. (2007). Childhood Experiences Associated with Care for the Natural World: A Theoretical Framework for Empirical Results. *Children, Youth and Environments*, 17(4), 144–170.
- Cheng, J. C.-H., & Monroe, M. C. (2012). Connection to Nature: Children's Affective Attitude Toward Nature. *Environment and Behavior*, 44(1), 31–49.
- Collado, S., Corraliza, J. a., Staats, H., & Ruiz, M. (2015). Effect of frequency and mode of contact with nature on children's self-reported ecological behaviors. *Journal of Environmental Psychology*, 41, 65–73.
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3), 297–334.
- Dale, M. A., & Wagner, W. G. (2003). Sandplay: an Investigation Into a Child's Meaning System Via the Self Confrontation Method for Children. *Journal of Constructivist Psychology*, 16(1), 17–36.
- Davis, J. L., Green, J. D., & Reed, A. (2009). Interdependence with the environment: Commitment, interconnectedness, and environmental behavior. *Journal of Environmental Psychology*, 29(2), 173–180.
- de Vaus, D. (2001). Case Study Designs. In *Research Design in Social Research* (pp. 219–267). Sage publishers.
- de Vries, S., Langers, F., Donders, J. L. M., Willeboer, M. T., & van den Berg, A. E. (2013). *Meer groen op het schoolplein : een interventiestudie*. Wageningen.
- Duerden, M. D., & Witt, P. A. (2010). The impact of direct and indirect experiences on the development of environmental knowledge, attitudes, and behavior. *Journal of Environmental Psychology*, 30(4), 379–392.
- Dunlap, R. E., Liere, K. D. Van, Mertig, A. G., & Jones, R. E. (2000). Measuring Endorsement of the New Ecological Paradigm : A Revised NEP Scale. *Journal of Social Issues*, 56(3), 425–442.
- Evans, G. W., Brauchle, G., Haq, A., Stecker, R., Wong, K., & Shapiro, E. (2007). Young Children's Environmental Attitudes and Behaviors. *Environment And Behavior*, 39(5), 635–659.
- Ewert, A., Place, G., & Sibthorp, J. (2005). Early-life outdoor experiences and an individual's environmental attitudes. *Leisure Sciences*, 27(3), 225–239.

- Fjørtoft, I., & Sageie, J. (2000). The natural environment as a playground for children. *Landscape and Urban Planning*, 48(1-2), 83-97.
- Flouri, E., Midouhas, E., & Joshi, H. (2014). The role of urban neighbourhood green space in children's emotional and behavioural resilience. *Journal of Environmental Psychology*, 40, 179-186.
- Frantz, C. M., & Mayer, F. S. (2014). The importance of connection to nature in assessing environmental education programs. *Studies in Educational Evaluation*, 41, 85-89.
- Gibson, J. J. (1979). *The Ecological Approach to Visual Perception*.
- Giusti, M. (2012). *Reconnecting to the Biosphere: children's socio-ecological emotions for Nature*.
- Giusti, M., Barthel, S., & Marcus, L. (2014). Nature Routines and Affinity with the Biosphere : A Case Study of Preschool Children in Stockholm. *Children, Youth and Environments*, 24(3), 16-42.
- Hermans, H. J. . (1986). *Het verdeelde gemoed. Over de grondmotieven in ons dagelijks leven*. Baarn: Uitgeverij H. Nelissen.
- Jansson, M. (2008). Children's Perspectives on Public Playgrounds in Two Swedish Communities. *Environments Children, Youth and Environments*, 18(182), 88-109.
- Kals, E., Schumacher, D., & Montada, L. (1999). Emotional Affinity toward Nature as a Motivational Basis to Protect Nature. *Environment and Behavior*, 31(2), 178-202.
- Kellert, S. R. (2002). Experiencing Nature: Affective, Cognitive, and Evaluative Development in Children. In P. H. Kahn Jr. & S. R. Kellert (Eds.), *Children and Nature* (pp. 117-151). Cambridge, MA: The MIT Press.
- KNMI. (2017). Daggegevens van het weer in Nederland. Retrieved February 2, 2017, from <https://projects.knmi.nl/klimatologie/daggegevens/index.cgi>
- Kollmuss, A., & Agyeman, J. (2002). Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, 8(3), 239-260.
- Lachowycz, K., & Jones, a. P. (2011). Greenspace and obesity: a systematic review of the evidence. *Obesity Reviews*, 12(5), 183-189.
- Lerstrup, I., & Konijnendijk van den Bosch, C. (2017). Affordances of outdoor settings for children in preschool: revisiting heft's functional taxonomy. *Landscape Research*, 42(1), 47-62.
- Lerstrup, I., & Refshauge, A. D. (2016). Characteristics of forest sites used by a Danish forest preschool. *Urban Forestry & Urban Greening*, (In Press, Accepted Manuscript).
- Linzmayr, C. D., & Halpenny, E. a. (2014). "I might know when I'm an adult': making sense of children's relationships with nature. *Children's Geographies*, 12(4), 412-428.
- Louv, R. (2005). *Last child in the woods*. Chapel Hill, North Carolina: Algonquin Books of Chapel Hill.
- Lysklett, O. B., & Berger, H. W. (2016). What are the characteristics of nature preschools in Norway, and how do they organize their daily activities? *Journal of Adventure Education and Outdoor Learning*, 0(0), 1-13.
- Manoli, C. C., Johnson, B., & Dunlap, R. E. (2007). Assessing Children's Environmental Worldviews: Modifying and Validating the New Ecological Paradigm Scale for Use With Children. *The Journal of Environmental Education*, 38(4), 3-13.
- Mayer, F. S., & Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology*, 24(4), 503-515.
- Millar, M. G., & Millar, K. U. (1996). The Effects of Direct and Indirect Experience on Affective and Cognitive Responses and the Attitude-Behavior Relation. *Journal of Experimental Social Psychology*, 32(6), 561-579.
- Miller, J. R. (2005). Biodiversity conservation and the extinction of experience. *Trends in Ecology and Evolution*, 20(8), 430-434.
- Mulder, M. B., Schacht, R., Caro, T., Schacht, J., & Caro, B. (2009). Knowledge and attitudes of children of the Rupununi: Implications for conservation in Guyana. *Biological Conservation*,

142(4), 879–887.

- Natuurmonumenten. (n.d.). Heumensoord. Retrieved December 7, 2016, from <https://www.natuurmonumenten.nl/natuurgebied/heumensoord/over-dit-gebied>
- Nicholson, S. (1972). The Theory of Loose Parts: An important principle for design methodology. *Studies in Design Education Craft & Technology*, 4(2).
- Nisbet, E. K., & Zelenski, J. M. (2013). The NR-6: A new brief measure of nature relatedness. *Frontiers in Psychology*, 4, 1–11.
- Nisbet, E. K., Zelenski, J. M., & Murphy, S. A. (2009). The Nature Relatedness Scale: Linking individuals's connection with nature to environmental concern and behavior. *Environment And Behavior*, 41(5), 715–740.
- Oxford Dictionaries. (2017). Online English Oxford Dictionary. Retrieved April 7, 2017, from <https://en.oxforddictionaries.com/>
- Postma, L. R. (2016). *Nature experiences and nature connection of children in urban natural playgrounds in the Netherlands*. Wageningen University.
- Punch, K. F. (2005). *Introduction to social research*. London: SAGE Publications.
- Richardson, M., Sheffield, D., Harvey, C., & Petronzi, D. (2015). *The Impact of Children's Connection to Nature* *The Impact of Children's Connection to Nature: A Report for the Royal Society for the Protection of Birds (RSPB)*.
- Schreurs, E. (2009). Zelfonderzoek met kinderen De KinderZelfKonfrontatieMethode, 3–5.
- Schultz, P. W. (2000). Empathizing with nature: The effects of perspective taking on concern for environmental issues. *Journal of Social Issues*, 56(3), 391–406.
- Schultz, P. W. (2001). The Structure of Environmental Concern: Concern for Self, Other People, and the Biosphere. *Journal of Environmental Psychology*, 21(4), 327–339.
- Schultz, P. W. (2002). Inclusion with Nature: The Psychology of Human-Nature Relations. In P. Schmuck & P. W. Schultz (Eds.), *Psychology of Sustainable Development* (pp. 61–78). Boston: Kluwer Academic Publishers.
- Skar, M., Gundersen, V., & O'Brien, L. (2016). How to engage children with nature: why not just let them play? *Children's Geographies*, 14(5), 1–14.
- Söderström, M., Boldemann, C., Sahlin, U., Mårtensson, F., Raustorp, A., & Blennow, M. (2013). The quality of the outdoor environment influences childrens health - a cross-sectional study of preschools. *Acta Paediatrica*, 102, 83–91.
- Soga, M., Gaston, K., Yamaura, Y., Kurisu, K., & Hanaki, K. (2016). Both Direct and Vicarious Experiences of Nature Affect Children's Willingness to Conserve Biodiversity. *International Journal of Environmental Research and Public Health*, 13(6), 529.
- Tam, K. P. (2013). Concepts and measures related to connection to nature: Similarities and differences. *Journal of Environmental Psychology*, 34, 64–78.
- Taylor, A. F., & Kuo, F. E. (2008). Children With Attention Deficits Concentrate Better After Walk in the Park. *Journal of Attention Disorders*, 12(5), 1–8.
- Taylor, A. F., Kuo, F. E., & Sullivan, W. C. (2002). Views of nature and self-discipline: Evidence from inner city children. *Journal of Environmental Psychology*, 22(1–2), 49–63.
- van den Berg, A. E., Koenis, R., & van den Berg, M. M. H. E. (2007). *Spelen in het groen: effecten van een bezoek aan een natuurspeeluin op het speelgedrag, de lichamelijke activiteit, de concentratie en de stemming van kinderen*. Alterra.
- van der Waal, M. E., van den Berg, A. E., & van Koppen, C. S. A. (2008). Terug naar het bos; Effecten van natuurbelevingsprogramma "Het Bewaarde Land" op de natuurbeleving, topervaringen en gezondheid van allochtone en autochtone kinderen, 7.
- Villacorta, M., Koestner, R., & Lekes, N. (2003). Further Validation of the Motivation Toward the Environment Scale. *Environment and Behavior*, 35(4), 486–505.

- Wells, N. M. (2000). At home with nature: Effects of "greenness" on children's cognitive functioning, *32*(6), 775–795.
- Wells, N. M., & Evans, G. W. (2003). Environment and Behavior A Buffer of Life Stress Among Rural Children, *35*(3), 311–330.
- Wells, N. M., & Lekies, K. S. (2006). Nature and the life course: Pathways from childhood nature experiences to adult environmentalism. *Children, Youth and Environments*, *16*(1), 1–25.
- Wu, C.-D., McNeely, E., Cedeño-Laurent, J. G., Pan, W.-C., Adamkiewicz, G., Dominici, F., ... Spengler, J. D. (2014). Linking Student Performance in Massachusetts Elementary Schools with the "Greenness" of School Surroundings Using Remote Sensing. *PLoS ONE*, *9*(10), e108548.

Appendix

A. Observation scheme nature experiences

Observatieschema natuurervaringen			
Datum:		Tijd:	Volgnr.:
BSO (afdeling):			
Locatie:			
Weer:			
Aantal kinderen:			
Leeftijden:			
Bijzonderheden:			
Natuurlijk			Sociaal
Beschrijving van de locatie (speeltuin, grasveld, bos, rivierstrand, etc.)			Activiteiten zonder natuur (spelen met elkaar, speeltoestellen, ballen, knutselmateriaal, etc.)
Lerstrup kenmerken			Activiteiten met natuur (bv. Lerstrup activiteiten)
Kenmerk	belangrijkste activiteiten	Aanwezig?	
Open vlaktes	rennen, lopen		
Hellend terrein	rollen, glijden, klauteren		
Afgeschermd de plaatsen	verstoppert, als frame		
Vaste objecten	klimmen, balanceren, springen		
Bewegende objecten	schommelen, zwaaien, wippen, draaien		
Losse objecten	schikken, aanpassen, gereedschap, rekwisiet, schat		
Losse materialen	graven, verplaatsen, vormen, smeren		
Water	gielen, mixen, spetteren, drijven		
Dieren (schepsels)	zoeken, omgaan met, zorgen voor		
Vuur	opstoken, opletten, bij zitten		

B. Letter parents

Onderwerp: deelname onderzoek Wageningen Universiteit

Beste ouder van...

Sinds kort loopt er bij Struin een masterstudent van de Universiteit van Wageningen rond. Haar naam is Anouk Schouten en ze is bezig met haar afstudeeronderzoek. Anouk is geïnteresseerd in hoe een groene buitenschoolse opvang kan bijdragen aan de verbondenheid van kinderen met natuur. Ze wil graag weten of het hiervoor uitmaakt of kinderen in de 'wilde natuur' spelen, zoals bij Struin, of in de wat 'tammere natuur', zoals in parken in de stad. Ze verwacht namelijk dat spelen in de wilde natuur zorgt voor een grotere verbondenheid met natuur dan spelen in stadsparken. Hiervoor gaat ze onderzoek doen bij twee BSO's en gaat ze deze vergelijken. Met de resultaten van dit onderzoek hoopt ze bij te dragen aan beleidsplannen van BSO's en overheden, door te laten zien welk soort natuurervaringen kinderen het meest met natuur verbindt.

Voor dit onderzoek zou ze [naam] graag willen interviewen tijdens een van de middagen dat hij/zij op de BSO is. Dit interview duurt ongeveer 20-30 minuten en zal gaan over onderwerpen als wat is natuur, hoe voel je je in natuur, empathie voor natuur en natuurvriendelijk gedrag. Tijdens de interviews zullen geluidsopnames gemaakt worden die later uitgeschreven zullen worden. Het onderzoek is **anoniem** en alle gegevens zullen uiterst **vertrouwelijk** behandeld worden in de scriptie.

Via deze mail willen we dan ook vragen of je toestemming wilt geven voor deelname van [naam] aan dit onderzoek. Als [naam] mee mag doen, dan zou Anouk het fijn vinden als een ouder een korte online enquête in zou willen vullen over je eigen verbondenheid met natuur en dat van [naam]. Deze enquête is hier te vinden en is geschikt voor invullen op computers en mobiele apparaten: https://wur.az1.qualtrics.com/SE/?SID=SV_0By5itk8rFGas8R.

Zou je willen laten weten of [naam] mee mag doen aan het onderzoek?

Alvast bedankt, ook namens Anouk,

Naam afdelingsleider

C. Interview questions individual interviews children

1. Natuur in het dagelijks leven

- | | |
|--|---|
| 1. Heeft jullie huis een tuin? | 4. Krijg je op school les over natuur? Hoe dan? |
| 2. Is er natuur in jullie wijk? | 5. Kijk je wel eens naar natuurprogramma's op tv? |
| 3. Waar speel je het liefst na school? | Leer je hier dan dingen van? Waarover? |

2. Wat is natuur?

- | |
|--|
| 1. Waar denk jij aan bij het woord natuur? |
| 2. Welke van deze dingen vind je leuk en welke niet? Waarom? |
| 3. Voelt het voor jou alsof je ook bij natuur hoort? |
| 4 foto's |
| 4. Als je naar deze foto's kijkt, is dit ook natuur? Waarom? |
| 5. Leg de foto's op volgorde van wat je het meest natuur vindt naar minst natuur |

3. Wat natuur voor jou betekent

- | |
|---|
| 1. Is natuur belangrijk voor jou?
Als je moest kiezen, is natuur dan heel belangrijk, gewoon belangrijk, een beetje belangrijk, niet belangrijk/niet onbelangrijk, een beetje onbelangrijk, gewoon onbelangrijk of heel onbelangrijk voor jou? |
| 2. Hoe voel je je als je in de natuur bent? Je mag deze woorden gebruiken als inspiratie. |

4. Ideale speelplek

Kun je beschrijven hoe jouw ideale speelplek buiten eruit zou zien? <i>Op wat voor een plek zou dit zijn? Welke dingen vind je er? Is er ook natuur?</i>

5. Activiteiten in natuur

- | | |
|--|-----------------|
| 1. Stel dat jij dit bent op deze foto, hoe zou jij je dan voelen? Waarom?
Geef dit aan door een van deze smileys te kiezen:
<i>helemaal niet leuk, niet leuk, ertussenin, leuk, heel leuk.</i> | 8 foto's |
| 2. Als je mocht kiezen, wat doe je dan liever? Waarom?
a. In het bos van de paden af, of op de paden blijven?
b. Op het gras spelen, of in de bosjes spelen? | |

6. Natuurvriendelijk gedrag

- | |
|--|
| 1. Denk jij dat de dingen die jij doet op een normale dag de natuur kunnen beïnvloeden? Hoe dan? |
| 2a. Waar denk jij aan bij dingen die goed zijn voor de natuur en het milieu? |
| 2b. Welke dingen doe jij wel eens? |

7. Foto's beoordelen

4 foto's Hoe voel je je bij het zien van deze foto? Kies een van de smileys . Wat vind je van deze foto? Vind je dit goed of slecht? En waarom?
--

8. Dilemma's

- | |
|---|
| 1. Soms vinden kinderen een spin in huis. Sommige kinderen maken de spin dan dood, maar andere kinderen vangen hem en zetten hem naar buiten. Wat vind jij hiervan? Waarom? |
| 2. Sommige ouders brengen hun kinderen met de auto naar school, anderen doen dit met de fiets. Wat vind jij hiervan? Waarom? |
| 3. Sommige kinderen vangen beestjes en stoppen ze in een bakje en houden ze gevangen, andere kinderen laten de beestjes vrij. Wat vind jij hiervan? Waarom? |
| 4. Sommige kinderen vinden dat mensen de baas zijn over de natuur, andere kinderen vinden dat mensen en natuur gelijk zijn. Wat vind jij hiervan? Waarom? |
| 5. Sommige kinderen denken dat mensen zonder natuur kunnen leven, anderen denken dat mensen niet zonder natuur kunnen leven. Wat vind jij hiervan? Waarom? |

D. Questionnaire parents

Deze enquête is bedoeld voor ouders van kinderen die naar BSO Struin of BSO Wijs! gaan en die meedoen aan het afstudeeronderzoek naar verbondenheid met natuur. Het is voor dit onderzoek belangrijk dat data van elk kind aangevuld wordt met data van een ouder. Daarom wil ik u vragen deze korte vragenlijst in te vullen. Deelname aan deze enquête neemt ongeveer 10 minuten in beslag. Het onderzoek is anoniem en alle gegevens zullen uiterst vertrouwelijk behandeld worden in de scriptie. Alvast bedankt voor uw medewerking!

Met vriendelijke groet,
Anouk Schouten-van der Laan

e-mailadres: anouk.vanderlaan@wur.nl

- ☐ Ik geef toestemming voor het gebruik van mijn antwoorden en die van mijn kind voor dit onderzoek. Gegevens zullen anoniem en vertrouwelijk behandeld worden.

Dit onderdeel bevat een aantal algemene vragen over uw kind en de BSO.

- Wat is de naam van uw kind?
- Naar welke school gaat uw kind?
- Hoe lang gaat uw kind al naar deze BSO?
- Waarom heeft u voor deze BSO gekozen?

De volgende vragen gaan over uw verbondenheid met natuur.

- Beoordeel onderstaande stellingen op hoe ze bij u passen.

	Zeer mee oneens (1)	Mee oneens (2)	Neutraal (3)	Mee eens (4)	Zeer mee eens (5)
Mijn ideale vakantiebestemming is midden in de natuur	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik denk altijd na over hoe mijn acties de natuur beïnvloeden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mijn verbondenheid met de natuur is een deel van mijn identiteit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik zie vaak (wilde) dieren, waar ik ook ben	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mijn relatie met natuur is een belangrijk deel van wie ik ben	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik voel me erg verbonden met alle levende dingen op de aarde	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- Hoe vaak gaan jullie als gezin de natuur in?
- Waar gaan jullie dan heen?

- Beoordeel onderstaande stellingen op hoe ze bij u passen.

	Zeer mee oneens (1)	Mee oneens (2)	Neutraal (3)	Mee eens (4)	Zeer mee eens (5)
Ik praat veel met mijn kinderen over natuur	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik moedig mijn kinderen aan tijd door te brengen in natuur	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik moedig mijn kinderen aan rekening te houden met natuur	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Het laatste onderdeel van deze enquête gaat over de verbondenheid van uw kind met natuur.

- Hoe belangrijk denkt u dat natuur is voor uw kind?
 - ☐ Helemaal niet belangrijk (1)
 - ☐ Niet belangrijk (2)
 - ☐ niet belangrijk/niet onbelangrijk (3)
 - ☐ Belangrijk (4)
 - ☐ Heel belangrijk (5)
- Waarom denkt u dit en hoe ziet u dit terug in het gedrag van uw kind?
- Passen onderstaande stellingen bij uw kind?

	Zeer mee oneens (1)	Mee oneens (2)	Neutraal (3)	Mee eens (4)	Zeer mee eens (5)
Mijn kind voelt zich op zijn/haar gemak in de natuur	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mijn kind is graag in de natuur	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mijn kind weet veel over natuur	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mijn kind vraagt me vaak of we naar een natuurlijke plek kunnen gaan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mijn kind maakt zich wel eens zorgen over natuur	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mijn kind haalt me wel eens over om voor een natuurvriendelijk alternatief van iets te kiezen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- Laat uw kind wel eens natuurvriendelijk gedrag zien? Zo ja, wat? Dit zijn bijvoorbeeld dingen als afval op straat oprapen, zuinig zijn met water, helpen met recyclen en een zorgzame houding ten opzichte van natuur.
- Als uw kind wel eens natuurvriendelijk gedrag laat zien, hoe vaak doet hij/zij dit dan?
- Hoe vaak komt uw kind naast de BSO nog meer in aanraking met natuur (elke dag, elke week, etc.)?
- Op welke plekken komt uw kind dan?

Bedankt voor het invullen van deze vragenlijst!

Als u het leuk vindt de resultaten van dit onderzoek te ontvangen, kunt u hieronder uw e-mailadres invullen.

E. Impression of play locations and examples of activities

Locations Struin

The following section shortly describes the play locations visited during this research and gives examples of activities observed here. Numbers behind the names refer to the location on the map in Figure 4.1. Pictures are taken by the author and give an impression of the area visited.

Apple field (28)

The apple field, as it was named by the children, lies south of Nijmegen. It is located on estate Elshof. The apple orchard itself is owned by the municipality of Heumen, but is open for everyone. The orchard is managed by the municipality, but not for commercial use. Two sides of the orchard are surrounded by forest, one is located next to a road and the other next to pastures. The forest had several walking trails. The sound of cars and being able to see houses and the road through the trees is a constant reminder of being close to the city. This feeling decreases when walking off-track in the forest.

During one observation, both activities with nature and activities without nature were observed. Activities without nature included a game where the children would push each other with their backpacks and a fantasy game where some children would play a horse and another their trainer. Activities with nature included playing with mud, crafting a seesaw, gathering apples, off-track exploration of the forest, guided tour through the forest looking for mushrooms and sword fighting with branches.



Heumensoord (27)

Heumensoord is a nature reserve of approximately 500 hectares at the south border of the city Nijmegen. It is owned by the municipality of Nijmegen and water company Vitens and is managed by Natuurmonumenten (Natuurmonumenten, n.d.). The area consists of different types of nature, e.g. coniferous forest, deciduous forest, heathland and grassland. There are hiking trails, cycling trails and horse riding trails. In the forest, hardly any city noise can be heard. Recently, a natural playground was created on a sandplain in the forest. This used to be a location Struin visited often, but now that the playground is there, they hardly go there anymore. They believe that the play equipment distracts the children from interacting with nature.

During two observations, activities with and without nature were observed. Activities without nature included exchanging Pokémon cards and joke telling. Activities with nature included finding mushrooms and beetles, building and repairing a hut, playing with branches, playing baseball with a branch and an apple, making a slide on a sand hill and sliding off a hill with wet leaves.



Struinland (14)

The Struinland is property of Struin and has been designed as a home base for the Struin children of section Ooijpolder. These children return to this location at the end of the day and play here when the weather is rough, so they are close to an inside location. It is located at the border of the city and the border of the Stadsward. The area is made up of several parts, each suitable for one age group. There is also a village of huts made by the children themselves. On a specific part of the property two wild horses can be found. As the Struinland is still very new, the trees are not very tall yet. The area is very open and therefore the skyline of the city is clearly visible and you can see and hear cars passing now and then.

During three observations, activities with and without nature were observed. Activities without nature included just sitting and chatting, playing tag and frolicking around. Activities with nature included climbing a willow tree and bending the branches, balancing on a log over a dry ditch, sitting in the grass alone, fighting with stick, searching for worms, crafts with mud and jumping off a log.



Kops plateau (16)

The Kops plateau is a small private forest open for the public. There are no specific rules, so dogs do not need to be on a leash and people are allowed to make a fire. It is located at the east border of Nijmegen and is surrounded by roads. The northeast border, however, lies higher than the road below it and is fenced to prevent falling off the steep hill. When in the area, it does not feel or sound like you are a few steps removed from the city. There are several open places, but also patches of forest.

During one observation, activities with and without nature were observed. Activities without nature were for example to monkey about with each other and playing living Stratego with animal cards. Activities with nature included climbing in trees, picking apples and crafting with leaves.



Groenlanden (10)

The Groenlanden is part of the Ooijpolder, a nature reserve east of Nijmegen, along the river the Waal. This specific part is elevated a bit. There are trails, but they are more desire paths than landscaped paths. Horses and cattle can also access the area. The area has a wild look, with a lot of tall grass and bushes and nature everywhere you look. There does not seem to be a lot of management, apart from grazing by the horses and cattle. Within the area, no city elements can be seen or heard.

During one observation, only activities with nature were observed. Activities with nature included catching frogs, playing hide and seek and climbing trees. Playing hide and seek in this case is an activity with nature, as the children used bushes and grass to hide in or under.



Stadswaard (12)

The Stadswaard is part of the Ooijpolder and directly borders the city. It is managed by Staatsbosbeheer. The area is very open and therefore allows for a beautiful view on the Waal and the city skyline. When in the area, however, there are no city-related noises. The area is a grassland wilderness with a small patch of forest. Cattle can roam free and visitors can walk everywhere they want. Recent construction works for a secondary channel, however, have transformed a part of the area in temporary sandy hills.

During two observation, only activities with nature were observed. Activities with nature included sand throwing fights, building with sand and climbing trees.



Bemmelsewaard (6)

The Bemmelsewaard is a floodplain on the north shore of the Waal with a high biodiversity and a real wilderness feeling. During my visit, there was a thick fog, making it hard to fully observe the area. There is one cycling trail. The area is covered with pastures and forest and contains several

(sand mining) ponds. At the shore of one of these ponds, the brick factory is clearly visible and audible as a constant soft noise in the background. Apart from a few hiking trails, the area only contains narrow and rough desire paths. A lot of animal tracks, for example beaver tracks, and bones can be found in the area.

During one observation, only activities with nature were observed. Activities with nature included swinging on a rope on a tree, climbing on a fallen tree, making a chain of shells and independent off-road exploration.



Sprokkelbos (3)

The Sprokkelbos is a small play forest behind an old water pumping station in Lent. It is managed by a small foundation which depends on donations and volunteers. In this little play forest are several natural playsets, like a hut, big trunks, and a bridge. Children are also allowed to build their own huts. Behind the forest is a little pond with muddy or grass shores, depending on the water level. Houses are still visible through the trees and of noise from traffic and nearby construction works can be heard clearly.

During two observations, only activities with nature were observed. These included searching for sticks and peeling these, and climbing trees.



Goffertpark (25)

The Goffertpark is a large park within the city of Nijmegen. It contains large grasslands, patches of forest and a petting zoo. There are several big asphalt roads. As the park lies in the middle of the city, it is managed and can be crowded. At most places, houses and cars can still be seen. However, when in the right places, there are not so much city influences.

During one observation, only activities with nature were observed. These were mostly playing with the snow, especially sliding of a hill with tiny sleds.



Hengstdal (20)

The Hengstdal is a very long grass field in a sort of valley at the border of the city. It is still a bit surrounded by the city. Behind the trees a few houses can still be seen. At one of the long sides the forest was closed off with a gate, but the forest on the slope on the other side was accessible.

During one observation, activities with and without nature were observed. Activities without nature included reading a book on a bench and activities without nature included digging, playing with the snow and climbing in a tree.



Heerlijkheid Beek (21)

This forest could be reached from the Hengstdal. Heerlijkheid Beek is a narrow strip of forest between two main roads. Even though it is only a small strip of forest, it does not feel like it is small or close to the city. There are a lot of (extreme) height differences, which makes it feel like being in another country. One of the teachers described it as a magical place with a lot of height differences, pastures and alternations between deciduous and coniferous forest.

During one observation, only activities with nature were observed. These included sledging of a hill, climbing through the vegetation on and off a hill, and being alone.



Locations Wijs

The following section shortly describes the play locations visited during this research and gives examples of activities observed here. Numbers behind the names refer to the location on the map in Figure 4.2. Pictures are taken by the author and give an impression of the area visited.

Car wreck (19)

This location is named after a car wreck artwork in the middle of a wide asphalt road in the Maximapark. At one side of the road there are a few benches. On both sides beside the road is a lawn with small trees which were planted in straight lines. Behind these lawns there is a thin strip of bushes. In these bushes there are no paths. Close to the road there is also a house and a few ditches.

During one observation, activities with and without nature were observed. Activities without nature included playing soccer, climbing on the car wreck and playing tag. Activities with nature were for example playing hide and seek, exploring the bushes and searching for mushrooms. The latter two activities, however, were only done by a few children.



The Stones (13)

In the centre of this lawn lies a circle of big stones. In the back, there is a wide ditch and at some borders there are patches of high bushes. In the bushes next to the ditch children have created some desire paths. Around the field are houses and roads.

During one observation, activities with and without nature were observed. Activities without nature were for example playing soccer, playing tag and fantasising. Activities with nature were for example climbing and jumping on the rocks, exploring the bushes, playing with mud and with the water.



Building Playground Voorn (9)

This playground has a large outdoor playground and a small inside location. There are a lot of play materials present, ranging from monkey bars and a cableway to shovels and little carts. The playground is fenced and can only be accessed through one entrance. At the edges, there are some small trees and low bushes. A large part of the surface is sand or stone, but there are also patches of grass. The playground is surrounded by houses and lies next to a school.

During four observations, activities with and without nature were observed. Activities without nature were for example playing soccer and using the playground equipment. Activities with nature included for example digging in the sand and drawing in the sand with a stick. Most children, however, used the playsets or the little carts.



The Ship (3)

The pirate ship is a fenced playground with one entrance and a big wooden ship in the middle. The surface is covered with grass and sand. Several playsets are present, e.g. a swing and a cableway. The playground is separated by a bike path from a big lawn with soccer goals. At the border of the lawn is a ditch with a shallow layer of water. The playground and lawn are surrounded by houses and border a busy road.

During one observation, activities with and without nature were observed. Activities without nature were for example playing soccer and using the playground equipment. Activities with nature included for example digging in the sand and playing with the ice in the ditch, like gathering it, breaking it and walking on it.



Butterfly park (2)

This relatively large park contains playsets, grass, trees and bushes. The playsets are scattered around the park, leaving enough room for natural elements like big stones and bushes. One side of the park borders a ditch. The park is surrounded by houses and on the other side of the ditch is a busy road.

During one observation, activities with and without nature were observed. Activities without nature were for example playing soccer and using the playground equipment. Activities with nature included for example gathering sticks and feathers and playing with huts in the bushes.



Orange playground (11)

The orange playground is a playground in the middle of a quiet neighbourhood. There are several big trees, providing shade in summer. However, the trees are not really climbable as the branches are too high. There are several playsets on a lawn, like monkey bars, swings and soccer goals.

During one observation, only an activity without nature was observed, namely playing soccer.



Parasites and orchard (1)

The so-called Parasites are two buildings in an orchard. These blue and orange buildings are designed by an artist and are the home base of the children. At the end of the day, they come here to play either inside or outside. The orchard lies next to a busy road, is surrounded by houses and borders Castellum Hoge Woerd, which owns and manages it.

During one observation, activities with and without nature were observed. Activities without nature were for example playing soccer. Activities with nature included for example climbing in the trees.

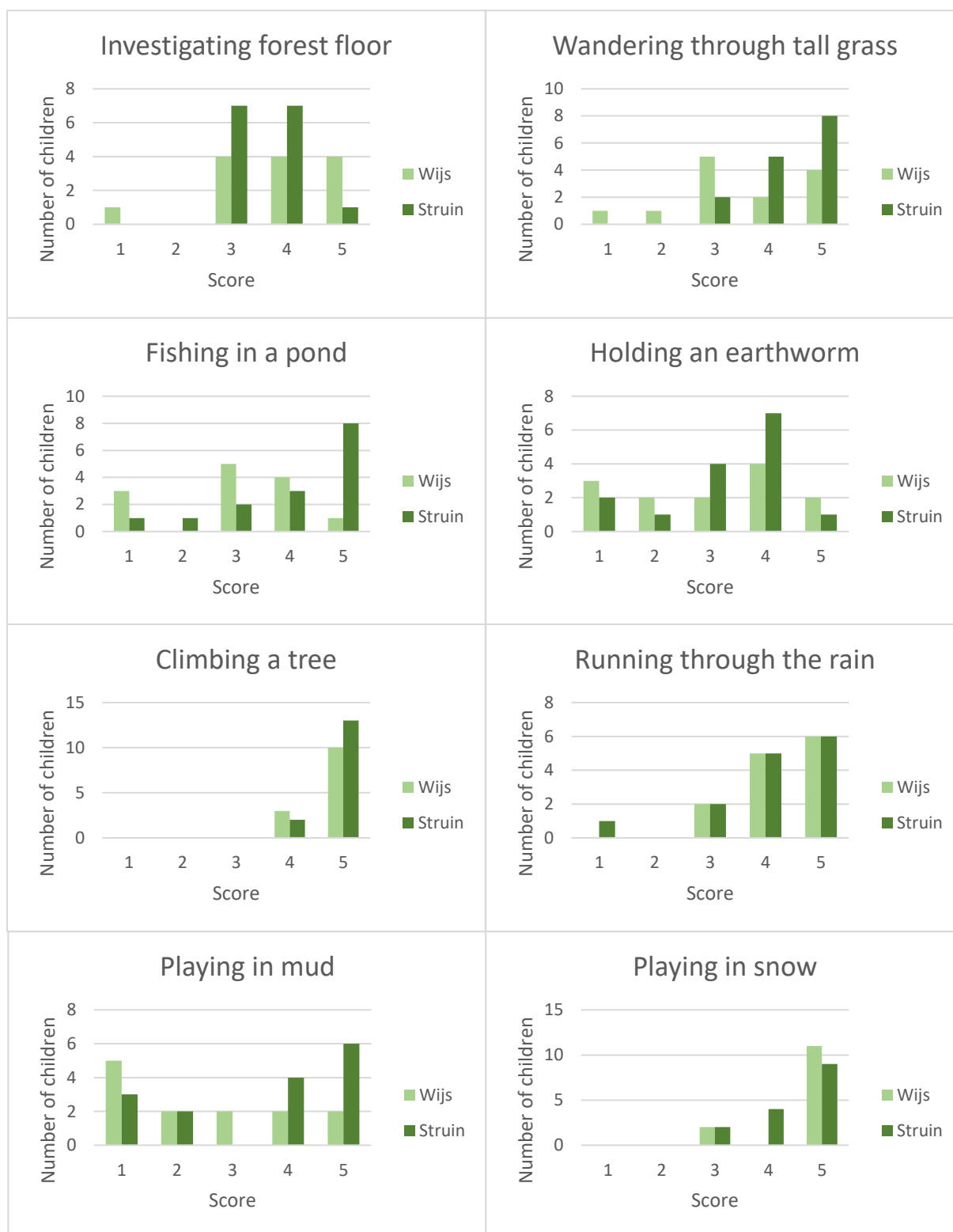


F. Distribution of connection to nature scales

Feelings about activities in nature

Names refer to the pictures in Figure 3.3 on page 19.

Struin n=15, Wijs n=13.



Judging environmental degradation pictures

Names refer to the pictures in Figure 3.4 on page 19.

Struin n=14, Wijs n=13.

