

**TRENDS OF CHILDREN'S EXPERIENCES WITH  
NATURE AND THEIR CONNECTEDNESS TO  
NATURE**

by

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## LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
CTN	Connectedness to Nature
DOE	Department of Environment
ESD	Education for Sustainable Development
IUCN	International Union for Conservation of Nature
JEPeM	<i>Jawatankuasa Etika Penyelidikan Manusia</i> (Humans Research Ethics Committee)
MOE	Ministry of Education
SK	<i>Sekolah Kebangsaan</i> (National schools)
SPSS	Statistical Package for the Social Sciences
UNCRC	United Nations Convention on the Rights of the Child
UPSR	<i>Ujian Pencapaian Sekolah Rendah</i> (Primary School Achievement Test)
USM	<i>Universiti Sains Malaysia</i>
VIF	Variance Inflation Factor

## LIST OF TERMINOLOGIES

<i>Baling Tudung Tin/ Ceper</i>	A traditional game where the players use their fingers to shoot the bottle cap to the other bottle cap. This game uses five bottle caps.
<i>Batu Seremban</i>	‘Five stones’ or ‘seven stones’ is a traditional game that uses rounded objects such as marbles, rubber seeds or small stones. The game involves two or more players and has seven levels.
<i>Bola Beracun</i>	A traditional game that involves group(s) of players. The players have to avoid the ‘poisonous’ ball thrown by other player from the other group.
<i>Bumiputera</i>	Refers to the Malays and indigenous people particularly in Malaysia.
<i>Congkak</i>	A traditional game that the players (two players) need to simultaneously scoop up all the seeds (marbles) in any holes of the <i>congkak</i> board on their side and drop the seeds into the next holes in a clockwise direction. The game lasts until the final seeds have been deposited.
<i>Gotong-royong</i>	Communal work by community members to achieve a goal.
<i>Guli</i>	Marbles.
<i>Lompat Tali</i>	A game that uses a braided rubber as a rope. The game needs at least three players. Two players hold the rubber rope and another player jumps over the rope starting from feet level and increasing to head level.
<i>Masak-masak</i>	A game where children pretend to cook using a toy kitchen or natural elements, such as leaves or flowers, as their cooking ingredients.
<i>Non-bumiputera</i>	Refers to other ethnicities (other than Malays and indigenous people) particularly in Malaysia.
<i>Sulam padi/ menyulam padi</i>	Paddy plants replacement.
<i>Takraw</i>	Kick volleyball, a native sport in the Southeast Asia that use rattan ball. The players can use only their feet, chest, and head to touch the ball.

<i>Teng-teng</i>	Hopscotch, a traditional game in which the players draw a hopscotch pattern on the ground. Each player has to have a marker, such as a small stone or bottle cap, and has to hop from one square to another square.
<i>Tuju Kasut</i>	A game that requires the players to arrange the slippers/ sandals vertically in a pyramid-like form and another slipper or sandal is be thrown at the pyramid of slippers/ sandals to knock them over.
<i>Wakaf</i>	Gazebo.

# **TREND PENGALAMAN KANAK-KANAK DENGAN ALAM SEMULA JADI DAN KEBERKAITAN MEREKA DENGAN ALAM SEMULA JADI**

## **ABSTRAK**

Keberkaitan dengan alam semula jadi (KASJ) semasa zaman kanak-kanak memainkan peranan penting untuk mempengaruhi sikap and tingkah laku mereka terhadap alam semula jadi semasa kanak-kanak sekarang and sebagai seorang dewasa kemudian. Faktor paling ketara yang mempengaruhi KASJ adalah pengalaman mereka dengan alam semula jadi, terutamanya pengalaman secara langsung. Walau bagaimanapun, pemesatan urbanisasi, kemodenan, halangan daripada ibu bapa, dan kualiti persekitaran telah mengurangkan pengalaman kanak-kanak dengan alam semula jadi. Kanak-kanak memperoleh pengalaman alam semulajadi kebanyakannya melalui pengalaman secara tidak langsung, yang mungkin mempunyai kualiti yang tidak sama seperti pengalaman secara langsung. Kajian ini bertujuan untuk mengkaji trend pengalaman kanak-kanak dengan alam semula jadi, tahap keterikatan mereka dengan alam semula jadi dan kesan-kesan pengalaman dengan alam semula jadi yang berbeza terhadap keberkaitan mereka dengan alam semula jadi. Rekabentuk kajian secara *sequential mixed method* telah digunakan untuk mencapai tujuan-tujuan tersebut. Kajian melibatkan 760 kanak-kanak berumur 10-11 tahun daripada 20 sekolah (bandar dan luar bandar) di Kedah dan Pulau Pinang, Malaysia. Soal selidik digunakan untuk bahagian kuantitatif (n=760), manakala perbincangan kumpulan fokus dan lukisan digunakan untuk bahagian kualitatif (n=72). Data kuantitatif dianalisis menggunakan statistik deskriptif dan inferensi, dan data kualitatif dianalisis menggunakan analisis kandungan. Terdapat beberapa penemuan utama kajian ini. Pertama, penemuan mengesahkan pengalaman secara langsung dalam kalangan

kanak-kanak telah berkurangan. Kedua, kajian ini menunjukkan pengalaman secara tidak langsung telah memberi sumbangan yang lebih terhadap keberkaitan kanak-kanak dengan alam semula jadi berbanding pengalaman secara langsung. Walaupun pengalaman secara langsung memberi sumbangan yang sedikit, kajian menunjukkan kekurangan pengalaman secara langsung memberi kesan buruk kepada keberkaitan kanak-kanak dengan alam semula jadi. Ketiga, faktor fizikal dan faktor sosial didapati memainkan peranan penting untuk mempengaruhi cara kanak-kanak mempunyai pengalaman dengan alam semula jadi, yang seterusnya mempengaruhi KASJ. Penemuan-penemuan ini menjadi satu sumbangan penting terhadap gabungan teori-teori berkaitan kanak-kanak dan alam semula jadi. Pengamal di dalam persekitaran binaan, pendidikan alam sekitar dan juga ibu bapa perlu mendekatkan kembali kanak-kanak dengan alam semula jadi melalui kedua-dua cara secara langsung dan tidak langsung kerana kedua-duanya melengkapinya antara satu sama lain. Akhir sekali, rekabentuk kajian secara kaedah *mixed method* didapati menjadi satu pendekatan berkesan untuk memahami hubungan kanak-kanak dengan alam semula jadi. Secara keseluruhannya, kajian ini mempunyai impak dalam menggalakkan generasi masa akan datang untuk menjaga alam sekitar dan alam semula jadi.

# **TRENDS OF CHILDREN'S EXPERIENCES WITH NATURE AND THEIR CONNECTEDNESS TO NATURE**

## **ABSTRACT**

Connectedness to nature (CTN) during childhood plays an important role to influence children's attitudes and behaviour towards nature as a child now and later as an adult. The most significant factor that contributes to children's CTN is their experiences with nature, especially direct experiences. However, rapid urbanization, modernization, parental restrictions, and quality of the outdoor environment have reduced children's direct experiences with nature. Children obtain nature experiences mostly through indirect experiences, which may not have the same quality as direct experiences. This study aims to investigate the trends of children's experiences with nature, the levels of their CTN and the effects of different types of experiences with nature on their CTN. A sequential mixed method research design was employed to achieve these aims. This study involved 760 children aged 10-11 years old from 20 schools (urban and rural) in Kedah and Pulau Pinang, Malaysia. Questionnaires were used for the quantitative part (n=760), whereas focus group discussions and drawing activities were used for the qualitative part (n=72). Quantitative data were analysed using descriptive and inferential statistics, and qualitative data were analysed using content analysis. There are several major findings of this study. First, the findings confirm that direct experiences among children have decreased. Second, this study has demonstrated that indirect experiences make a greater contribution to children's CTN compared to direct experiences. Even though direct experiences make little contribution, the study has indicated that the reduction in direct experiences is having an adverse effect on children's CTN. Third, physical factors and social factors have

been found to play an important role to influence the way children experience nature, which subsequently influences their CTN. These findings make an important contribution to combination of theories related to children and nature. It is suggested that practitioners in built environment, environmental education, as well as parents should help to reconnect the children with nature through both direct and indirect ways as both complement each other. Finally, the mixed method research design was found to be an effective approach to understanding children's relationship with nature. As a whole, this study has a significant impact in encouraging future generations to care for the environment and for nature.



# CHAPTER 1

## INTRODUCTION

### 1.1 Background

A large number of studies have demonstrated that an individual attachment to nature, known as connectedness to nature (CTN), plays an important role in developing a positive attitude and behaviour towards the environment. Indeed, CTN has positively influenced people's environmental concerns and behaviours (Cheng & Monroe, 2010; Collado, Staats, & Corraliza, 2013; Duerden & Witt, 2010; W. Zhang, Goodale, & Chen, 2014). Previous studies also have shown that CTN is associated positively with other specific attitudes towards nature and the environment including the wildlife (W. Zhang et al., 2014), tourism (Xu & Fox, 2014), and the landscape (Kaltenborn & Bjerke, 2002). CTN also has been found to play an important role in influencing people's perceptual evaluation of the natural landscape (Tang, Sullivan, & Chang, 2014), as well as their environmental preferences (Bixler & Floyd, 1997). Recently, Lin et al. (2017) found that people with high CTN planted more trees in their yard and spend more time there. In addition, researchers have found that CTN has a positive impact on an individual's psychological well-being, as it has a positive correlation with mindfulness (Howell, Dopko, Passmore, & Buro, 2011) and happiness (Capaldi, Dopko, & Zelenski, 2014).

Given the many benefits of CTN regarding individual attitudes towards nature and the environment, as well as psychological well-being, the question now is how an individual develops their CTN. Many studies have demonstrated that frequent

experiences with and in nature are the most significant factor that contributes to an individual's CTN, which subsequently influences their environmental concerns and behaviours (Cheng & Monroe, 2010; Duerden & Witt, 2010; W. Zhang et al., 2014). In retrospective studies, frequent experiences with and in nature during childhood have been found to influence children's environmental career choices and environmental concerns (Chawla, 2007; Palmer, Suggate, Robottom, & Hart, 1999; Wells & Lekies, 2006), as well as their attitude towards activities with nature (Lohr & Pearson-mims, 2005) when they become adults. Also, frequent childhood experiences with nature influence children's preferences for particular landscapes and places when they become adults (Manzo, 2005). Furthermore, frequent visits to green areas during childhood have a positive influence on their use of green areas when they become adults (Thompson, Aspinall, & Montarzino, 2007), and develop positive perceptions of the natural environment and natural recreation activities when they become adolescents (Bixler, Floyd, & Hammitt, 2002; Jorgensen & Anthopoulou, 2007). These retrospective studies have indicated that frequent childhood experiences with and in nature are vital in creating long-lasting effects that endure until adulthood. Hence, it is becoming increasingly difficult to ignore the importance of experiences with and in nature during childhood.

Although the development of CTN is a lifelong process and could change over time, researchers have suggested that childhood experiences with nature, especially during middle childhood age, are important because it is a critical period in developing CTN (Kellert, 2005). It is crucial for the children to have experiences with and in nature during their middle childhood, which later develops their CTN and

further affects their attitude and behaviour towards nature and the environment during childhood and adulthood.

However, rapid urbanization and population growth, which mostly occur in developing countries, have reduced children's experiences with nature especially direct experiences (Chawla & Derr, 2012; Louv, 2008; Myers, 2012). Children's spontaneous and unstructured experiences with nature in the backyard, field, and natural areas in their neighbourhood have decreased (Freeman & Tranter, 2011; Gundersen et al., 2016; Kellert, 2005; Louv, 2008). Studies have shown that the number of children playing in the outdoor environment where nature exists is rapidly declining (Clements, 2004; Gaster, 1991; Karsten, 2005). Modernization has also caused children's leisure activities to change from them being actively involved in outdoor activities to being passively confined to indoor activities, aided by gadgets (Louv, 2008; Veitch, Bagley, Ball, & Salmon, 2006). Also, parental restrictions due to safety have limited children's opportunities to play in the outdoor environment (Castonguay, 2010; Holt, Lee, Millar, & Spence, 2015) where they can experience nature directly. For that reason, children have obtained experiences with nature mostly from indirect experiences through the media (Cohen & Horm-Wingerd, 1993; Kellert, 2005) and books, as well as in classes and visits to organized natural places, such as zoos (Louv, 2008).

The phenomenon of the disconnection with the natural world leads to changes in children's quality of life, and this phenomenon is known as 'Nature Deficit Disorder', as coined by Louv (2008). The phenomenon of disconnection with the natural world involves physical and psychological aspects (Zylstra, Knight, Esler, & Le Grange, 2014) that have negative impacts on the well-being of both children and

the environment. Gaps between children and nature may breed apathy towards the natural environment (W. Zhang, Goodale, & Chen, 2014). As the renowned ecologist Aldo Leopold (1949) once wrote, “We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect” (as cited in Tam, 2013, p.1). Hence, it is crucial to reconnect the children with nature at an early age to instil love and respect for the land because they are its future guardians. Regarding children’s well-being, disconnection from nature is one of the factors have a negative effect on children’s health and development issues, as numerous studies have demonstrated that experiences with and in nature have a positive impact on children’s holistic developmental needs, which include their cognitive, physical, social, and emotional development (Mustapa, Maliki, & Hamzah, 2015). Other studies have found that children are facing obesity issues (Ozdemir & Yilmaz, 2008) and cognitive and language developmental issues (Jusoff, 2009) as consequences of being disconnected from the natural world.

The importance of children’s experience in and connection with nature, as well as children’s environment has also been highlighted in the United Nation Convention on the Rights of the Child (UNCRC) and other assemblies. Article 31 in UNCRC stated that children should, “engage in play and recreational activities” (The United Nations Convention on the Rights of the Child [UNCRC], 2010, p. 29) where children can experience nature. In addition, the World Conservation Congress in 2012 has endorsed the movement supporting “Children’s Right to Connect with Nature and to a Healthy Environment” (International Union for Conservation of Nature [IUCN], 2012, p. 148). The declaration emphasizes “the child’s inherent right to connect with

nature in a meaningful way, as a substantial part of his or her everyday life and healthy development, and to enjoy, maintain and strengthen this connection through the direct and on-going experience of nature”, and highlights the importance of the “conservation of nature and the protection of the environment, for the benefit of present and future generations” (IUCN, 2012, p. 149). These movements have highlighted that children have the right to connect with nature and enjoy a healthy environment, and these rights should be recognized and included in the Convention on the Rights of the Child. Action should be taken that will act as a catalyst to reconnect children with nature. Therefore, this study aims to investigate children’s experiences with nature and their CTN.

## **1.2 Problem Statement**

Several studies have found that today’s generation, generation Z, who were born after 1991, have fewer environmental concerns than their parents, who were born from the 1960s to early 1980s and who belong to generation X (Gronhoj & Thogersen, 2009; Malone, 2007). This situation may be related to how today’s children experience nature. Compared to previous generations, who had more freedom in the outdoor environment to have adventurous, spontaneous, direct, and unstructured experiences with nature (Palmer et al., 1999; Thompson et al., 2007), today’s children are home centred (Hand, 2014; Thompson et al., 2007; Valentine & McKendrick, 1997) and have organized, structured, and supervised activities (Malone & Tranter, 2003; Skår & Krogh, 2009; Valentine & McKendrick, 1997). Several factors have contributed to these changes, such as urbanization, modernization, and technological improvements. Urbanization and modernization have disconnected children from the outdoor environment where they can obtain experiences with nature

(Louv, 2008; Restall & Conrad, 2015). Another important factor that limits the children's opportunities to play in the outdoor environment where nature exists is the restriction from parents due to concerns for their children's safety because of the increasing amount of crime and violence, as well as traffic hazards in neighbourhood areas (Castonguay, 2010; Holt et al., 2015; MacDougall, Schiller, & Darbyshire, 2009; Prezza, 2007). This situation has reduced children's independent mobility (Curtis, Babb, & Olaru, 2015; Handy & Mokhtarian, 2008; Prezza, 2007; Thompson et al., 2007) to explore the outdoor environment. Therefore, children are playing close to home with supervision (Thompson et al., 2007; Valentine & McKendrick, 1997). Children are also busy with their scheduled activities in schools, and this prevents them from spending more time in the outdoor environment (Rosenfield & Wise, 2001). The quality of the physical environment is another factor that is causing the reduction in the children's experiences in the outdoor environment and nature. This includes issues related to design and safety, as well as the level of affordances (Aziz & Said, 2011). Lack of affordances in the outdoor environment due to the degradation of nearby nature has reduced children's opportunity to have challenging and spontaneous experiences with nature (Chawla, 2006a). The above mentioned factors have caused children's to have fewer direct experiences with nature and this will further affect their CTN.

As children have restrictions in connecting with nature in the outdoor environment at home, one initiative is to develop children's CTN through education in school. In Malaysia, many initiatives have been established to promote environmental and nature awareness among children. Environmental education has been implemented in pre-schools, primary, and secondary schools to enhance

children's awareness of environmental and natural issues through Education for Sustainable Development (ESD) under the Ministry of Education, Malaysia (MOE). As one of the alternatives to implement ESD, the Sustainable Schools-An Environmental Award was introduced by Department of Environment (DOE) in 2005 to strengthen the existing environmental education in preserving and conserving the environment with the integration of knowledge, skills, and moral values in the curriculum and co-curriculum (Department of Environment, 2004). However, environmental education programmes in school normally focus on cognitive aspects by imparting knowledge about nature and environment with the assumption that increasing this knowledge will develop positive attitudes and behaviour towards nature. Children are taught about the environment and nature before they develop and have an affective or loving relationship with nature (Sobel, 1996) that can be obtained through experiences with nature. Children are taught about nature and the environment in indoor learning. Also, the emphasis is on value (marks and grades), as well as the position in class (Spalie, Tahir, & Ani, 2011). Even though children have been taught about environmental friendly practices from pre-school to higher education, a study by Mamat and Mokhtar (2012) found that the level of environmental attitude that among Malaysian students in higher education is low. The environmental attitude in their study includes their thought about energy conservation, recycling, vicarious behaviours towards conservation, ethical living towards flora and fauna, and ethical living towards air and water. They found that about half of the respondents (43.5%) in their study do not have positive environmental attitude. They suggested that current practices of teaching and learning about environment that focus only on environmental issues such as global warming and pollutions are ineffective to promote positive environmental attitudes and, therefore, need to be improved. Sobel

(1996) claimed that a love of nature in children should be developed first before there is any imparting of knowledge of the environment. This is also in line with Burrough's (2000) idea that "knowledge without love will not stick but if love comes first, knowledge is sure to follow" (as cited in Burgess & Mayer-Smith, 2011, p. 39). Thus, children first need to have CTN and to love nature through experiences with nature before knowledge about nature and environment is imparted to them.

As a consequence of disconnection with nature, children have been found to have lower CTN (Cheng & Monroe, 2010; Ernst & Theimer, 2011). Studies have found that when children have fewer experiences with nature, they lack any knowledge and are unaware of nature (Aaron & Witt, 2011; Tunstall, Tapsell, & House, 2004). Specifically, children who lack direct experiences with nature have expressed negative feelings towards nature known as biophobia (Aaron & Witt, 2011; Cohen & Horm-Wingerd, 1993; E. O. Wilson, 1984). They show a lack of appreciation and enjoyment towards the natural environment and convey more expressions of fear and dislike, especially towards wild nature (Simmons, 2006). They also rate wild nature as the least of their preferences (McAllister, Lewis, & Murphy, 2012). Studies also found that the children have less interest in natural areas and natural activities when they have fewer direct experiences that involve physical contact with nature (Aaron & Witt, 2011; Ballantyne & Packer, 2002). Also, children who lack exposure to nature will see themselves separated from the natural world (Phenice & Griffore, 2003) and so will have less empathy towards nature (Louv, 2008). As the consequences of having experiences with nature mostly through electronic media (indirect experiences), studies have shown that children have misconceptions about nature (Aaron & Witt, 2011; Cohen & Horm-Wingerd, 1993).



They explained nature in vague words when they were asked about nature (Aaron & Witt, 2011).

If today's children are disconnected from the natural world and show apathy towards the natural environment, then how will they manage and protect nature in the future? Nature, the environment, green areas and landscapes will cease to exist if the phenomenon of disconnection with nature among today's children continues. They will possibly treat nature as something to be controlled rather than protected or preserved. This situation is alarming, as children are becoming more urbanized. According to United Nations Population Division, 87.9% of Malaysians will live in urban areas by 2050 (United Nations, 2012). As misconceptions of and misinformation on nature are difficult to correct later in adulthood (Palmer, 1995), it is important to identify and assess children's CTN when they are young. It is also important to identify how experiences with nature can contribute to their CTN in order to develop higher CTN among children. Higher CTN is important to ensure a future generation that cares for and will manage the environment and nature in a sustainable way.

### **1.3 Research Gap**

A number of studies on children and nature have been conducted and those studies have different concerns as presented in Table 1.1. There were a number of studies that concern on the importance of natural environment (e.g., Wells, 2000; Taylor & Kuo, 2009; Hodson & Sander, 2017) as well as the affordances of these natural environment on children's development needs (e.g, Fjørtoft & Sageie, 2000; Fjørtoft, 2004; Laaksoharju et al., 2012; Said, 2012). However, these studies did not

address the issues of children being disconnected with nature and the concern are more on the importance of nature on children's cognitive, physical, emotional and social development. Acknowledging the importance of children experiences with nature on their CTN, other studies have examined the relationship between experiences with nature and children's CTN (e.g., Cheng & Monore, 2010; W. Zhang et al., 2014). However, as shown in Table 1.1, studies mostly focused on the effect of direct experiences with nature on children's CTN (e.g., W. Zhang et al., 2014; Collado et al., 2015). It has become a concern as the frequency of children having direct experiences with nature is declining (Skår & Krogh, 2009; Gundersen et al., 2016) and children obtain nature experiences mostly through indirect ways. In addition, it is important to investigate the contribution of both direct and indirect experiences with nature on children's CTN as studies found that children's thought of, feelings towards and interest in nature are influenced by the way children have experiences with nature either directly or indirectly (Tunstall & Tapsell, 2004; Aaron & Witt, 2011; Adams & Savahl, 2013). It is important to examine whether indirect experiences with nature have a similar effect to direct experiences with nature on children's CTN as several studies have demonstrated that indirect experiences with nature without physical contact give different thought and concept about nature to children (Aaron & Witt, 2011; Keliher, 1997). Moreover, most studies comparing direct and indirect experiences have been conducted through environmental programmes (Duerden & Witt, 2010; Ernst & Theimer, 2011; Liefländer, Fröhlich, Bogner, & Schultz, 2013) which might be different from daily experiences (Tomkins & Tunnicliffe, 2007). Therefore, this study aims to first identify the current trends of children experience nature that include both direct and indirect experiences and further examine the effects of these experiences on their CTN.

Table 1.1: Summary of Studies on Children and Nature

<b>Context</b>	<b>Authors</b>	<b>Research concerns</b>	<b>Main findings</b>
Western	Wells (2000), Taylor, Kuo, & Sullivan (2002), Taylor & Kuo (2009), Matsuoka (2010), Hodson & Sander (2017)	The importance of natural environment on children's developmental needs.	Natural environment make contribution to children's cognitive and emotional development.
Western	Fjørtoft & Sageie (2000), Fjørtoft (2004), Laaksoharju et al. (2012)	The affordances of natural environment and contribution of these affordances to children's developmental needs.	Natural environment provide many affordances that further contribute to children's cognitive, physical and social development.
Asian (Malaysia)	Hussein (2012), Said (2012), Said & Abu Bakar (2005), Shamsuddin & Said (2008), Yatiman, Aziz, & Said (2012)		
Western	Cheng & Monroe (2010), Collado et al. (2013), Collado et al. (2015)	The relationship between children's experiences with nature (direct experiences) and their CTN.	Children's direct experiences with nature make significant contribution to children's CTN.
Asian (China)	W. Zhang et al. (2014)		
Western	Keliher (1997), Tunstall & Tapsell (2004), Bizerril (2010), Aaron & Witt (2011), Muderrisoglu & Gultekin (2015)	Children's perception, attitude and preferences towards nature.	Children's thought of, feelings towards and interest in nature are influenced by types of nature experiences that the children have either directly or indirectly.
Asian (Malaysia)	Mahidin & Maulan (2012)	Children's preferences towards nature in specific natural environment.	Children preferred natural elements such as trees and water.
Western	Ernst & Monroe (2006), Duerden & Witt (2010), Liefländer et al. (2013)	The importance of environmental programme on children's CTN.	Environmental programme that involve direct and indirect experiences with nature can develop children's CTN.
Asian (Malaysia)	Ab Bakar (2013)	The relationship between children's knowledge about nature and their CTN.	Children's knowledge about nature is significantly contribute to children's CTN.
Western	Skår & Krogh (2009), Gundersen et al. (2016)	Children's use of nature nearby home.	The frequency of children's use of nearby nature at home is declining.

Despite many studies having debated the importance of children's experiences with nature and their CTN, only limited studies have been conducted on this topic in the Malaysian context (refer Table 1.1). Most studies that have been conducted in Malaysia focused on the affordances of natural environment and the impact of these affordances on children's cognitive, physical and social development (Hussein, 2012; Said, 2012; Said & Abu Bakar, 2005; Shamsuddin & Said, 2008; Yatiman, Aziz, & Said, 2012). There is also a study that focused on children's preferences for the natural environment (Mahidin & Maulan, 2012). However, little is known on the trends of children experiences with nature in Malaysian context, whether the children still play in the outdoor environment directly with nature or they obtain most nature experiences indirectly. Moreover, few studies have examined children's CTN among Malaysian children. One of the studies on children's CTN in Malaysia was conducted by Ab Bakar (2013) focusing only on the relationship between children's knowledge about nature and their CTN. In addition, Ab Bakar's (2013) study adopted a previous instrument to measure children's CTN without validating the appropriateness of the instrument with Malaysian children. It is important to fill this gap, as Malaysian children may have different experiences with nature that will further influence their CTN.

In addition, although extensive studies have discussed the importance of CTN, it is still unclear how CTN should be conceptualized. This is due to limited theories explaining the measurement of CTN. Previous researchers have defined and conceptualized CTN in many ways. Some scholars have defined CTN in one domain (Kals, Schumacher, & Montada, 1999; Mayer & Frantz, 2004), whereas others have defined it in two or three domains (Clayton, 2003; Larson, Green, & Castleberry,

2009). Moreover, there has been little discussion on the underlying constructs to measure CTN, particularly among children. As children view things differently from adults (Sebba, 1991; R. Wilson, 1997), it is important to understand CTN from children's perspectives. In addition, little attention has been paid to the characteristic of children with different levels of CTN. Identifying the differences between low, moderate, and high levels of CTN will further reveal factors that influence how children experience and connect to nature. Furthermore, the existing theories and assessment tools are commonly based on a Western context and may be unsuitable for use in a Malaysian context. Most studies have been conducted in Western countries, and few have been conducted in Asian countries. It is important to fill this gap because studies have found that people with different cultures have a different engagement with nature (Milfont, 2012; Robertson, Walford, & Fox, 2003), as well as different environmental attitudes and behaviours (Deng, 2006; Yore, 2004).

#### **1.4 Research Aims**

This study aims to investigate the trends of children's experiences with nature and the levels of their connectedness to nature, as well as the relationship between different types of experiences with nature and their connectedness to nature.

## **1.5 Research Objectives**

The following research objectives are developed to achieve the research aims:

1. To investigate the trends of children's experiences with nature
2. To investigate the levels of children's connectedness to nature
3. To examine the relationship between children's experiences with nature and their connectedness to nature
4. To explore to what extent children with different levels of connectedness to nature differ from one another in experiencing and being connected to nature

## **1.6 Research Questions**

This study specifically aims to answer the following research questions to achieve the research objectives:

### **Research Objective 1**

- i. How frequently do children have direct and indirect experience with nature as well as non-nature experiences?
- ii. How do children's frequencies of experiences with nature differ by geographical locations, living environment, and demographic characteristics?

## **Research Objective 2**

- iii. What is the level of children's connectedness to nature?
- iv. How do children's levels of connectedness to nature differ by geographical locations, living environment, and demographic characteristics?

## **Research Objective 3**

- v. What is the relationship between children's experiences with nature and their connectedness to nature?

## **Research Objective 4**

- vi. How do children with different levels of connectedness to nature differ in experiencing and connecting to nature?
- vii. What are the factors that influence whether children have experiences with nature?

### **1.7 Scope of Study**

This study focuses on experiences with nature and CTN among middle childhood children aged 10 and 11 years old. Children's experiences with nature include both direct and indirect experiences. Activities that are not related with nature (non-nature experiences) were also being investigated to see whether the children still

play in the outdoor environment. Children's experiences with nature are expected to influence their CTN level with more contributions expected from direct experiences. To understand further why children have different levels of CTN and what factors shape the way children experience nature, this study explores how different groups of children with different levels of CTN (low, moderate and high) differ from one another in experiencing nature and connecting to nature. This study was conducted in 20 schools from both urban and rural areas in Kedah (10 schools) and Pulau Pinang (10 schools). Although much is currently known about the differences between urban and rural adults regarding their relationship with nature (Hinds & Sparks, 2008; Howley, Donoghue, & Hynes, 2012; Yu, 1995; Zheng, Zhang, & Chen, 2011), little is known about the differences between urban and rural children regarding their experiences with nature and CTN.

## **1.8 Significance of Study**

This study is important as it make a significant contribution to reconnect the children with nature by identifying the trends of both direct and indirect experiences with nature and contribution of these experiences to children's CTN. This study also offers new insights on the differences of children's experiences with nature and their CTN by geographical location, living environment, and demographic characteristics. Apart from that, this study helps to advise practitioners in various fields including those in built environment such as landscape architects and planners; and environmental education such as teachers, as well as parents to reconnect the children with nature to develop higher CTN. In addition, this study is anticipated to make theoretical contribution by combining several theories to explain the relationship between children and nature.



## 1.9 Operational Definitions

*Nature:* In a general context, nature refers to the natural environment (green areas ranging from dense trees to a line of trees in a park or neighbourhood) and natural landscapes (forest, mountain, beach, river, waterfall, and lake). In the specific context related to activities and experiences, nature refers to the natural elements such as plants, animals, water, sand, and soil.

*Direct Experiences with Nature:* This refers to activities with nature that involve actual contact with nature through play and spontaneous activities in unstructured, unorganized, and unplanned areas, such as in the yard, green areas, and wild nature.

*Indirect Experiences with Nature:* This refers to activities with nature other than direct experiences with nature. Indirect experiences include actual contact with nature in structured, organized, and planned areas, such as in zoos. Indirect experiences also include activities without actual physical contact with nature, such as observation and vicarious learning activities.

*Non-nature Experiences:* This refers to activities that are not involved with nature, such as cycling, playing badminton, playing football, and playing games.

*Connectedness to Nature (CTN):* This refers to a disposition towards nature in various aspects that cover the cognitive, affective, and behavioural domains. The cognitive includes thoughts and beliefs about nature. The affective domain refers to feelings towards nature, whereas the behavioural domain is the intention to be involved in activities with nature or to be in natural spaces and areas.

*Middle childhood children:* This refers to children aged between 7 to 12 years old. Children at this age are able to express their thoughts logically and effectively. They can classify things and draw logical inferences from the knowledge and facts given to them (McDevitt & Ormrod, 2002).

*Nearby nature:* Nature within proximity to places and areas where the children live and play. Nearby nature includes nature near home such as home garden, trees and plants on the streets in neighbourhood areas and playground, and nearby forests (see Gundersen, Skår, O'Brien, Wold, & Follo, 2016).

*Urbanization:* Urban development that cause degradation of agriculture land and nature for the development.

*Urban:* In context of areas, urban areas refer to areas that have population more than 10, 000 citizens with density of 50-60 persons per hectar. The citizens (15 years and above) involve in non-agriculture work (Federal Department of Town and Country Planning, 2006). In context of people, urban people or children refer to people or children who live in this area.

*Rural:* In context of areas, rural areas refer to areas that have population less than 10, 000 citizens with density less than 50-60 persons per hectar. The citizens (15 years and above) work in agriculture and nature related work. Rural areas are surrounded with agriculture land and nature (Federal Department of Town and Country Planning, 2006). In context of people, rural people or children refer to people or children who live in this area.

## **1.10 Organization of the Chapters**

This section explains the organization of the chapters. This thesis is divided into six chapters.

**Chapter 1** discusses the research background, research problem, and research gaps in previous studies related to the topic. This is followed by the outline of the research aim, research objectives, and research questions. Then, this chapter explains the scope, purpose, and significance of the study. Finally, this chapter provides the operational definition of the terms used in this study.

**Chapter 2** presents the existing literature related to the topic. This chapter begins with an explanation of the underpinning theories related to the relationship between humans and nature. This chapter also provides the literature related to main variables in this study, which are experiences with nature and CTN, as well as the importance of different types of experiences with nature for children's CTN. In addition, this chapter presents the factors that influence children's experiences with nature and their CTN.

**Chapter 3** describes the research methodology used in the study. First, this chapter discusses the research design employed in this study, followed by the research population and sampling techniques, as well as sample size. Then, this chapter explains the research protocol and ethics. This is followed by the explanation of the methods used for data collection for both the quantitative and the qualitative approach. Subsequently, the findings for the pilot study are presented, which cover

the validity and reliability of the instrument. Finally, this chapter describes the data analysis used to answer the research questions.

**Chapter 4** presents the findings of the study for both the quantitative and the qualitative parts. This chapter presents the findings for the four research objectives in this study which are as follows: Research Objective (1) - to investigate the trends of children's experiences with nature, (2) - to investigate the level of children's CTN, (3) - to examine the relationship between children's experiences with nature and their CTN, and (4) - to explore to what extent children with different levels of CTN differ from one another in experiencing and being connected to nature.

**Chapter 5** discusses the findings of the study according to the research objectives. First, this chapter discusses the findings for children's experiences with nature, and this is followed by a discussion on their CTN. This is followed by a discussion on the relationship between children's direct and indirect experiences with nature on their CTN. Finally, this chapter discusses the differences between children with low, moderate, and high levels of CTN in experiencing nature and being connected to nature. The factors that influence how children experience nature and are connected to it are also discussed.

**Chapter 6** provides the conclusion of the study. This section discusses the theoretical, practical, and methodological contribution of the study. The limitations of the study are also addressed in this chapter. Then, the directions for future research are discussed.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter presents the existing literature and theories related to the topic in eight sections. The first section addresses the underpinning theories related to the study. Next, the second section discusses middle childhood children while the third section provides an overview of the studies related to children and nature. Subsequently, the fourth and fifth sections discuss the main variables of this study, which are experiences with nature and CTN. The section on experiences with nature begins by discussing the types of experiences with nature, followed by an explanation of the benefits of each type of experiences. The section on CTN provides an overview of the importance of CTN, followed by a discussion on the concept and measurement of CTN, as well as the constructs that have been used in previous studies. This is followed by a review of the literature on the relationship between direct and indirect experiences with nature and CTN as well as the factors that influence children's experiences with nature. Finally, the eighth section presents the conceptual framework for the study. The summary of this chapter is provided at the end of this chapter.

#### **2.2 Underpinning Theories**

There are three underpinning theories that can explain the relationship between children and nature: biophilia hypothesis, theory of constructivism, and the model of experiences with nature and learning development.

### **2.2.1 Biophilia Hypothesis**

Biophilia hypothesis, also called the theory of connectedness to nature by Restall and Conrad (2015), has inspired numerous studies in various fields related to the relationship between humans and nature, such as environmental psychology, environment and behaviour, and environmental education. Therefore, it is an important underpinning theory for understanding the relationship between children and nature. The term 'biophilia' was coined by evolutionary biologist, Edward O. Wilson in 1984. He defined biophilia as, "the innate tendency to focus on life and lifelike processes" (E. O. Wilson, 1984, p. 1). He suggested that humans have an innate need to connect with all living things because humans evolve in nature; the innate needs have become part of our genes (E. O. Wilson, 1984). In other words, biophilia is a love of nature, an attraction to nature, and a feeling of connection to nature (Kellert & Wilson, 1993). Biophilia also has been described by Kahn (1997) as the "fundamental, genetically based, humans need and tendency to affiliate with life and lifelike processes" (Kahn, 1997, p. 1).

The relationship between humans and nature benefits both humans and nature. Kellert and Wilson (1993) suggested that biophilia, which links humans with nature, is important for humans' emotional and psychological development. Instead of the need for material and food resources from nature, the biophilia hypothesis states that humans need nature for aesthetic, intellectual, cognitive, and even spiritual meaning. Many studies have been conducted to support the biophilia hypothesis framework. In the context of children and nature, studies have demonstrated that children's contact with nature benefits their holistic developmental needs which includes cognitive

(Collado et al., 2013; Wells, 2000), physical (Fjørtoft, 2004), social (Laaksoharju, Rappe, & Kaivola, 2012), and emotional (Wells & Evans, 2003) well-being.

Even though E. O. Wilson (1984) claimed that humans’ connection to nature is genetically based, other authors have suggested that humans’ connection to nature and well-being is strongly influenced by their relationships with the surrounding natural world, as shown in Figure 2.1. As proposed by Kahn (1999), culture, social experience, and direct experience with nature influence people’s biophilia tendencies (see Figure 2.1). He recommended the concept of, “mediated biophilia”, where humans’ cultural learning and experience act as the mediator to influence people’s content, direction, and tendency to have nature-related values. Kahn and Kellert (2002) also suggested the same concept, which is that humans need additional learning and experience to enhance biophilic tendencies (see Figure 2.1). A considerable number of studies have demonstrated that additional experiences with nature increases children’s biophilia score, affinity towards nature, and CTN (Collado et al., 2013; Duerden & Witt, 2010; W. Zhang et al., 2014).

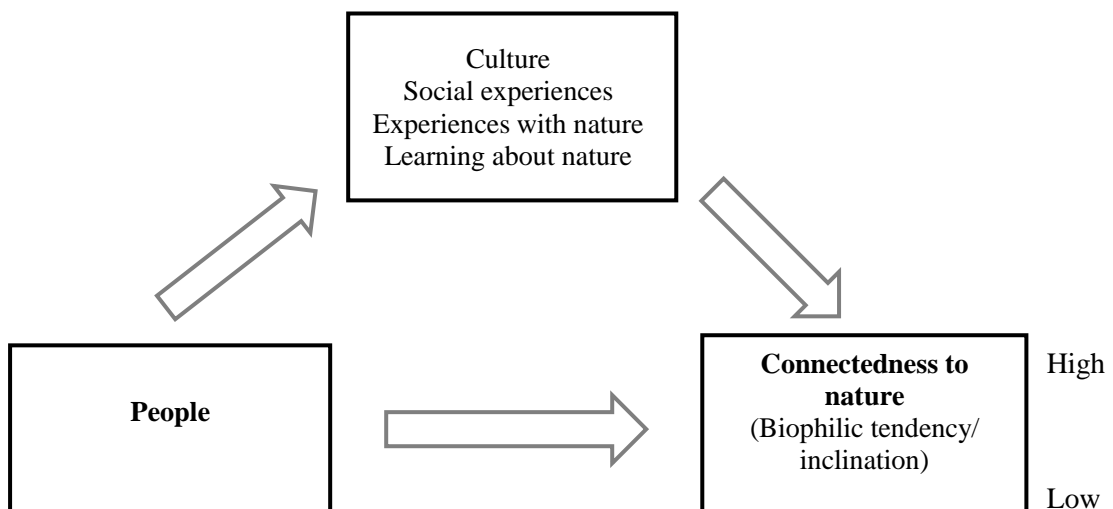


Figure 2.1: Mediated Biophilia Hypothesis Framework

The biophilia hypothesis also explains why people care for nature (Kahn & Kellert, 2002). Studies have found that people who have a strong affection for the natural environment have the inclination and strong intention to protect nature. A person with a high level of CTN will show more care and more commitment to protecting nature (Schultz, 2001). Thus, it can be claimed that a person with a high level of CTN is a person who has a strong and high inclination towards nature, and is someone who appreciates nature and values nature more. In contrast, a person with a low level of CTN is a person who has a lack of interest regarding the protection and appreciation of nature.

The opposite concept of biophilia is biophobia. Biophobia refers to a negative affiliation to nature, and it is the opposite of biophilia, which refers to a positive affiliation to nature (Orr, 2004). Based on psycho-evolutionary reasoning, biophobia occurs due to certain aspects of biodiversity that elicit fear and avoidance associated with danger (Ulrich, 1993). Biophobia is described as a negative value in biophilic tendencies, which will be explained in more detail below.

In an effort to explain further the biophilia hypothesis, Kahn and Kellert (2002) explored humans' relationship with nature and described it as demonstrating dependencies and values. Dependencies and values refer to people's attitudes and values towards the natural world. Kahn and Kellert (2002) refined a typology of nine values to reflect a range of physical (behaviour), emotional (affective), and intellectual (cognitive) expressions of the biophilic inclination to affiliate with nature. The nine values are utilitarian, naturalistic, ecologicistic-scientific, aesthetic, symbolic, humanistic, moralistic, dominionistic, and negativistic, as shown in Table 2.1.