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Childhood nature experience and public affective attitudes towards tropical urban biodiversity conservation

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RESEARCH SUMMARY

The concept of 'urbanization' has been widely discussed as a threat to biodiversity conservation. Nevertheless, in general, the modern urban environments have limited the access to nature among mankind, thus reducing human contact with nature. This unfortunate lack of contact may shift one's attitude towards nature conservation, such as one's affective attitude towards wildlife. Furthermore, vast studies, which happen to derive from developed western countries, have proven that contact with the nature plays a key role in affective attitudes and willingness to conserve biodiversity. As for biodiversity conservation, information concerning affective attitudes (e.g.; preferences of like or dislike towards a subject) and willingness to participate in conservation is insufficient to reflect the present conservation agenda, especially in the urban landscapes. Nonetheless, willingness to coexist can be a good indicator when promoting biodiversity conservation in urban areas. Furthermore, researches on childhood nature-related experiences, along with their effects, are largely biased towards the more developed Western countries, hence suggesting a pressing need for such similar studies to be carried out in developing countries.

On top of that, the nature-related experiences that contribute to one's favorable feelings towards the nature have yet to be tapped into, especially in the Southeast Asia region. With that, this study focused on two groups of populations, which are the urban-rural residents and the school children in Peninsular Malaysia. Besides, in gathering relevant information pertaining to factors that contribute to biodiversity conservation, the survey questionnaire method had been employed. As such, a total of 357 adults (> 20 years old) were selected as the study sample to retrieve their childhood experiences with nature using the retrospective approach.

Next, this study also had determined the attitude displayed by sample in nature-based experiences between younger and older generations. As such, the study investigated if those who grew up in urban areas had fewer experiences than those from rural areas. As a result, the findings revealed that several common nature-related experiences, such as playing in rivers or waterfalls and collecting and eating tropical fruits, emerged as the most common nature-related activities experienced during childhood. Nonetheless, a minimal decline was noted for nature-related experiences between generations. Besides, the study showed that those who grew up in rural areas had more nature-related experiences than those from urban areas. This is because; loss of nature

areas and increment in population density could have accelerated the decline in nature-related experiences in urban areas. Other than that, childhood nature experiences exhibited a strong positive effect upon preferences towards wild animals, but showed significantly indirect effect upon willingness to coexist with these animals.

In addition, experiences of children with nature at this present time were also examined to evaluate affective attitude towards and willingness to coexist with wildlife. As a result, Malaysian children were found to be fond of insects, birds, and squirrels, but disliked mammals in general. Such direct experiences with nature during childhood are especially essential to enhance both psychological and physical development in children. Among the school children (N= 401 respondents), a shift was noted in nature-experience, which was from direct contact to vicarious methods. These findings revealed that children possessed more vicarious experience than direct nature experience. Direct nature experience affects the children's preference towards nature, including perceptions towards animals and natural landscapes. Nevertheless, both direct and vicarious experiences turned to be significant factors in determining willingness to coexist with animals among children. On top of that, the survey confirmed that direct contact led to positive impacts upon mental, emotional, and social development of children, besides projecting positive emotion towards the nature. Furthermore, by engaging several elements of wild animals; landscape ecologist, environmental educators, and conservation biologists had been proven to play a significant role in conveying conservation principles by forging effective partnerships with town planners, health professionals, natural resource managers, and local communities. Hence, in order to maintain critical biodiversity and ecosystem services for the benefit of humans; it is imminent for cities and urban areas to reduce the risk of biodiversity extinction. Additionally, researches need to provide effective guidelines for urban planning and designing. For instance, developing urban parks and public spaces, in the attempt to reconnect urban children with the nature, is indeed important in urban planning and environmental education. Such efforts develop awareness and foster conservation habitat in tropical developing nations, such as Malaysia.

Keywords; *extinction of experience; nature-related experience; urban area; rural area; Southeast Asian tropics; wild animals*

キーワード：経験の消失，自然とのふれあい，農村, 都市, 東南アジア熱帯，野生動

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General Introduction

1.1 Urban biodiversity conservation

Sustainable landscape management is indeed essential for the well-being of mankind as it protects and enhances the ecosystem system (flora and fauna), besides providing the future generations an opportunity to fulfil their tourism needs (Dorcas, 2012). In fact, urban green spaces developed in cities, along with their necessary ecosystem services, range from maintenance of biodiversity to regulation of urban climate. Hence, those residing within such ecosystem benefit from the services offered in these luxurious urban green spaces.

Excellent ecosystem services that benefit mankind can be extracted from the nature itself. In fact, people have gained endless benefits from the nature to continue living on earth, as listed in the following: 1) provisioning services, such as food, water, and timber; 2) regulating services, such as flood and disease controls; 3) cultural services, including spiritual and recreational ones; 4) cultural benefits; and 5) supporting services, such as nutrient cycling (EU Report, 2015). Furthermore, cultural ecosystem services have affected the human well-being (Probstl-Haider, 2015) through the provision of green space for it bolsters mental health and physical activity levels, besides providing a range of 'free' ecosystem services (e.g. cooling heat in islands, sequestering carbon, reducing pollution, and intercepting storm water) (Bryne & Sipe, 2010).

Therefore, through biodiversity conservation, a viable solution is available to maintain a balance between the conservation of threatened species and further urbanization phases. For example, parks and other green spaces offer numerous ecosystem benefits, such as regulating ambient temperatures, filtering air, reducing noise pollution, sequestering carbon, and attenuating storm water. Aside from these human benefits, carefully designed urban green spaces can also protect habitats and preserve biodiversity. As such, green spaces that feature good connectivity and act as 'wildlife corridors' or function as 'urban forests' can help maintain viable populations of species that would otherwise disappear from concrete jungle (Bryne & Sipe, 2010).

In a more worrisome note, more than two thirds of the world population have been estimated to dwell in cities by year 2030 (United Nations, 2010), and the conventional approach has projected limited success (Dearborn & Kark, 2009) in "inventing, establishing, and maintaining new habitats especially to conserve species diversity in places where people live, work or play" (Rosenzweig, 2003). The said approach refers to areas that are no longer wild, thus emphasizing a formula for civilization and wildlife to coexist. Moreover, Rosenzweig asserted that the more traditional approach to biodiversity conservation is likely to meet limited success where urban areas are concerned. Moreover, wilderness-based conservation is rooted in an incompatibility between biodiversity and the heavy presence of human beings. On the contrary, reconciliation ecology views that the amalgamation of these two notions as indispensable in the acceptance that human-occupied landscapes are ecologically valuable without being wild or pristine.

Additionally, a decline in human interactions with the natural world, also known as the 'extinction of experience', could turn into a threat to the conservation of biodiversity (Miller, 2005). Hence, in the attempt to reduce the phenomenon of 'extinction of experience' in urban areas, individuals can be reconnected to the nature via ecosystem services. Nonetheless, experiences in nature, such as dealing with biodiversity or wildlife, have been proven to increase one's positive feelings (*biophilia*) or even conjure negative feelings (*biophobia)* (Zhang et al., 2014).

1.2 Types of nature experiences

Beyond doubt, urban areas need recreational and nature-based tourism experience for the benefit of city dwellers. Besides, places like green areas, urban parks, neighborhood parks, as well as managed places, such as zoos, aquariums, botanical gardens, and butterfly parks, function as a vital medium for people to come into contact with urban natures. Furthermore, outdoor recreation advantages that derive from the contact with nature could enhance one's engagement towards both nature and wildlife. In addition, experience in nature-based tourism, especially that involving plants, soil, and fauna, is increasingly becoming an attractive package among tourists (Manfredo, 2008).

Furthermore, contact with nature can be classified into (1) direct, (2) indirect, and (3) vicarious experiences (Kellert, 2005; 2002). Direct and indirect experiences reflect unstructured and structured types of contact, where direct contact with nature is unplanned experience, for instance, when a child encounters a fauna or a flora while playing at home backyard, a neighborhood park or at an abandoned lot (Kellert, 2002). As such, 'direct' experience refers to the actual physical contact with the nature

in a natural setting. Besides, Kellert (2002) claimed that direct encounters with animals and plants mostly occur outside and independent of human-built environment.

Meanwhile, the 'indirect' experience with nature refers to the actual physical contact with plants and animals in a more restricted, programmed, and managed context. In precise, indirect experience is derived from unnatural and planned activities between humans and the nature at certain spots, such as tourism or recreation areas, zoos, aquariums, botanical gardens, domesticated species and habitats like farm and companion animals, as well as cultivated crops (Kellert, 2002).

Lastly, the final type of experience with nature described by Kellert (2002; 2005) is the 'vicarious or symbolic' experience. Such experience excludes contact with the actual living organisms and environments, but incorporates images, representation or metaphorical expression of nature (Kellert, 2005, p. 66). In fact, vicarious experience has become more predominant among children via various means, such as books and other print media, mass media, and computers (Kellert, 2002). Thus, direct and indirect experiences with nature involve hands-on contact with plants, animals, and other aspects of nature, while vicarious experience does not (Kellert, 2002; 2005).

Direct experiences are equivalent to unstructured activities in nature, described by participants as those that facilitate children's exploration, discovery of, and immersion in nature, where they negotiate their own identities and positions in the world. On the other hand, indirect experiences are equal to structured hands-on activities in nature, in which participants describe as beneficial for meaningful learning, problem-solving skills, empowerment, as well as connecting with local community members, teachers, and other adults. Besides, indirect activities occur in programmed contexts (Kellert, 2002), which refers to the school environment in the present context. Lastly, vicarious experiences refer to a virtual nature, defined as 'nature experienced vicariously via electronic means' (Zaradic & Pergams, 2007). Nevertheless, vicarious experience does have several benefits, particularly for children who are dependent on adults for access to numerous natural areas (Soga, Gaston, Yamaura, Kurisu, & Hanaki, 2016b; Zaradic & Pergams, 2007).

1.3 Importance of childhood with nature experience on attitudes

Many children residing in urban environments do not have access to nature. Parents prohibit their children from exploring wild natural areas due to pressure placed upon young children to achieve academic success, safety concerns, as well as lack of time and familiarity (Louv, 2006; Singer, Singer, D'Agostino, & Delong, 2009). Such growing trend of avoiding the nature could pose as a threat to urban biodiversity conservation. Hence, urban biodiversity conservation must be made aware to hinder 'extinction of experience' cycle, where people who lack the opportunity to interact with nature are less likely to value and appreciate nature, thus leading to a decline in public support for conservation activities and degradation of natural environments (Miller, 2005; Soga & Gaston, 2016). Thus, assessing this trend is vital for conservationists, ecologists, and environmentalists.

Other than that, *biophilia* refers to one's nature instinct that could be manifested via play in natural environments and/or with natural elements (soil, water or animals). In fact, a fundamental shift away from 'an innate tendency to affiliate with living organisms' in a positive manner (biophilia) (Kahn, 1997; Wilson, 1984) or even negatively (biophobia) (Kellert & Wilson, 1993; Ulrich, 1993) is associated to the idea of 'naturalistic intelligence' – an intrinsic human aptitude that understands and processes information about the natural world (Gardner, 1999) apparent during childhood.

Besides, the ethical concept of biophilia refers to love of life or the emotional commitment to life (Eckardt, 1992). This particular notion claims that humans possess a biologically-based attraction to nature and that their well-being greatly depends on the relationship with the surrounding natural world (Kellert, 1997). Consequently, it is imminent that humans should affiliate with nature. Therefore, inadequacy of childhood natural play experiences and/or learnt responses from cautious adults could disconnect the biophilia connection; thus resulting in children to develop irrational aversions towards nature (Kellert, 2002; Wilson, 2007). This, in turn, can turn into a negative influence upon children's subsequent attitudes, emotions, and behaviors within the natural environments. Hence, Kellert (2002) suggested that based on biophilia, hands-on contact with the nature becomes predominant during the mid-childhood phase.

Furthermore, participation of childhood nature experience is the beginning of the nature-acculturation process with implications on their nature-based activity preferences and behaviors, as well as environmental attitudes and behaviors (Chawla, 2009; Thompson, Aspinall, & Montarzino, 2008). Thus, children do not only get to play in a natural world, but also build competence and memories of

positive nature experiences. In fact, childhood experiences of nature, which functions as a motivating factor, has been linked to adult behavior both directly (Chawla, 2007; Horwitz, 1996; Vadala, Bixler, & James, 2007; Wells & Lekies, 2006) and indirectly, via influence of adult values (Ewert, Place, & Sibthorp, 2005; Kals, Schumacher, & Montada, 1999), where positive values create positive ecological attitudes (Dettmann-Easler & Pease, 1999; Dresner & Gill, 1994).

Early in the human history, an evolutionary advantage was discovered in addressing the natural world, particularly information concerning plants and animals, which led to survival among mankind (Kellert, 1997). People across nations have varied reasons to care and to give importance to wildlife. Wildlife does not only evoke positive and negative emotions among individuals, but it is also a source of concern for people's choice of recreation and tourism activities. Wildlife has ultimate utilitarian value and a symbolic meaning for both attraction and fear, thus being a barometer in measuring one's concern for environmental sustainability (Manfredo, 2008).

Moreover, as various stakeholders dwell and work together in urban areas, the varying values and attitudes towards some information is indeed essential because affective attitudes display a greater effect upon public support, more than cognitive dimensions, concerning biodiversity conservation (Martin-Lopez et al., 2007). Besides, public affective attitudes towards wild animals may differ among various populations in terms of gender, age, education level, and income (Kellert, 1993; Bjerke & Østdahl, 2004; Schlegel & Rupf, 2010; Zhang et al., 2014; Soga et al., 2016). To a great extent, attitudes are known to vary based on sociodemographic factors (Dickman, 2010; Kellert et al., 1996), including age (Sakurai et al., 2014), gender (Kellert & Berry, 1987; Herzog, 2007), ethnicity (Bencin et al., 2016), residential area (Lindsey et al., 2005), education level (Schlegel & Rupf, 2010), and socioeconomic level (Ogra, 2008; Lüchtrath & Schraml, 2015).

1.3.1 Public preferences towards animals

Animals, apart from being important to human, have strong emotional factors that could trigger mankind (Jacobs, 2009). Animals can evoke strong positive or negative emotions in humans, such as phobia towards snakes and spiders across varied cultures (Knight, 2008). Therefore, this research only focused on animals to prevent confusions that may derive from plants (trees and flowers), primarily because plants are normally static and unaggressive.

Moreover, a substantial number of studies have documented public preferences towards animals at a global scale, displaying similarities and dissimilarities across nations and cultures. Generally, people prefer aesthetic animals, such as birds, butterflies, and squirrels (Schlegel & Rupf, 2010; Bjerke & Ostadhl, 2004; Taylor & Signal, 2005) or charismatic mega-fauna, such as large mammals (Kellert, 1996; Kellert & Berry, 1981). On the other hand, invertebrates are non-preferable, including disease-spreading species, such as mosquitoes and rats (Bjerke & Ostadhl, 2004; Kellert, 1993; Soulsbury & White 2016; Conover, 1997; Kaltenborn et al., 2006), Nevertheless, this is exceptional among Japanese, who are known to have higher preferences for insects (Hogue, 1987).

The affective component refers to feelings or emotions towards the attitude displayed by an object. As for this particular study, the notion 'affective attitude' is known as 'preferences' (feelings of likes or dislikes) (Soga et al., 2016). Thus, understanding human attitudes towards wildlife issues is an important step in learning how to work with people in addressing these issues—after all, a large part of conservation work is changing the human behavior (Mascia et al., 2003) and wildlife conservation efforts is deemed as most successful when public attitudes and values are taken into consideration (Kideghesho, Røskaft, & Kaltenborn, 2007; Schwartz, 2006).

Affective attitudes

Public perceptions of and attitudes to wildlife have the potential to influence an individual's behaviors toward wildlife in various circumstances. Perceptions are firmly related to attitudes and both terms are used together occasionally (Almeida et al., 2014), while affective components refer to feelings related to certain object (Millar & Tesser, 1986). Perceptions of and attitudes towards animal can be varied across nations and social groups. For instance, George (2016) pointed out a remarkable transformation in public attitudes toward animals in the American society historically upon assessing the positive shifts on perceptions towards bats, sharks, vultures, wolves, and coyotes in 2014, in

comparison to 1978. Such concept addresses the basic public perceptions regarding wildlife, which vary across cultures and living conditions. These visions constitute the democratic basis of environmental conservation, as well as the frame for an effective two-way communication between professionals and communities on issues concerning nature protection and management.

Although attitudes have been proven to significantly affect the success of conservation initiatives (Mir et al., 2015), the species that the public prefers might not be the species that they are willing to coexist with at close proximity. Moreover, studies have revealed that public affective attitude (positive/negative feelings for object) towards nature has been significantly associated to decision-making contribution of nature conservation and sustainable wildlife management (Sekhar, 2003; Curtin & Kragh, 2014; Shrestha & Alavalapati, 2006). In Swiss, for example, Schlegel and Rupf (2010) found that people seemed to show higher affinity for species they could identify than for unfamiliar species. Likewise, in Kenya, de Pinho et al., (2014) discovered a significant correlation that perceived a species beautiful or ugly as the primary factor in explaining one's support for its protection in or removal from their locale. Meanwhile, a study from China (Zhang et al., 2014) revealed that children's affective attitude was positively linked to willingness to protect wildlife.

Nonetheless, many studies are largely biased towards the developed Western world, such as in the United States, Norway, Australia, and Switzerland, but limited in tropical developing country (Jenks et al., 2014). This is because; attitudes vary to a great extent based on sociodemographic factors (Dickman, 2010; Kellert et al., 1996), for instance, age (Sakurai et al., 2014), gender (Kellert & Berry, 1987; Herzog, 2007), ethnicity (Bencin, Kioko & Kiffner, 2016), residential area (Lindsey, Du Toit, & Mills, 2005), education attainment (Schlegel & Rupf, 2010), pet ownership (Prokop & Tunnicliffe, 2010), socioeconomic level (Ogra, 2008; Lüchtrath & Schraml, 2015), and culture (Zimmermann et al., 2005), which can affect one's perception and attitude.

1.3.2 Public preferences towards nature landscapes

With reference to natural environment, people, and the relationship between them; many researchers have looked into the vital psychological role that nature plays in our lives. For instance, Kaplan and Kaplan (1989) claimed that researchers have ardently sought to understand how people perceive nature, what type of natural environments are preferred, what psychological benefits seem to derive from wilderness experiences, and why backyard gardens are especially significant to some people.

Moreover, urbanites explore the nature as the varieties of it contribute to their overall well-being through enhancement of physical and mental health, as well as social interactions (Foo, 2016). These benefits are derived from direct experiences with nature because stress and negative impact of ailments can be reduced through physical exercises (Maller et al., 2002; de Vries et al., 2011; Groenewegen et al., 2012). Besides encouragement in outdoor recreation, experience with nature can also promote social contact, strengthen interpersonal bonds, and foster other beneficial social factors by facilitating varied levels of physical activities (Baur & Tynon, 2010; Hartig et al., 2011).

The nature is also vital for child development, especially in this urbanization era, where the present generation has less direct contact with nature, compared to prior ones. In addition, studies have suggested that such loss of daily interactions has decreased appreciation towards the natural world, which has remained quantitatively unexplored (Soga & Gaston, 2016). For example, a group of undergraduate university students in Japan demonstrated that students did value neighborhood natural environments, birds, and butterflies for many varying reasons, such as for relaxation, to enjoy the picturesque natural scenes, an indicator of seasonality, and education opportunities (Soga et al., 2016a). Furthermore, both present and childhood frequencies of contact with nature had been positively related not only to students' emotional connectedness to nature, but also their perceptions of neighborhood nature. As such, students' emotional connection to nature was positively linked to perceptions of neighborhood nature. Hence, given the rapid decrease in children's daily contact with nature, public appreciation of natural world values is likely to decrease in an indirect manner thus emerging as a major obstacle to reverse global environmental challenges (Soga et al., 2016).

Besides, encouraging people to experience neighborhood natural environments and biodiversity enhances their appreciation to value nature, which is important due to the widespread of global urbanization. In fact, residents from highly urbanized cities may have high preference for manicured landscapes (Khew, Yokohari & Tanaka, 2014). Thus, the development of more naturalized parks that

resemble native vegetation meant for biodiversity conservation faces a greater challenge among those with prolonged residence in heavily modified landscapes (Khew, Yokohari & Tanaka, 2014).

Other than that, studies that investigated the natural landscape preferences among children are rather scarce. For example, a study carried out in Brazil among 11 to 17 years old urban, suburban, and rural students using three main tests (cognitive, and two evaluated affectivity of children's opinions and preferences, including natural elements) revealed that urban students had more contact to native environment elements, such as waterfalls and reserves (Bizerril, 2004). Furthermore, the attitudes the students displayed towards their surrounding natural environment often favored biodiversity conservation. This is because; respondents with more contact with the region's natural landscapes exhibited greater affection for it (Bizerril, 2004).

1.3.3 Rural and urban landscapes as important settings for nature conservation

Nature conservation is important for both rural and urban landscapes. Unfortunately, due to the recent global changes and urbanization shift, the extinction of experience (Soga & Gaston, 2016) in urban setting revealed several variances between urban and rural children in nature experience (Hinds & Sparks, 2011). As known to all, urban areas are highly modified and have complex landscapes, within which green or open areas are viewed as significant for both the well-being of humans and wildlife (Pickett et al., 2001; 2004). Nevertheless, in many cases, urban green spaces have failed in completely fulfilling the recreational needs of urban dwellers (Baur, Joshua, Tynon & Joanne, 2010; Baur, Tynon, Ries, & Rosenberger, 2016).

With that, those residing in urban landscapes must be made the main focus for investigation of the trend of loss or less experience in nature (Hosaka, Sugimoto, & Numata, 2017a; Soga, Gaston, Yamaura, Kurisu, & Hanaki, 2016). Thus, halting 'extinction of experience' and disengagement of people with the natural world is vital not only for the benefits of human health and well-being (Soga et al., 2015), but also to maintain and to increase public support for global biological conservation.

Through such investigation, public support for nature conservation could serve as a better aid in devising possible strategies towards urban and biodiversity conservation. Besides, in this modern era, how culture interacts with outdoor environment also could be a significant indicator for investigation. Previously, the urban or rural environment appeared as an important factor on how close the children were to the nature. For example, the rural children in New York identified the nearby nature to

moderately affect stressful life events on their psychological well-being (Wells & Evans, 2003). Besides, early experiences of the natural environment (e.g., childhood location) appeared conducive in hindering negative experiential states, while those from rural setting were more experienced with nature, compared to those from the urban (Hinds & Sparks, 2011). Apart from the changes in landscapes, the pattern of nature-related experience among people were largely affected by sociodemographic variables, such as gender, age, and education level (Davison & Lawson, 2006; Zhang, Goodale, & Chen, 2014). Some socio-demographic factors that can influence one's preference to nature include landscape (Kaplan & Talbot, 1988; William et al., 2005) and wildlife species (Dickman, 2010; Kellert & Berry, 1987; Sakurai, Jacobson, & Ueda, 2014).

However, our understanding on childhood nature experiences, public affective attitudes towards animals, and their influential factors is strongly biased towards Western developed countries. On the contrary, little is known about the attitudes of those from rapidly urbanized regions, such as in Southeast Asia. Therefore, this thesis investigated the Southeast Asians, particularly Malaysians, on their nature childhood experiences and their attitudes, not only towards wild animals, but also towards the nature landscapes. Furthermore, this investigation explored the willingness to coexist and landscape preferences among school children, which function as a platform in support for biodiversity conservation, particularly among Malaysians.

1.3.4 Willingness to conserve

In addition, some view that the green infrastructure developed in urban areas should principally be designed and maintained to maximize the ease with which people will make use of it, thus increasing one's health and well-being benefits (Fuller, Irvine, Devine-Wright, Warren, & Gaston, 2007; Keniger, Gaston, Irvine, & Fuller, 2013), as well as their emotional affinity and willingness to protect the nature (Miller, 2005). In precise, local biodiversity cannot be maximized, but to some extent, sacrificed for direct local human benefit and wider biodiversity gain.

Such loss of emotional connection towards nature, nonetheless, is closely linked to not only the declining willingness displayed by people to conserve nature (Nisbet et al., 2009; Zhang et al., 2014; Zaradic, Pergams & Kareiva, 2009), but also reduced psychological well-being (Capaldi et al., 2014; Nisbet et al., 2011). Additionally, the aspect of willingness to conserve nature indicates the level of those willing to protect nature conservation, such as animal species or plants.

Likewise, many industrialized nations have portrayed that human aesthetic appreciation of animal species could influence public willingness to protect them and decide about their conservation (Knight, 2008; Knegtering et al., 2002; Metrick & Weitzman, 1996), particularly when targeting a particular species for conservation efforts. Moreover, indignation about protecting nature, in turn, is predictive of willingness to engage in nature-protective behaviors. Hence, nature-related contact may enhance willingness among children to support wildlife conservation indirectly by nurturing *biophilic* attitudes towards wildlife (Zhang et al., 2014). Furthermore, children with greater experience in nature are likely to display higher emotional affinity to and support for protecting nature biodiversity (Soga et al., 2016b). In addition, willingness to support nature conservation also depends on one's experience with nature (Zaradic, Pergams, & Kareiva, 2009).

1.3.5 Willingness to coexist

Conserving wildlife is a challenging effort, especially among urban dwellers in crowded cities. Hence, the coexistence concept should increase people-wildlife tolerance within human-dominated landscapes. Simply put, allowing wildlife to habitat nearby residential areas seeks willingness from the residents. Thus, willingness to coexist with wildlife must be further examined. Moreover, the context of willingness to coexist with them (i.e., the level of willingness to live close to the animals) has remained scarce, in comparison to the context of tolerance (i.e., the level of acceptability towards the existence of wild animals or the problems they cause).

Besides, the approach of coexistence elaborated on the co-adaption of human and their willingness to be nearby with wildlife (Inskip, Carter, Riley, Roberts, & Macmillan, 2016) could reflect animals that people like, but may not be the same animals that people want to have nearby. For instance, although many are fond of elephants, the idea of having them near residential areas is unlikely as they can cause damages. In fact, such acceptability toward animals and its related issues have been studied intensively in the context of tolerance; 'passive acceptance of a wildlife population' (Inskip et al., 2016), but scarcely in the context of willingness to coexist (i.e. if people are willing to live closely with the animals), which reflects active acceptance of a wildlife population.

Hence, it is important to comprehend the influential factors for affective attitudes (i.e., preference and willingness to coexist, as for this study) towards wild animals in designing effective educational programs that could further enhance such attitudes.

1.3.6 Review of the Asian and Malaysian contexts of attitudes towards animals

The affective attitude exhibited by the public promotes support for biodiversity conservation actions. Nevertheless, a decline in direct experience with nature can lead to disaffection towards natural environments and wildlife, as well as public indifference towards biodiversity conservation. Besides, understanding public affective attitude towards biodiversity has been largely biased towards developed Western countries, while attitudes vary across cultures and urbanization levels.

With that, this study measured the affective attitudes (i.e., preferences for and willingness to coexist with animal species) towards wildlife as an important aspect in cities and urban ecological systems by surveying 357 adults and 401 school children in rapidly urbanizing Malaysia. Other than that, the relationships between these attitudes and childhood experiences with nature had been examined as well. Moreover, several studies have reported public perceptions of and preferences for wild animals in the Southeast Asia region (however, cf. Jenks et al., 2014; Baharuddin et al., 2013; Karuppannan et al., 2014; Nik Mohamad, 2011).

For instance, Jenks et al., (2014) examined the variables that predicted the attitudes displayed by locals from 34 villages located in Southeastern Thailand towards dholes (*Cuon alpinus*). As a result, the respondents agreed that dholes should be eliminated heavily based on whether or not they 1) considered dholes as dangerous and 2) believed dholes would attack a person. Most villagers, nonetheless, held neutral or positive attitudes towards dholes, as only 12% of the respondents asserted that dholes should be left in the wild. They also discovered an encouraging social climate for dholes in Thailand and their findings supported the need for enhanced efforts to teach people to distinguish dholes from jackals (*Canis aureus*), besides encouraging students to experience nature.

Meanwhile, a case study carried out in Kuala Lumpur presents the situation of urban wildlife species and the quality of the habitats. As a result, it was found that many factors contributed to the healthy conservation of urban wildlife, such as quality and variety of habitats, ornamental versus native vegetation, and ecological design. Besides, this research highlighted that common urban birds were dominant in urban green spaces regardless of the size of the green spaces. Nevertheless, only larger urban green spaces helped to protect the species. Finally, they concluded that urban wildlife in Kuala Lumpur declined rapidly, thus suggesting a greater need for both the community and stakeholders to promote programs and activities in preserving and enhancing urban wildlife. Other than that,

development of comprehensive acts, policies, and guidelines is essential for urban wildlife protection (Karuppannan et al., 2014).

Next, another study that looked into five main districts in Kuala Lumpur and local authorities investigated the environmental attitudes towards urban biodiversity, especially on urban wildlife. The research determined the correlations between demographic factors and values with regard to urban biodiversity. Besides, the survey focused on two major groups, namely stakeholders (n = 128) and residents (n = 288). As a result, those who lived closer to Kuala Lumpur urban parks exhibited higher moralistic values (ethical and spiritual) towards urban wildlife. Naturalistic (exploration and discovery), ecologistic (concern for environment, as well as interrelationships between wildlife species and natural habitats), and scientific (knowledge and understanding) values projected the highest mean scores (3.5 and 4.0), which reflected an acceptable degree of agreement. In fact, a majority placed higher values on wildlife and its ecosystems. Meanwhile, negativistic, humanistic, utilitarian, and dominionistic values had mean scores between 2.50 and 3.00; thus indicating the dependence of these values on specific issues associated to urban wildlife. Moreover, it was inferred that dwellers in Kuala Lumpur did not exhibit strong negativistic, humanistic, utilitarian, and dominionistic values towards urban wildlife (Baharuddin, Karuppannan, & Sivam, 2013).

Additionally, a study carried out by Nik Mohamad (2011) in six neighborhood schemes within the Klang Valley area investigated 8 typologies of wildlife species commonly found in urban residential in tropical countries (small birds, butterflies, squirrels, tortoises, frogs, monkeys, crows, and snakes). Furthermore, the researcher categorized these animals into favorable (small birds, squirrels, and butterflies), nuisance (crows, frogs, tortoises, and snakes), and dangerous (monkey). Besides, in the attempt to measure the attitudes displayed by the residents, three variables (awareness and feelings about wildlife; as well as bad experiences/problems encountered) were examined in relation to wildlife. As a result, the urbanites indicated strong preferences to small birds, butterflies, and squirrels, which could be attributed to appreciation towards psychological and social benefits from living with nature, including wildlife. On the other hand, monkey was seen as a dangerous animal to the residents due to the negative experiences endured. This research, as a conclusion, asserted the positive values of urban wildlife and support for neighborhoods living together with urban wildlife.

Furthermore, this thesis was inspired from several prior and prominent studies carried out by Hosaka, Sugimoto and Numata (2017b), Soga et al., (2016b), and Zhang et al., (2014). Nonetheless, the originality of this present study is highlighted in the research methods, including study areas, selection

of respondents, survey procedure, nature-related activities, wild animals involved, as well as inclusion of nature landscapes based on the main landscapes found in this tropical country.

Furthermore, the novelty of this thesis lies in the inclusion of coexistence level, although similarly applied in Hosaka et al., (2017b), but it is worthy to note that this present study employed a wider scope of both urban and rural groups of population, in comparison to cases that mainly focused on Japanese urban societies alone. Hence, due to the variances found in natural landscapes and cultures between Malaysia and Japan, the selection of varied wild animals and nature-related experiences had been considered as significant aspects to those variances.

As for the details of verifying the selection of new variables into the existing model, as given in Chapter 4, the opted sociodemographic variables in this present research were gender, age, and ethnicity, as compared to the case of Japanese study that examined gender, age, and having a child.

Moreover, the findings of this present thesis had been based on three main clusters; from favorable to unfavorable species, with an emphasis on favorable insects (butterfly, dragonfly, firefly, and cicada) and squirrel, whereas the Japanese case study generated five main groups (insects, Mammals, Birds, Large Mammals, and Unfavorable Animals), with fireflies emerging as the most preferred (mean score: 3.78), and followed by bush warblers (3.74).

1.4 Research Objectives

This thesis examined the correlation between childhood nature experience and its impact upon conservation attitudes (in this particular research; preference refers to *like or dislike*), as well as willingness to coexist with wildlife and natural landscapes. Direct experiences with nature in childhood had been deemed as essential to enhance both psychological and physical development in children. Nonetheless, studies concerning childhood nature-related experiences and their effects are largely biased towards developed Western countries. With that, this particular research focused on several tropical urban biodiversity areas located in Malaysia.

As such, the first phase of the thesis (Chapter 3) is focused on (1) identifying the common nature-related activities during childhood among adults and school children, and finally, (2) determining if younger generations had fewer nature-based experiences than older generations and if people who grew up in urban areas had fewer experiences than those who grew up in rural areas.

Next, in the second phase (Chapter 4), the research focused on (1) identifying animals that Malaysians preferred and wished to coexist and them, (2) examining the factors that affected public preferences (Preferences) and willingness to coexist (Coexistence) with wild animals based on sociodemographic factors or childhood nature experiences (Experience). Lastly, as for the final phase (Chapter 5), this thesis elaborated (1) the frequency of involvement among school children in nature-related experiences either in direct or vicarious contact mode, and (2) how the nature-related experiences, either direct or vicarious, influenced the children' landscape preferences. Finally, this thesis (4) determined the wild animals preferred by children and wished to coexist with, as well as (5) determined the factors that affected children's Preferences and Coexistence towards wild animals based on sociodemographic factors or nature-related experiences.

1.5 Research Hypotheses

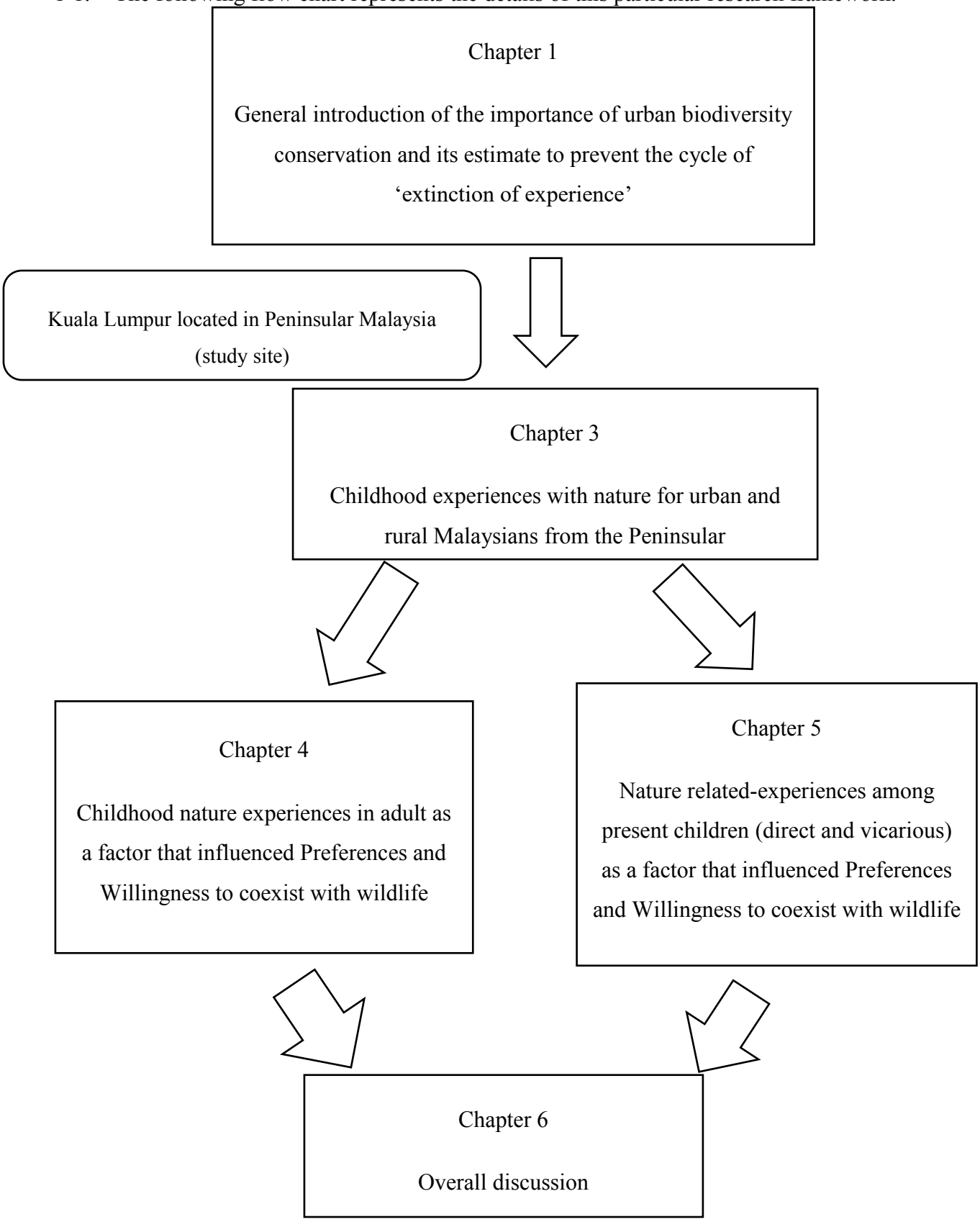
Increasing public support for biodiversity conservation can be strengthened by examining and understanding the public's preference towards wildlife. This human dimension is essential to be integrated with ecological dimension for it aids in managing and conserving better urban ecosystems, as well as healthy environments (Claire 2002; Teel et al., 2007). However, uncertainty was observed in public perceptions towards biodiversity, especially around Southeast Asian countries (Jenks et al., 2014; Nik Mohamad, 2011). Some were more global in investigating people's attitudes towards varied wildlife (Schlegel & Rupf, 2010), while others focused on certain species or taxonomic groups (Bjerke & Ostadhl, 2004; Taylor & Signal, 2005). With that, as far as the researcher's knowledge, this is the first study that documented common childhood nature-related experiences in Malaysia and temporal changes in nature-related experiences.

As such, this study had hypothesized several correlations between childhood nature experiences and their impact upon people's preferences towards wildlife and landscapes, as well as willingness to coexist with wildlife. Hence, the research sub-hypotheses are stated accordingly by chapters.

1- The younger generation experienced fewer nature-related activities than the older generations (Chapter 3).
2- The level of childhood nature-related experiences differed between people who grew up in rural areas and those who grew up in urban areas (Chapter 3).
3- The wild animals that Malaysians preferred and wished to coexist with were birds and small mammals group (Chapter 4).
4- Experience scores affected Preference and Coexistence scores towards wild animals. If so, how significant are the effects of Experience compared to those of sociodemographic factors (Chapter 4).
5- School children experienced vicarious nature experience more frequently that direct nature experiences (Chapter 5).
6- School children preferred more manicured landscapes (urban parks or urban cities areas) than natural landscapes (forest or agricultural landscapes) (Chapter 5).
7- Direct and vicarious nature experiences influenced Preference and Coexistence scores towards wild animals among the school children (Chapter 5).

1.6 Organization of the thesis

1-1. The following flow chart represents the details of this particular research framework.



1.7 Significance of research

'Biodiversity' has emerged as a significant key word in urban landscape design and management by national and local governments, private companies, and citizen groups (Secretariat of the Convention on Biological Diversity, 2012). Furthermore, as more than half of the global population are presently residing in cities; urban biodiversity conservation has been expected to prevent both the cycle of 'extinction of experience' and the engagement among people to interact with nature, which are essential to one's health and well-being, as well as the declining public value towards urban matrix in support for biodiversity conservation effort (Soga et al., 2015). Hence, this research contributes in promoting young children and urbanites to have regular contacts with the nature.

Such contact allows one to benefit from the green neighborhood environments towards better health and well-being (Ward Thompson & Aspinall, 2011). Furthermore, interaction with the nature has been proven to enhance positive attitudes towards support for and to develop willingness in the light of nature conservation (Soga et al., 2016; Zhang et al., 2014; Martin-Lopez et al., 2007).

Therefore, this research could justify for various stakeholders (wildlife managers, urban planners, ecologists, conservationists, and residents) the importance of shaping awareness and public affective attitudes upon biodiversity conservation, especially among urbanites. Besides, due to the heavy geographical bias in the existing published studies, in which approximately 80% of researches are focused on Europe, North-America, and Oceania (Shwartz et al., 2014a); this study contributes to the knowledge pertaining to tropical country efforts in addressing issues related to urban ecology in urban areas. Moreover, this particular information is presented from the stances of childhood nature experience and public affective attitudes, which are indeed essential to understand the affective attitudes of residents (whether rural or urban) towards wild animals, as well as the factors that affect these attitudes in the perspective of tropical developing country. Furthermore, this study bridges a gap as studies concerning contact with nature and children's attitude towards wildlife conservation are relatively scarce (but see Ballouard et al., 2012; Zaradic et al., 2009).

In addition, a pressing social challenge is the ongoing global process of urbanization, which results in degradation of urban ecosystem services and the loss of certain benefits to residents generated by urban nature (Elmqvist et al., 2013). Besides, urban sprawl has terribly undermined the 'ecology in the city' (Picket et al., 2016), including natural and semi-natural areas, e.g., forests or wetlands (European

Environment Agency, 2016; Organization for Economic Cooperation and Development, 2012). For example, urban sprawl can fragment natural habitats, such as forest cover (Miller, 2012), hence negatively affecting the wildlife. Although policies favoring the compact city include multi-dimensional objectives to secure sustainable development, the main aim of these compact cities is to protect the environment from further degradation due to urban sprawl (Organization for Economic Cooperation and Development, 2012). If sustainable use of wild animals becomes a strategy for nature conservation; it is critical to comprehend public affective attitudes towards biodiversity, and its related influential factors to promote public support for urban biodiversity conservation.

Therefore, findings eligible for incorporation with the Malaysian Biological Policy 2016 to 2025 implementation towards encouraging effective planning and management of biodiversity must be obtained in a participatory manner. Besides, is important for the younger generation to continue to preserve and conserve the varied biodiversity with at least 60 percent of identified species of organisms. Moreover, the headline tagged in the mass media has become a main concern not only among scientists, researchers or the government, but also among other stakeholders. Recently, the urge for Malaysians to actively conserve and protect wildlife has also been stressed (Dionysius, 2016).

Additionally, perspectives for broader approaches in terms of policy, education system, conservation, as well as improvement in urban preferences, values, beliefs, and behaviors, are highlighted. For instance, in urban planning, the managers should have access to Malaysian studies on biodiversity conservation, as well as conservation efforts by federal, state, and local governments, which could ascertain the survival of ecosystem, species, and genetic diversity. In line with the policy and legislations in the Protection of Wildlife Act 1972, the findings from this study should support the protection of indigenous flora and fauna. Moreover, environmental education for young children should focus on frequent practical researches and observations rather than mere theory applications.

As urban areas are home for many, understanding public attitudes could increase the people's awareness regarding the importance of conserving biodiversity. Besides, psychological benefits are increased with species richness in urban green spaces (Fuller et al., 2007). Hence, it is vital for landscape management to emphasize on biological complexity in the attempt to enhance human well-being, in addition to biodiversity conservation (Fuller et al., 2007). The study is significant not only for health consequences, but also to indirectly increase affinity and appreciation towards environments and nature conservations among the younger generation especially. Thus, this study offers an overview regarding the essentials of nature experiences, urban environments and ecosystem

functions, urban ecology and human social interaction, as well as human health and well-being (see Gaston, 2010). Green spaces in urban areas are a form of arena where the public can enjoy regular contact with nature, which leads to physical and psychological well-being benefits. As such, this study proposes to further enhance the use of urban green spaces, including urban parks and neighborhood parks; the orientation enforced via environmental education and campaigns; and the role of community/stakeholders. With that, this research sheds light on the policy for urban biodiversity conservation, including systematic planning for urban areas.

Chapter 2

Research Methodology

2.1 Study site description

It is very unfortunate that the Southeast Asia region has been listed to have one of the highest rates of deforestation in the tropics primarily due to rapid urbanization, agricultural expansion, unscheduled logging, and habitat fragmentation (Sodhi et al., 2010), in which the consequences are not only in extinction of species, but also extinction of experience (Soga & Gaston, 2016). Moreover, Malaysia has emerged as one of the most rapidly developing and urbanizing countries within the Southeast Asia region. Based on the National Biodiversity Index, Malaysia appears to be one of the 12 megadiverse nations at the global level (National Policy on Biological Diversity, 2016) for its typical tropical monsoon climate and temperatures that range from 23 ºC to 32 ºC. Furthermore, most parts of the country are covered with dense rainforest, which functions as host to a substantial number of plant and animal species (Convention on Biological Diversity, 2016). As for population, most Malaysians residing in Peninsular Malaysia are of Malay ethnicity (68.6%), along with Chinese (23.4%) and Indians (7.0%) (Department of Statistics, 2016). Besides, Islam is the official religion with a majority of the population being Muslims, thus contributes to be one of the most essential cultural aspects (Zainal Abidin & Jacobs, 2016) in Malaysia.

2.1.1 *Different landscapes for urban-rural in Malaysia*

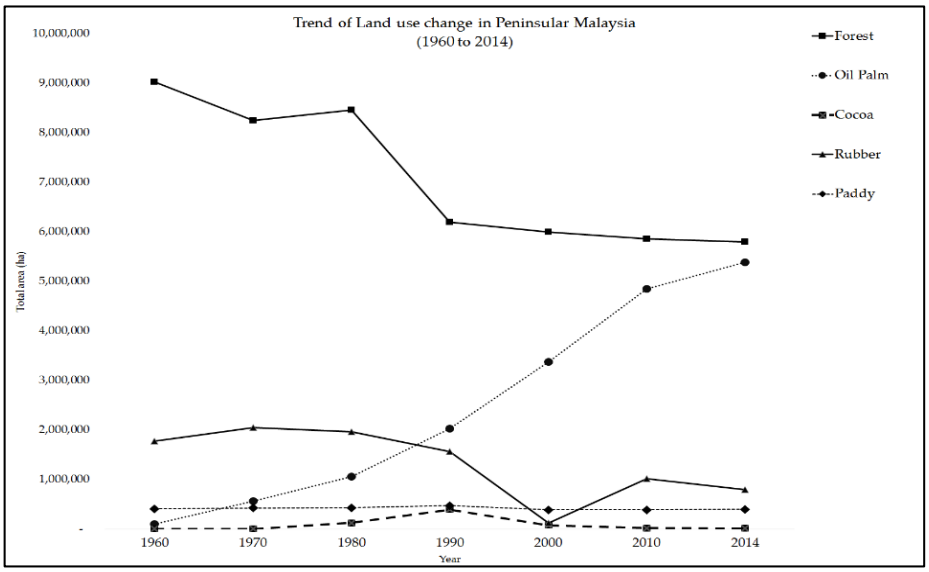
This particular study placed its focus to two primary areas within Peninsular Malaysia, which are the urban and rural areas. The rural areas from 1970 until 2000 were comprised of farms, plantations, paddy fields, rubber estates, oil palm plantations, orchards, and home backyards. In fact, the villages located in rural areas, also known as *kampung* in Malay, have been the most familiar landscape to the Malays (E. C., Thompson, 2004). The Malays in *kampung* are actively engaged in cultivating rice, tapping and harvesting rubber, managing coconut groves, growing food in the orchard garden, and fishing (Ngah, 2009; Ninotaziz, 2016; Jamil, 2002).

Before its independence in 1957, the Malaysian economy was heavily dependent on primary commodities. For example, the Malaysian government promoted rubber plantations from 1900 until

1950s, whereas oil palm plantations since 1960s. Hence, children then played in the woods and streams, besides helping to collect fruits, such as coconuts, mangoes, plantains, as well as herbs, such as lemongrass *(Cymbopogon)* and screwpine leaves *(Pandanus amaryllifolius)* (Ninotaziz, 2016; Jamil, 2002). Other than that, children then loved climbing trees (Jamil, 2002), observed weaverbird's nests that hung high on the top of bamboo plants, and catching fireflies to function as natural 'torchlights' (Lat, 2006). Moreover, fishing and swimming in the rivers were common activities, besides enjoying rough rides on the spathe of the Pinang tree (*Areca catechu)* (Lat, 2006).

2.1.2 *Urbanization in Malaysia*

Nevertheless, the forest areas in Peninsular Malaysia portrayed a declining trend from 73% during the late 1960s to 44% in 2001 (Abdullah & Nakagoshi, 2006; Federal Department of Town and Country Planning, 2005). Meanwhile, built-up areas and agricultural areas saw a hike from 1% to 3% and 24% to 51%, respectively (Abdullah & Hezri, 2008; Vincent & Hadi, 1993). The increment observed for agricultural land had been mainly due to the rapid expansion of oil palm plantations (Yaakob, Masron, & Masami, 2010), which do not function as play area among local children (Figure 2-1). With that, the percentage of urban population to the overall population escalated from 28% in 1970 to 62% in 2000 (Yaakob et al., 2010).



Sources: Vincent and Hadi (1993) and Department of Statistics Malaysia (2014)

Figure 2-1. Trend of land use change in Peninsular Malaysia from 1960 to 2014.

2.1.3 *Implementation of urban greening and biodiversity conservation in Peninsular Malaysia*

The changes in these landscapes took place since the rapid urban progression took place in Peninsular Malaysia from early 1980s until 1990s due to manufacturing and industrialization (Abdullah & Hezri, 2008; Miyamoto, Mohd Parid, Noor Aini, & Michinaka, 2014). This progression mode led towards a rather massive township development (Ho, Matsuoka, Simson et al., 2013). With that, this rapid growth in urbanization displayed a significant effect on natural surfaces modification and local environment change, especially to cater to the escalating demand of urban population (Jusoh et al., 2009). Besides, many agricultural and plantation lands were developed into new townships motivated by high economic growth; thus resulting in a significant shift from forest to agriculture and urbanization (Yunus et al., 2004). In addition, those from rural areas began migrating to urban areas for financial improvement and better employment, hence promoting the shift from agriculture to industry and services (Alias et al., 2014). Therefore, urbanites ended up getting disconnected from outdoor play and socialization (Said, 2010).

In fact, urbanization in the Southeast Asia region portrays that metropolitans were able to attract migration from rural areas, as compared to smaller towns (McGee, 1975). The population then in urban Malaya (1950) was only 19%, but expanded to 26.5% in 1957 (Masron, Yaakob, Mohd Ayob, & Mokhtar, 2012). By 1957, out of the 6.5 million population in Peninsular Malaysia, 73.4% lived in rural areas, of which 61% were Malays, 28% Chinese, and 11% Indians (Ngah, 2009). Upon forming Malaysia in 1963, the proportion of urban population hiked to 28.4% in 1970, which further increased to 14 million in 1980 and 22 million in year 2000 (Yaakob et al., 2010).

Upon initiating the first Malaysia National Biodiversity Policy, 15 strategies and 87 actions were formulated to protect flora, fauna, and their original habitats in national and state parks, as well as wildlife sanctuaries and reserves in 1988. Later, this policy was revised as the National Policy on Biological Diversity Plan 2016–2025, which contained 5 goals, 17 targets, and 65 actions that reflected conservation and sustainable use of Malaysian biodiversity. Of these, Action 6.5 covers biodiversity conservation in urban areas that promotes the establishment of natural green networks in developed areas, besides organizing conservation events involving urbanites (National Policy on Biological Diversity 2016–2025, 2016). Moreover, the City Hall of Kuala Lumpur, the National Landscape Department (NLD), and the Department of Wildlife and National parks (DWNP) have devised a Landscape Master Plan for urban green spaces and biodiversity conservation.

2.2 Survey procedure for adults

In this thesis, the research methodologies elaborated in Chapters 3 and 4 mainly focus on surveys carried out for adults. The questionnaire survey was conducted in three rural districts (Hulu Langat, Kuala Selangor, and Hulu Selangor) and three urban towns (Kepong, Kuala Lumpur, and Putrajaya) within and <100 km from Kuala Lumpur, the capital of Malaysia. As far as this study is concerned, urban is defined as non-agricultural area with > 10,000 inhabitants, whereas rural area is denoted as an area that consists mainly of agricultural and forested lands or water bodies with < 10,000 inhabitants (Department of Statistics, 2015; Malaysian Rural Master Plan, 2010).

2.2.1 *Sampling*

Furthermore, since this study involved residents who inhabited within 100 km radius from the KL city (known as clusters), the strata of Rural (Cluster 1) and Urban (Cluster 2) were applied as cluster or area sampling. From these two main strata, the research team randomly selected sample from each cluster, which shared similar neighborhood within the municipal council as listed in below table. In total, 357 respondents were selected via cluster random sampling (Sekaran, 2013).

Characteristics	**Kuala Lumpur**	**Putrajaya**	**Selangor**
Population	1.8 million	0.08 million	7.9 million
National function	Federal Territory	Federal administrative	Most developed state
Natural landscape	100% Urban	100% Urban	1) Built-up/urban area: 30% 2) Agriculture : 6% 3) Forest : 4% 4) Water bodies: 7% (100% Peninsular Malaysia)
Human landscape * the nearest green area for survey site	Metropolitan Kepong Park	Putrajaya Botanical Garden	o Gabai Waterfall o Kanching Forest Eco-Park o Nuang Mountain
Selected districts	o Kepong o Selayang Utama o Gombak	Precincts 11, 14, and 18	o Hulu Langat o Hulu Selangor o Kuala Selangor

2.2.2 *Face-to-face interview*

In conducting the survey, the research team approached randomly selected houses from January 2016 until March 2016 located at the six study areas and conducted face-to-face interview sessions with one adult member (>20 years) at each household by adhering to the structured questionnaire. Besides, the survey, which was conducted in either English or Malay, targeted some 180 respondents from each area. Moreover, in order to secure confidentiality, names or identification numbers were excluded as responses. The respondents were assured that their responses were treated only as aggregate data for scientific research purposes, without any profit or marketing segmentation implication. Hence, neither formal ethics approval nor written consent had been acquired from the municipal council.

2.2.3 *Questionnaire survey*

The survey questionnaire, which was designed in both English and Malay languages, had been comprised of four primary sections: A) perceptions towards green spaces and wildlife, B) perceptions towards policies and governance of green spaces, C) sociodemographic characteristics (gender, age, education level, ethnicity, having children, annual income, and urban/rural childhood setting), and lastly, D) experiences with nature-related activities during childhood.

The first section assessed the experiences among adults regarding nature-related activities during childhood, where the respondents were asked if they had experienced a list of 18 activities during childhood (≤ 12 years) by providing 'yes' or 'no' answers. The list of the 18 activities is as follows: 1) playing in rivers and waterfalls, 2) observing wild animals, 3) collecting flowers and fruits, 4) collecting seeds and twigs, 5) eating self-collected fruits, 6) climbing trees, 7) making kites, 8) fishing, 9) sliding from river banks and slopes, 10) playing with soil/sand, 11) making spinning tops, 12) making flower crowns, 13) collecting herbs and weeds, 14) catching frogs 15) catching spiders, 16) making bamboo guns 17) making boats from bamboo, and 18) participating in traditional outdoor games. In fact, these experiences were confirmed after discussing with a panel of experts, inclusive of several local environmental education researchers, and a webpage entitled 'Malaysia games without gadgets' (Traditional games in Malaysia, 2016). The list of activities suggested direct interactions with the nature. Moreover, before commencing with the main survey, the research team performed a preliminary survey to confirm the relevancy of the activities for all generations.

2.2.4 *Questionnaire design (Chapter 4)*

Next, the second section assessed the respondents' attitudes towards wildlife (hereafter, known as preferences scores) using the 5-point Likert scale (5=Likes very much; 1=Does not like at all) for some 22 species from the wildlife. Meanwhile, willingness to coexist with wildlife refers to the level of willingness in having wildlife nearby their residence (hereafter, known as Coexistence scores). This is assessed by measuring the level of accepted distance between the desirable place for wildlife and the respondents (Table 2-1). First, items related to their willingness of coexist (Coexistence) was assessed using 5-point Likert scale (1= nowhere is desirable, 2= distant park and forest, 3= park and forest nearby, 4= home garden or veranda, and 5= anywhere is desirable). Next, 4-point scale was applied to combine the answers for scores 4 and 5 as score (4); anywhere is desirable to have the wild animals. Besides, the selected wild animals that were used as the baseline indicator for biodiversity in Peninsular Malaysia are monkey, wild boar, civet, bat, rat, slow loris, flying squirrel, shrew, kingfishers, crow, swallow, squirrel, snake, frog, beetle, cricket, cicada, butterfly, dragonfly, wasp, bee, and firefly. The chosen species are indeed commonly found in Malaysia. These 22 animals are popular (distributed across the whole nation) and reflect a good representation of various animal groups (mammals, birds, reptiles, amphibians, and insects). Although many other species are available, for the purpose of this study, the attention of the respondents was restricted to the selected species. More details of the questionnaire are presented in Appendix 1.

Table 2-1. Questionnaire design (adults)

Measurement	Variables	Measurement scale / Questions
Familiarity towards wild animals	Familiarity	'To what extent do you know about the following animals?' **Watching the real animal includes not only in the field, but also at the zoo or insectarium. For data analysis purpose, 'Do not know' was coded 1, 'Only know by name' was coded 2, 'Have seen in picture or movie' was coded 3, and 'Have seen the real animal' was coded 4.
Affective attitudes	Preferences	'To what extent are your feelings towards the following animals?' The scale used: 1= Unfavorable; 5= Favorable
	Coexistence	'Where is the desirable place for the following animals to inhabit?' (1= nowhere is desirable, 2= distant park and forest, 3= park and forest nearby, 4= anywhere is desirable to have the wild animals (including home garden or veranda).
Experience	Direct	Using the Retrospective approach [childhood duration aged < 12 years old]. The 18 nature-related activities were similar to those in the survey designed for school children. Besides, the list of the activities was discussed with experts (local environmental educators) based on familiarity among Malaysians aged between 20s and 70s. The responses were in binary scale (Yes= With experience or No= Nil experience).

2.3 Survey procedure for school children

2.3.1 *School children participation in survey*

Apart from adults, a separate questionnaire survey was conducted among school children to assess their experiences with the nature. As such, this survey for school children was carried out in November 2016 at several selected elementary schools located in Kuala Lumpur and Selangor, which happen to be nearest to the adult residential survey site. The schools were selected based on the location. Urban schools have a certain percentage of urban parks, lake or garden within the urban area, while schools at rural area are naturally surrounded with varied agricultural activities, such as paddy field, river or oil palm plantation. Since this study employed data with nil identifiable information, neither formal questionnaire nor written consent from parents had been required.

Furthermore, the survey session in schools had been performed among selected classes (with approximately 15 min to complete) from Standards 4 to 6. Each student who was willing to participate in the survey was given a 6-page questionnaire form with pictures of wildlife and preference landscape as reference. With the company of a classroom teacher, the purpose of the questionnaire was explained and each question was read aloud to the children in order to ascertain that they did understand the questionnaire items. In fact, the briefing was conducted in Malay language to avoid probable confusion. Moreover, the students were allowed to ask questions to the researcher or any of the assistant researchers at any time during the quiz.

In total, 401 (female = 193, male = 208) school children from Standards 4 until 6, aged 10-12 years old participated in the survey. Furthermore, the survey was comprised of nature-related activities, which happen to be similar with the survey designed for adults that involved direct interactions with the nature, mainly to assess the experiences of school children. In gathering responses, their frequency (1 = never, 2 = seldom, 3 = sometimes, 4 = often) of nature activities for the 18 listed activities had been collected, which also corresponded to ‘less than once a month’, ‘almost every month’, ‘almost every week’, and ‘almost every day’, respectively.

2.3.2 *Questionnaire design for school children (Chapter 5)*

The students were required to pay attention to the briefing as the researchers explained that the questionnaire session functioned as an exercise and quiz written in Malay language. Part of the quiz form contained colorful photographs of 22 commonly found animal species and types of landscapes. The selected wildlife gave a good representation of various animal groups (mammals, birds, reptiles, amphibians, and insects). Besides, no right or wrong answer is available for this questionnaire as it evaluated the general perception of attitudes among school children towards the nature. In addition, no time limit was given to complete the questionnaire.

The questionnaire was comprised of three main sections: (A) Attitude towards willingness to conserve nature, (B) Direct or vicarious nature-related experience, and lastly, (C) Social characters of school children (without name or identity). Section (B) that meant for direct nature experiences had been similar to that in questionnaire for adults, in which 18 nature-related activities were listed, along with the natural places frequented by the school children outside school hours within the Peninsular Malaysia region. Next, eight items were selected based on some popular places, which comprised of forest landscapes to main agricultural landscapes, including human-modified landscapes found in Peninsular Malaysia (Abdullah & Hezri, 2008). Meanwhile, as for vicarious experiences, the activities were modified from that found in Soga's et al., (2016b), in which this present study included new vicarious activities, such as playing videogames related to nature or wildlife. The questionnaire designed for school children is attached in Appendix 2. Moreover, the related measurement scales are given in Table 2-2.

Table 2-2. Questionnaire design (school children)

Affective Attitudes Or Preferences	Willingness to Conserve Biodiversity	(1) 'Have you seen this animal species?' (2) Student's preference towards the list of animals (e.g. 'How do you feel about squirrels?' (3) 'Would you protect these animals?' (4) 'Would you be happy if this animal species lives near you?' • For data analysis purpose, 'like' was coded 1, 'no feeling' was coded 0, and 'dislike' was coded -1
Experience	Direct	• The frequency of 17 items that involved nature-related activities (4 scales: 'less than once a month', 'almost every month', 'weekly' or 'almost every day') • The frequency of using green spaces (8 items: parks, forests, farmlands, aquarium, agriculture land, rivers/oceans) • The students chose the frequency based on a 4-point scale ranging from 1 (never) to 4 (very often).
	Vicarious	(1) 'How frequently do you read books or watch TV programs about nature or wildlife?' (2) 'How frequently do you talk about nature or wildlife with your parents or friends?' (3) 'How frequently do you play videogames related to nature or wildlife?' • The responses were based on a 4-point scale (1 = never, 2 = seldom, 3 = sometimes, and 4 = often) • The items corresponded to 'less than once a month', 'almost every month', 'almost every week', and 'almost every day'

<table>
<tr>
<td>Preferences</td>
<td>Nature landscapes</td>
<td>

Items 1-10 were about themselves and they only ticked for each answer.
Question 11 was about individual preferences from the pictorial of Malaysian landscapes sheet. The responses were based on a 3-point scale (0= dislikes, 1=no feelings, 2=like):-

<table>
<tr><td>1.</td><td>Forest</td></tr>
<tr><td>2.</td><td>Paddy field</td></tr>
<tr><td>3.</td><td>Oil palm plantation</td></tr>
<tr><td>4.</td><td>Urban area</td></tr>
<tr><td>5.</td><td>Rubber plantation</td></tr>
<tr><td>6.</td><td>Recreational park</td></tr>
</table>
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2.4 Data analysis

All data retrieved from this study were gathered and compiled in Microsoft Excel and had been analyzed by using the R software version 3.2.0 (R Core Team, 2015). This free statistical software program was employed for statistical tests, which are explained in detail in Chapters 3, 4, and 5.

Chapter 3

Nature experience in urban and rural areas located in Peninsular Malaysia

Keywords: *extinction of experience; nature-related experience; urban area; rural area; Southeast Asia tropics*

3.1 Introduction

At this present era, more than half of the global population is urbanites. Hence, urban biodiversity conservation must be enforced to prevent the 'extinction of experience' cycle, in which people lose the opportunity to interact with nature, hence devalue and depreciate nature, which could altogether cause a decline in public support for conservation activities, as well as further degradation of natural environments (Miller, 2005; Soga & Gaston, 2016).

Furthermore, direct experiences with the nature have substantial positive impacts upon mental, emotional, and social development among children (C. J., Maller, 2009; Zaradic & Pergams, 2007); behavior among people (Rajecki, 1982); and upon one's lifestyle to be healthier (de Vries, Verheij, Groenewegen, & Spreeuwenberg, 2003; Takano, 2002). Other than that, experience with nature during childhood is particularly essential to cultivate pro-environmental attitudes, behaviors, and moral judgments when attaining adulthood (Chawla, 2009; Lloyd, Burden, & Kiewa, 2008; Thompson et al., 2008; Wells & Lekies, 2006).

Additionally, Lohr and Pearson-Mims (2005) discovered a significant link between childhood nature experiences and attitudes exhibited by adults towards natural entities, such as trees, as well as nature-based practices like gardening. Moreover, positive experiences with the nature during childhood function as some major motivators in adult environmentalists to protect the environment (Chawla, 1999; Chawla & Cushing, 2007; Wells & Lekies, 2006). Thus, in the present 'extinction of experience' era, it is imminent to understand how children relate to nature and how this association has changed over time, as well as within various sociodemographics. This is particularly urgent in developing countries undergoing rapid urbanization. Nevertheless, our understanding of childhood nature-related experiences is largely biased towards developed Western countries.

Beyond doubt, the Southeast Asia is a rapidly urbanizing region that has experienced drastic changes in and degradation of natural landscapes since these past few decades (Sodhi, Koh, Brook, & Ng, 2004). Therefore, it is of utmost importance to clarify the types of human–nature interactions that exist, including their changes in this region. Within the Southeast Asia, Malaysia is also rapidly developing and urbanizing among other nations for it has been acknowledged as one of the 12 megadiverse nations across the globe (Convention on Biological Diversity, 2001). Besides, its population hiked from 14 million in 1980 to 30 million in 2015 (Department of Statistics Malaysia, 2016). Such impressive progression, nonetheless, caused a decline in the forested area of the Peninsular Malaysia from 73% in late 1960s to 44% in 2001. This reflects an increment in built-up and agricultural areas from 1% to 3% and 24% to 51%, respectively (Vincent & Hadi, 1993; National Physical Plan, 2005). This increment in agricultural land had been mainly due to the rapid expansion of oil palm plantations (Abdullah & Nakagoshi, 2006), which is an uncommon place for local children to play. Consequently, the urban population witnessed a hike from -10% in 1911, and 28% in 1970, to 62% in 2000 (Yaakob et al., 2010). Since availability of natural environments is a key aspect that enables children to interact with the nature (Maller, 2009), rapid changes in land use and urbanization that took place from 1960 to 2000 had likely to cause a decline in childhood experience with nature among Malaysians.

Moreover, this study hypothesized that younger people indulged in fewer childhood nature-related activities than older people. As such, a survey on their experiences with nature-related activities during childhood had been performed. Besides, factors, such as gender and growing up in urban versus rural settings, could be linked to experiences of nature-related activities. Hence, several sociodemographic aspects have been included in the questionnaire to control any possible confounding effects. Furthermore, the surveys were conducted to address the following research questions: (a) ‘What are the common nature-related activities indulged by Malaysians during their childhood?’; (b) ‘Do younger generations experience fewer nature-related activities than older generations?’; and (c) ‘Does the level of childhood nature-related experiences differ between those who grew up in rural areas and those who grew up in urban areas?’. As for research knowledge, this study appears to be the first of its kind to document common childhood nature-related experiences in Malaysia, as well as temporal changes in nature-related experiences.

Study areas

Malaysia is well-known for its tropical monsoon climate, with temperatures ranging from 23°C to 32°C. Moreover, based on the National Biodiversity Index, Malaysia emerged as one of the 12 megadiverse nations at the global scale (National Policy on Biological Diversity 2016-2025, 2016). Furthermore, Malaysia is covered with lush rainforest, which functions as host to numerous plant and animal species (Convention on Biological Diversity, 2016). Before its independence in 1957, the Malaysian economy depended heavily on primary products. As such, the Malaysian government promoted rubber plantations from 1900 until 1950s, whereas oil palm plantations since 1960s. On top of that, the manufacturing sector was promoted with the aim of diversifying the agriculture-based economy and generating employment opportunities. In recent times, industrialization has emerged significant to achieve the New Economic Policy, especially in restructuring employment and assets ownership, as well as poverty alleviation (Lim, 1987). In fact, urban development in Peninsular Malaysia began in early 1980s to 1990s due to heavy manufacturing and industrialization (Abdullah & Hezri, 2008; Miyamoto et al., 2014). Meanwhile, the rural areas from 1970 until 2000 generated farms, plantations, paddy fields, rubber estates, oil palm plantations, orchards, and home backyards. As for this study, the questionnaire survey was carried out in three rural districts (Hulu Langat, Kuala Selangor, and Hulu Selangor) and three urban towns (Kepong, Kuala Lumpur, and Putrajaya) located <100 km from Kuala Lumpur, the capital of Malaysia. In this study, urban is defined as non-agricultural area with > 10,000 inhabitants, in which at least 60% of the population are aged 15 years or older, whereas rural area refers to area that consists mainly of agricultural and forested lands or water bodies with < 10,000 inhabitants (Department Statistics of Malaysia, 2015; Malaysia Rural Master Plan, 2010). Additionally, rural area is also known as village or *kampung* that refers to 'all gazette areas consisting of less than 10,000 people and all areas that are not gazetted' (Malaysia Labor Force Survey Report, 2002).

Questionnaire design

In the attempt to assess experiences with nature-related activities during childhood, the respondents were queried if they had experienced each of the 18 listed activities ('yes' or 'no') during their childhood (≤ 12 years). Moreover, in order to examine the possible shift in nature-related activities between generations, the retrospective approach was employed in this present study as no longitudinal data on nature-related activities by children in Malaysia had been available. Despite of the limitations in the retrospective approach (e.g. inaccurate memory among those elderly), it was still employed to measure childhood nature experiences in some studies (e.g., Thompson et al., 2008; Wells & Lekies, 2006). Therefore, in order to retrieve more robust data across generations, the frequency or time period spent for each activity had been dismissed, but instead, this study only highlighted the experiences of respondents in relation to the listed activities. Besides, in line with the main objective, Chapter 3 taps into comprehending the changes that took place in the level of childhood nature-related experiences across generations during the period of rapid land use shift from 1960s until 2000s.

Furthermore, no longitudinal data is available on this issue, especially in the case of Malaysia. Hence, despite of the limitation in the retrospective approach, it had been used in its best way for this study. In addition, the 18 activities had been selected after a discussion was held with a panel of experts, including local environmental education researchers, as well as a webpage entitled 'Malaysia games without gadgets' (Traditional games in Malaysia, 2016). Besides, a preliminary survey was conducted before the main survey so as to ascertain that the activities were indeed relevant for all generations. As such, open-ended questions were posed to the respondents to add on to the nature-related activities. In specific, the activities that had been included reflected those with direct interactions with important nature elements, such as plants, animals, and soil.

On top of that, this study focused on wild animals as a biodiversity conservation instance, as animals can evoke strong positive or negative emotions in human. Therefore, animals had been used as an example to prevent confounding factors, which can also derive from plants, trees, and flowers due to their static and unaggressive nature. Besides, the list of wild animals employed in this survey is commonly found in the study region.

Data analysis

In identifying the common nature-related activities among present children and past generations in Malaysia, the percentage of respondents who had experienced each activity had been calculated. Next, in determining the influential factors of childhood experience, a generalized linear mixed model (GLMM) with binomial error distribution and log-link function had been applied. Moreover, the input response variables included experience (yes = 1, no = 0) or the total number of activities experienced (0: experienced none of the activities to 18: experienced all the activities). Besides, the fixed variables were gender (female = 0, male = 1), age (20–39 = young, 40–59 = middle-aged, ≥ 60 = old), and childhood setting (rural = 0, urban = 1). In fact, the age variable was divided into 3 categories, instead of using them as a continuous variable, primarily because the correlation between age and level of activities is often non-linear. Besides, a varying temporal trend had been hypothesized in the level of nature activities, thus justifying the inclusion of the interaction between age and childhood setting within the model. Furthermore, the random effects used were 'area ID', while the GLMM was performed with lme4 package in R ver. 3.1.2 (R Core Team, 2015).

3.2 Discussion

3.2.1 Sociodemographic profile

A total of 357 responses had been obtained, of which 180 from urban areas and 177 from rural areas. Next, females were accounted for 70% of the respondents among urban samples, while 50% from rural samples. Overall, 63% of the respondents grew up in rural areas during their childhood. In addition, the most common responses for each sociodemographic category are given in the following: middle-aged, had a child, moderate income (4,500–7,900 USD/year), and completed lower secondary school. As for ethnicity, 86% of the respondents were Malays, although only 60% of the total population had been Malays, while Chinese and Indians accounted for approximately 30% and 10% of the total population, respectively. Thus, it is important to note here that this study is biased towards those from the Malay ethnicity.

3.2.2 *Common nature-related activities during childhood*

Of the 18 nature-related activities embedded in the survey designed for adults (n=357), playing in rivers and waterfalls emerged as the most common activity (experienced by 84% of respondents), followed by observing animals (83%), collecting flowers and fruits (77%), collecting seeds and twigs (65%), as well as eating self-collected fruits (65%) (see Figure 3-1). On the other hand, collecting herbs and weeds (28%), catching frogs (26%), catching spiders (21%), and making boats from bamboo (16%) appeared to be the least common activities.

3.2.3 *Nature-related activities among school children*

Of the 18 listed nature-related activities embedded in the survey designed for school children, observing animals (experienced by 97% of the children), collecting flowers and fruits (95%), and playing in rivers or waterfalls (87%) had emerged as some common activities (see Figure 3-2). Contrary to the adult respondents, collecting herbs and weeds (71%) was relatively common among school children, when compared to the adults. Other than that, catching frogs (21%), making bamboo guns (19%), and making boats from bamboo (19%) appeared as the least common activities participated by the school children.

3.3 Sociodemographic effects on nature-related experiences

3.3.1 Common nature-related activities during childhood in Malaysia

As a result, the most common childhood nature-related activity in Peninsular Malaysia was playing in rivers or waterfalls. This is probably due to the tropical climate in Malaysia. Besides, children historically bathed in rivers near their houses almost every day (Lat Khalid, 2006), thus indicating direct contact with natural resources accessible near their homes. At present times, Malaysians have stopped using local rivers for daily baths, exceptional for recreational purposes. Moreover, waterfalls in forests and nature recreational spots (e.g., *Hutan Lipur*) have become important places for locals to gather, play, and swim during their leisure time, mainly due to the absence of admission fee for children under 12 years of age (Forestry Department Peninsular Malaysia, 2016).

Additionally, observing animals was another common childhood activity. Malaysian children often observed both domestic and wild animals. For instance, children loved playing with slingshots (*lastik*) targeted at birds and catching fireflies at night to take home (Lat Khalid, 2006). Furthermore, Malaysian children observed domestic animals, such as cows and other livestock, especially during the Islamic festival of *Eid al-Adha*. This festival is marked as most significantly by the conclusion of the annual pilgrimage to the holy city of Mecca (*Haj*), during which sacrificial-slaughtering (korban) of cows, goats, or buffaloes takes place in mosques and the meat is distributed to those needy (Nelly, 2012). Meanwhile, children in rural areas observed wild animals, such as monkeys, gibbons, squirrels, birds, bamboo rats, small rodents, civets, monitor lizards, turtles, tortoises, and frogs. Besides, these children eat fish, prawns, and crabs as well (Endicott & Bellwood, 1991).

Other than that, collecting flowers and fruits, as well as playing with seeds and twigs, appeared to be well-known nature-related activities among Malaysian children. Girls made paper dolls, designed clothes for their dolls, and played cooking games (*masak-masak*). At times, these children made pots and pans out of mud (Lee, 2014). Besides, they picked flowers, such as lotus (Lotus spp.), tanjung (Mimusops elengi), and frangipani (Plumeria spp.), besides collecting fruits, such as mangosteen (Garcinia mangostana) and bananas (Musa paradisiaca) (Abu Bakar, 2002). Furthermore, they fried bananas or boiled tapiocas in preparing meals for teatime (Lat Khalid, 2006) throughout the year. These children ate coconuts (Cocos nucifera), mangoes (Mangifera indica), rambutans (Nephelium lappaceum), jackfruits (Artocarpus heterophyllus), calamondins (Citrus microcarpa), and durians (Durio zibethinus) (Abu Bakar, 2002), as these fruit orchards were located in or near rural settlements.

On top of that, children explored for edible wild fruits, such as langsat (Lansium aqueum) or tampoi (Baccaurea bracteata) (Said, 2012) in forests, especially during the fruiting seasons. Other than that, these children used tree stems or branches to harvest fruits by tying them together with a string to make a pole (Said, 2012), whereas twigs from rattan or small pieces of bamboo were used to make fish traps (Lat Khalid, 2006). Meanwhile, seeds were gathered from rubber trees for traditional games. For instance, children then played a game using rubber seeds, where crushing the opponent's rubber seeds with their tougher rubber seeds had been the main objective of this game. Other popular traditional games, such as *congkak* or *batu seremban* also involved rubber seeds or small stones (Lat Khalid, 2006). Additionally, observing animals and playing with seeds or other plant elements were also popular among children from other nations, such as the United States (Wells & Lekies, 2006), Norway (Bjerke, Kalterborn & Ødegårdstuen, 2001; Bjerke & Østdahl, 2004), and Japan (Hosaka et al., 2017a), even though certain interactions with plants and wild animals differed greatly among various nations (Soga, Gaston, Yamaura, et al., 2016; Zhang et al., 2014). Hence, the common water- and tropical fruit-based activities experienced by Malaysian children could be regarded as significantly varied from Western and developed countries. In fact, the popularity of playing in rivers or waterfalls (almost daily in the past) and eating a variety of self-collected fruits had been considered as unique nature activities among children who grew up in tropical countries, such as in Malaysia.

3.3.2 Differences in nature-related experiences during childhood among respondents

The findings depicted that the younger adults had experienced fewer nature-related activities, in comparison to the older adults, except for climbing trees and participating in traditional outdoor games (see Table 3-1). This pattern was, in turn, unexpected as it differed from the findings obtained in other studies (e.g., Soga & Gaston, 2016). Nonetheless, a few possible explanations can be conjured for this exceptional scenario. First, this present study did not quantify the frequency of activities as it would be difficult for the respondents to provide accurate responses for activity frequency during their childhood, which, in some cases, could go up to 60 years ago. Moreover, even though those younger claimed to have had experienced most of the same activities, but they may vary in frequency. Second, the specifics of each activity may differ across generations, and this survey was not designed to tap into the details of each activity. For instance, it might be common for older generations to observe wild or livestock animals, whereas younger generations in urban areas might have observed pets or exotic animals only in zoos. As such, a more detailed analysis pertaining to the types of

activities, as well as interactions with animals and plants, is necessary to acknowledge the shifts in interactions with the nature among Malaysian children.

Furthermore, attitudes towards nature could have changed due to the improvisation that took place in the Malaysian education system. The Malaysian Ministry of Education has incorporated the Environmental Education Program into the Malaysian school curriculum since 1986 in both primary and secondary school syllabi (Aini, Nor Azura, & Fakhru'l-Razi, 2011), which has been aimed to enhance the awareness of environmental issues among children and to provide opportunities to interact with nature outdoors. As such, kindergartens and primary schools are becoming more important in providing nature experiences for children. Meanwhile, significantly fewer people who grew up in urban areas had experiences in six of the nature-related activities than those who grew up in rural areas. This suggests that childhood setting did affect the respondents' activities and experiences. Similarly, children from rural areas reported having more active involvement in nature-related activities than urban children from South Carolina, located at the United States (Davison & Lawson, 2006; Felton et al., 2002), and the United Kingdom (Ward 1988; 1990). Moreover, the significant interaction in the light of age and childhood settings points out that young and middle-aged people with urban childhood had fewer nature-related activities, as compared to those from rural areas (see Figure 3-3). This notion is consistent with the hypothesis outlined in this present study that natural environments are becoming less available to urbanites than those from rural, but other factors, such as parental concern about safety (Valentine & Mckendrickt, 1997), fear of crime (Sreetheran & Van den Bosh, 2015), and screen-based entertainment (Soga, Gaston, Yamaura, et al., 2016), could also affect a child's outdoor play. In fact, the combination of these natural and social environments in urban areas could possibly lead to a decline of experiences with the nature among Malaysian urban children.

Furthermore, approximately 70% of Southeast Asian children are actively engaged in mobile games during their spare time, compared to 56% in the United States. Besides, the Association of Southeast Asian Nations (ASEAN), including Indonesia, Singapore, Vietnam, Thailand, and Malaysia, children have begun displaying a shift in play trends, especially those in urban areas, where attraction to screen-based entertainment and gadgets (e.g., internet and online games) has escalated (Venture Beat, 2016). Hence, it is imminent to monitor such changes in children's experiences related to nature and how these changes affect their physical and mental health, as well as attitudes, towards the nature.

However, certain public spaces in Malaysia (Harun, Nor Zalina & Said, 1977) have been transformed into better play spaces by local stakeholders and state city councils (Latfi & Karim, 2012), thus

providing opportunities for direct contact with natural elements (e.g., plants, soil, and animals) and nature-related experiences for children in urban areas (Abdul Malek et al., 2015). Nonetheless, many urban parks in developing countries share similar designs with those in Western countries (Abu Bakar, 2002; Rabare et al., 2009; Abendroth et al., 2012). However, since climates, cultures, and popular nature-related activities differ in tropical developing countries, these public spaces and urban parks should be suitably designed by weighing in such factors. Thus, these findings suggest that childhood nature activities, such as playing in fresh water, observing animals, and collecting tropical fruits, are particularly popular among Malaysian children, and hence, spaces for such activities would likely be well-accepted by the local residents. However, several activities, such as tree climbing, fishing, and playing with silts, were less popular among urbanites, as compared to those from rural areas. Hence, creating spaces for these activities is essential to address the declining nature-related activities among children from urban areas.

3.4 Conclusion

This study appears to be the first to document common nature-related activities experienced during childhood in Malaysia. Playing in rivers or waterfalls, observing animals, collecting flowers and fruits, collecting seeds and twigs, as well as eating self-collected fruits, had been identified as the most common activities experienced during childhood. Although the percentage of respondents who experienced each activity did not differ significantly across generations, those from rural areas experienced more activities than those from urban areas. Hence, increment in urbanization and population density in urban areas may cause further decrease in such nature-related experiences. With that, developing urban parks and other public spaces to enable urban children to reconnect with the nature has emerged as a vital agenda for urban planning and environmental education in Malaysia; a tropical developing nation.

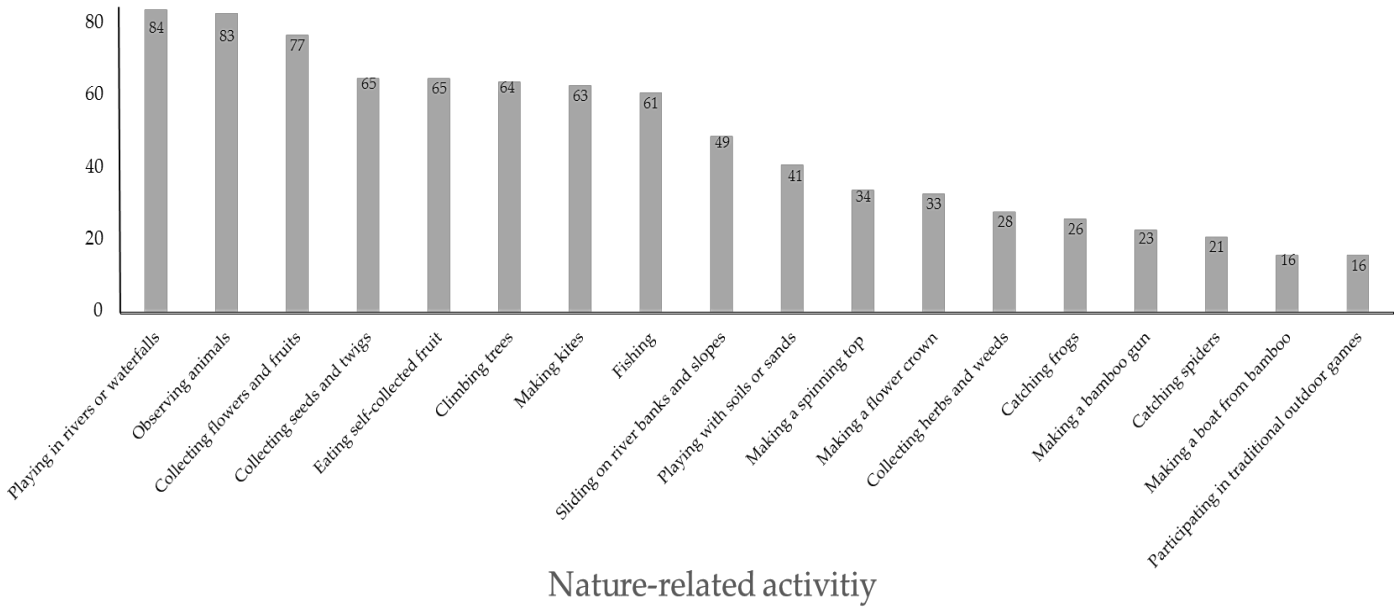


Figure 3-1. Percentages of respondents who experienced each activity during childhood (*n* =357).

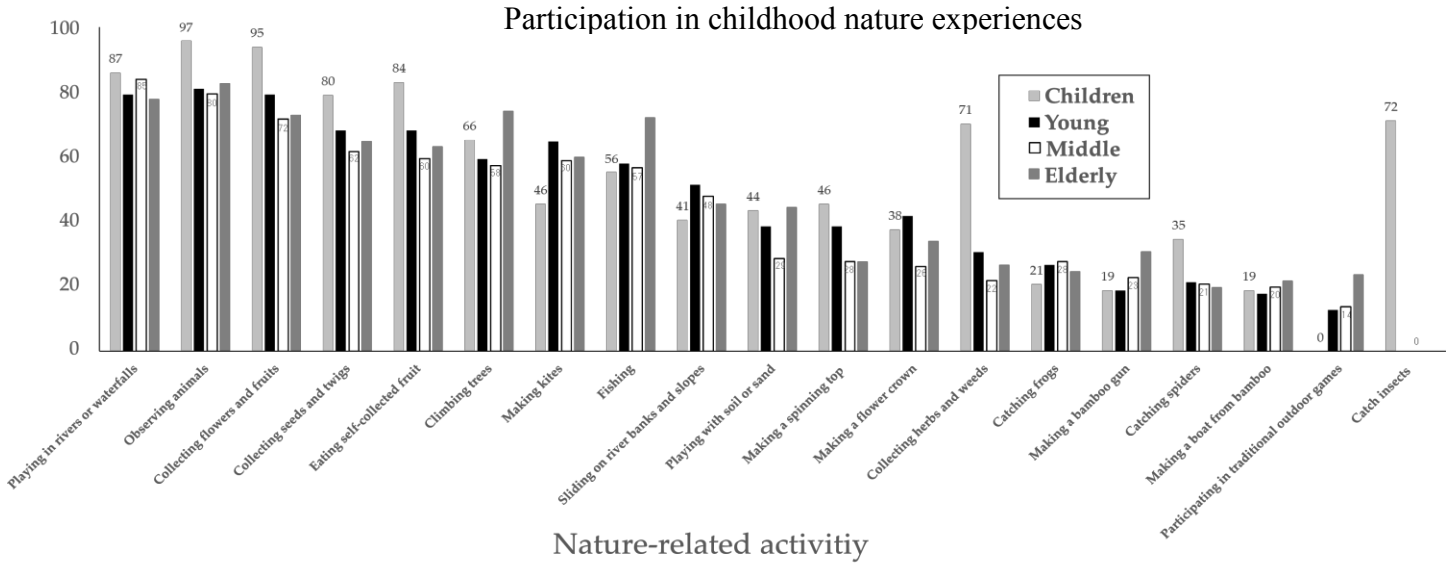


Figure 3-2. Percentages of present school children and adults who experienced each activity during childhood.

Table 3-1. Estimated parameter coefficients and standard errors (in parentheses) of the GLMM for relationships between experience in each activity and sociodemographic factors.

No	Nature-related activity	Constant	Gender (Male)	Childhood home (Urban)	Age		Age X childhood home (Interactions)
					Young	Middle-aged	
1	Observing animals	1.848** (0.841)	-0.082 (0.308)	0.478 (0.325)	-0.205 (0.444)	-0.599 (0.464)	0.209
2	Climbing trees	1.575** (0.588)	1.330*** (0.302)	-0.838*** (0.272)	-1.304** (0.443)	-1.033** (0.469)	-0.580**
3	Fishing	0.968** (0.348)	0.542* (0.247)	-0.687** (0.238)	-0.363 (0.373)	-0.576 (0.347)	0.438
4	Catching frogs	-1.409*** (0.351)	0.827** (0.261)	-0.068 (0.267)	0.118 (0.380)	0.015 (0.349)	0.103
5	Catching spiders	-1.699** (0.382)	0.792** (0.282)	-0.294 (0.293)	0.288 (0.409)	0.023 (0.380)	0.309
6	Collecting flowers & fruits	1.609* (0.628)	-0.091 (0.285)	-0.438 (0.295)	0.592 (0.415)	-0.027 (0.368)	-0.069
7	Eating self-collected fruit	0.506 (0.510)	0.298 (0.256)	-0.219 (0.257)	0.427 (0.365)	-0.095 (0.331)	-0.018
8	Collecting herbs and weeds	-0.803* (0.348)	0.072 (0.273)	0.036 (0.267)	0.030 (0.363)	-0.406 (0.340)	0.018*
9	Making a boat from bamboo	-1.944** (0.416)	0.799* (0.012)	-0.244 (0.332)	-0.247 (0.467)	0.028 (0.405)	-0.626
10	Making a spinning top	-0.881** (0.326)	0.612*** (0.249)	-0.382 (0.253)	0.569 (0.353)	-0.292 (0.332)	0.627
11	Making a flower crown	-0.204 (0.318)	-0.748** (0.255)	-0.451 (0.248)	0.134 (0.351)	-0.363 (0.334)	-0.513**
12	Making a bamboo gun	-1.530*** (0.435)	1.126*** (0.282)	-0.333 (0.296)	0.160 (0.388)	-0.293 (0.359)	0.333
13	Playing with soil or sand	-0.426* (0.308)	0.597** (0.236)	-0.279*** (0.249)	-0.004 (1.267)	-0.151 (1.184)	0.259

14	Collecting seeds and twigs	1.068 (0.572)	0.279** (0.109)	-0.190*** (0.055)	0.100 (0.077)	-0.014 (0.071)	0.165
15	Playing in rivers or waterfalls	1.926* (0.500)	0.417** (0.334)	-0.013 (0.333)	0.289 (0.428)	0.624 (0.411)	-0.063
16	Sliding on river banks and slopes	-0.418 (0.343)	1.039*** (0.248)	-0.246** (0.243)	0.039 (0.343)	0.001 (0.316)	0.272
17	Making kites	0.155 (0.389)	0.615* (0.256)	-0.249* (0.250)	0.503 (0.355)	0.157 (0.323)	0.171
18	Participating in traditional outdoor games	-1.607* (0.685)	1.032* (0.345)	-0.406 (0.340)	-0.515 (0.449)	-0.821* (0.402)	-0.458*
Total number of nature-related activities experienced		-0.199 (0.122)	0.456*** (0.056)	-0.251*** (0.056)	0.082 (0.078)	-0.137 (0.072)	-0.126***

*Significance: *** = $p < 0.001$; ** = $p < 0.01$; * = $p < 0.05$*

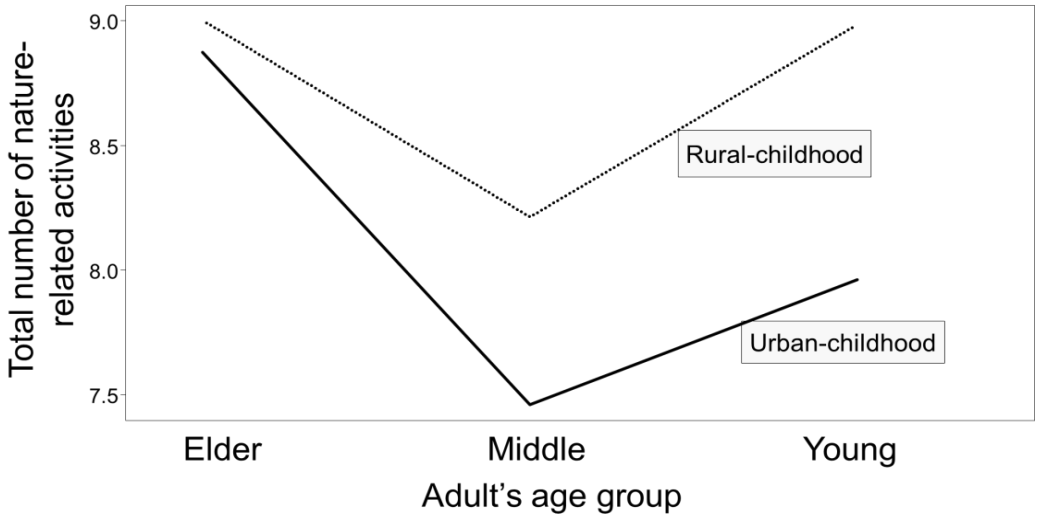


Figure 3-3. Interaction plot on age and childhood setting effects to nature-related experiences.

Chapter 4

Nature experience promotes public preference for and willingness to coexist with wild animals in Malaysia

Keywords: Extinction of experience, nature-based, perception, tropical biodiversity, urban biodiversity

4.1 Introduction

Apparently, as urbanization accelerates and urban population increases at the global scale, it is indeed important to protect and to create habitats for wild animals and plants in urban areas, along with the attempt to improve the quality of life among urban dwellers via ecosystem services (Dearborn & Kark, 2009). Ecosystem services met by urban biodiversity are diverse, such as provisioning, regulating, and supporting cultural services; as the well-recognized services are related to cultural ones, for instance, offering opportunities for recreation and improving psychological health (Soulsbury & White, 2015).

In addition, the very concept of biodiversity applies to all types of organisms, including those perceived by humans as favorable and unfavorable; in which such public preferences are known to have strong impacts upon the level of public support for species conservation projects (Martin-Lopez et al., 2007; Mir et al., 2015). Unlike conservation in protected areas far from human dwellings, urban biodiversity conservation promotes both people and wild animals to live together or close to each other. Nonetheless, an increase in interactions between people and wild animals could lead to an increase in human–wildlife conflicts (Hosaka & Numata 2016). As such, it is critical to comprehend public attitudes towards animals especially to gain wide support for urban biodiversity conservation.

Moreover, a substantial number of studies have documented public preferences towards animals at the global scale, displaying similarities and dissimilarities across nations and cultures. People generally exhibit preference towards species that are deemed esthetically pleasing, for example, birds, butterflies, and squirrels (Schlegel & Rupf, 2010; Bjerke & Ostadhl, 2004; Taylor & Signal, 2005), or charismatic megafauna, such as large mammals (Kellert, 1996; Kellert & Berry, 1981). In contrast, invertebrates are disliked (other than butterflies), for example, snakes or pests like mosquitoes and

rats (Bjerke & Ostadhl, 2004; Kellert, 1993; Soulsbury & White, 2016; Conover, 1997; Kaltenborn et al., 2006). However, the Japanese, uniquely, have been known to display a higher appreciation for insects, in comparison to those from other cultures (Hogue, 1987). Nevertheless, as for public perceptions of and preferences for wild animals within the Southeast Asia region, only a handful of studies have looked into such aspects (however, cf. Jenks et al., 2014; Baharuddin et al., 2013; Karuppannan et al., 2014; Nik Mohamad, 2011).

Furthermore, the animals that people are fond of may not be the same animals that people want to have or live nearby. For instance, many love elephants, but having them near residential areas can be disastrous. Therefore, attitudes towards animals and their associated problems have been investigated intensively in the context of tolerance (i.e., the level of acceptability towards the existence of wild animals or the problems they cause), rather than in the context of willingness to coexist with them (i.e., the level of willingness to live close to the animals). Furthermore, Inskip (2016) described tolerance as a 'passive acceptance of a wildlife population', whereas willingness to coexist refers to active acceptance of wildlife populations, which is relevant to the selection of flagship animals for urban biodiversity conservation.

Additionally, it is essential to understand the influential factors for affective attitudes (i.e., preference and willingness to coexist) towards wild animals in the attempt to design effective educational programs that can develop and enhance such attitudes. Other than the sociodemographic aspects elaborated in Chapter 1, levels of childhood nature experience can also generate affective attitudes towards wild animals because they often promote familiarity and psychological attachment towards nature (Bixler et al., 2002; Chawla & Derr, 2012).

Other than that, Kellert and Wilson (1993) proposed a biophilia hypothesis, where humans have an innate tendency to affiliate with living organisms, while Nabhan and St. Antoine (1993) further hypothesized that biophilia is triggered by experiences of nature at early developmental stages. In fact, several studies concerning children have supported these hypotheses, along with evidence that children involved in nature activities more frequently portrayed higher preferences towards wild animals than those who experienced nature less frequently (Zhang et al., 2014; Soga et al., 2016b). Nonetheless, the causal relationship between experience and attitude has remained vague from surveys carried out on children; thus suggesting uncertainty if more experience results in higher preference, or higher preference results in more experience. Furthermore, the long-term effects of childhood experience have continued to remain ambiguous. However, these shortcomings of surveys

on children can be addressed by performing adult surveys that probe into the correlations between childhood nature experiences and present attitudes towards wild animals. Moreover, comprehending the effect of nature experiences is an urgent issue because such experiences have been declining at the global rate due to rapid urbanization and modern lifestyle changes (Miller, 2005; Soga & Gaston, 2016).

In this study, Malaysians with more nature experiences during childhood (hereafter, Experience) was hypothesized to display more positive affective attitudes towards wild animals, in terms of i) likes and dislikes (hereafter, Preference), and ii) willingness to coexist (hereafter, Coexistence). Apart from Experience, this chapter explains several sociodemographic factors to control for their probable confounding effects upon attitudes, as well as to evaluate the relative significances of Experience and sociodemographic factors. Besides, a path from Preference to Coexistence had been presumed primarily because preference is often an important factor that affects attitudes towards wild animals, for example, tolerance (Hosaka et al., 2017a) and willingness for conservation (Soga et al., 2016b; Zhang et al., 2014; Martin-Lopez et al., 2007). With the outline of these objectives, a mediation model (see Figure 4-1) was developed and examined using the questionnaire survey data gathered from 357 Malaysian adult residents in and around Kuala Lumpur, the capital city of Malaysia. In precise, this study addressed the following research questions:

(i) Which wild animals do Malaysians prefer and wish to coexist with?

(ii) Do Experience scores affect Preference and Coexistence scores? If so, how strong are these effects compared to those of sociodemographic factors?

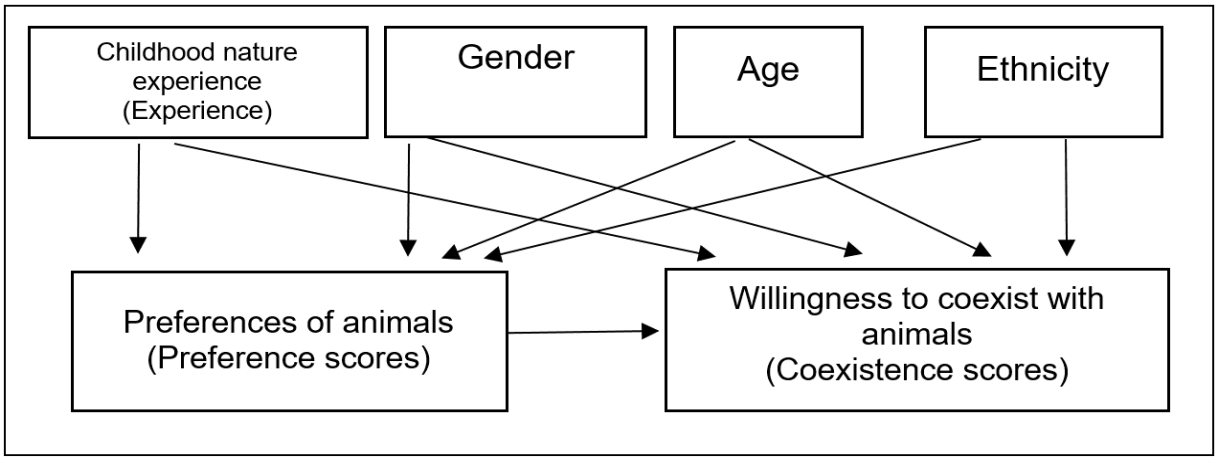


Figure 4-1. A hypothesized framework illustrating the relationships among childhood nature experience (Experience), sociodemographic factors (gender, age, and ethnicity), like or dislike of wild

animals (Preference), and willingness to coexist with wildlife (Coexistence). Preference was applied as a mediating factor between Experience and Coexistence.

Study areas

The study site focused in Peninsular Malaysia, as detailed in Chapter 2 (refer to adulthood survey procedure).

Data analysis

The mean scores of Preference and Coexistence for each animal were calculated. Next, a mediation analysis was carried out based on the hypothesized model (see Figure 4-1). For that purpose, the total number of activities the respondents had experienced (ranging from 0 until 18) had been applied as Experience scores. Other than that, the mean scores for Preference (0.0–5.0) and Coexistence (0.0–4.0) over all animals functioned as Preference and Coexistence scores for each respondent. In addition, Experience scores and several sociodemographic parameters (gender, age, ethnicity, education level, income, residential areas, and having children) were employed as explanatory variables, whereas Coexistence scores were denoted as the response variable, and Preference scores as the mediator. Nonetheless, several aspects, such as education, income, residential area, and having children, were excluded from this study due to their insignificant effects upon Preference and Coexistence scores. Next, in order to compare the effect sizes of the parameters, the standardized path coefficients had been computed. In assessing the level of significance for indirect effects, the standard error of estimated parameters of indirect effects had been calculated by using the bootstrap method (1000 iterations) (Rosseel, 2012; Zainuddin, 2015). Furthermore, the overall fit of the models was determined by the root mean square error of approximation (RMSEA) and comparative fit index (CFI). Meanwhile, goodness of fit (GOF) was determined based on the following criteria: RMSEA < 0.05, and CFI > 0.95. On top of that, a mediation analysis was performed with 'lavaan' package and 'sem' function (ver. 0.5–18) (Rosseel, 2012) in R (ver. 3.2.1). Moreover, as the effects of the parameters differed across the animal groups, those listed 22 animals were classified into 3 main groups (i.e., favorable, fairly unfavorable, and unfavorable) via cluster analysis (Ward method) based on Preference and Coexistence scores, which had been carried out similarly as the mediation analysis for each animal group.

4.2 Results

4.2.1 *Overall results*

A marked variation was noted in Preference and Coexistence scores among the 22 animal species (see Figure 4-2). The animals that gained the highest Preference scores were insects (e.g., butterfly, dragonfly, firefly, cicada, beetle, and cricket), and squirrels. On the contrary, animals with the lowest Preference scores included wild boar, rat, and bat. Similarly, the respondents assigned the highest Coexistence scores to insects and squirrels, while the lowest were given to boar, rat, and civet (see Figures 4-2 and 4-3).

In addition, Preference was positively linked to direct experience with nature (Figure 4-4). Besides, Malaysians with greater nature experience during childhood exhibited higher Preference scores (Pearson's $r = 0.13$, $p < 0.01$). Nonetheless, the Coexistence scores failed to correlate with direct nature experience ($r = 0.04$, $p = 0.49$).

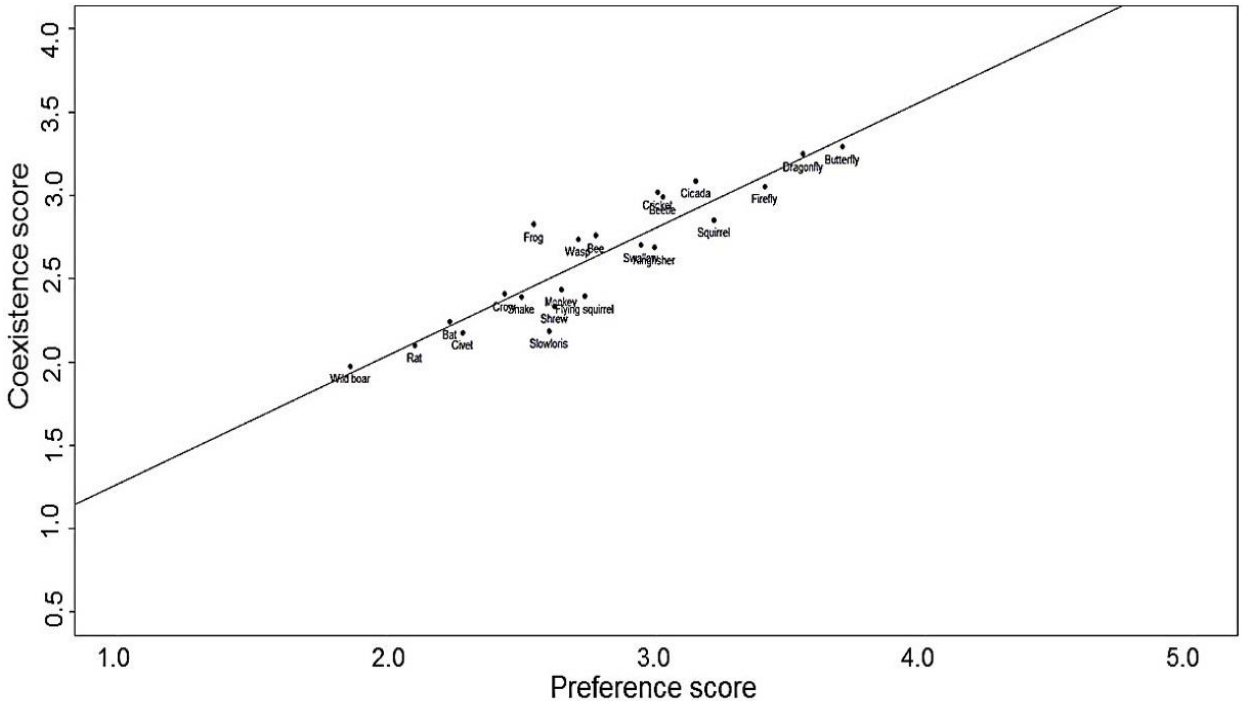


Figure 4 - 2. Preference and Coexistence scores for 22 wild animal species. The classification of species had been based on Ward's dendrogram of hierarchical cluster analysis (Clusters 1, 2, and 3) (see also Figure 4-3).

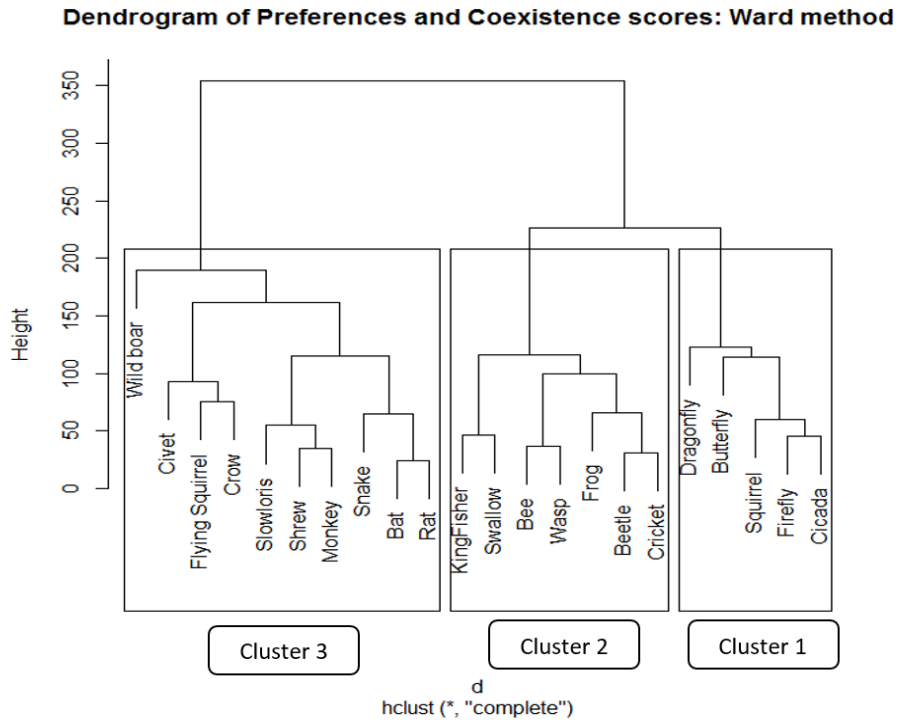


Figure 4- 3. Ward's dendogram of hierarchical cluster analysis performed on 22 animal species.

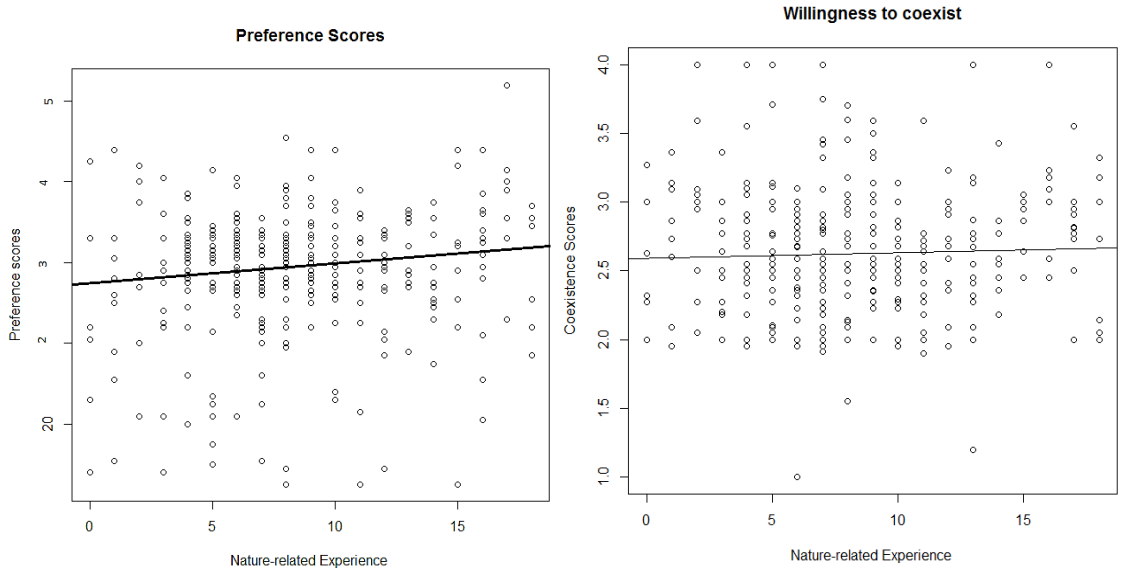


Figure 4-4. The correlations between childhood nature experience, as well as Preference and Coexistence scores. The linear regression line reflects the relationships between scores and nature experiences.

4.2.2 *Path analysis*

The hypothesized model exemplified a good fit with the data (RMSEA = 0.00, and CFI = 1.00) (see Figure 4- 5). Besides, no significant direct path was noted from Experience to Coexistence. Nevertheless, the aspect of Experience exhibited a significantly positive effect upon Preference, while Preference displayed a significantly positive effect upon Coexistence. With that, both the indirect and the total effects of Experience on Coexistence had been proven significant (see Table S 4-1).

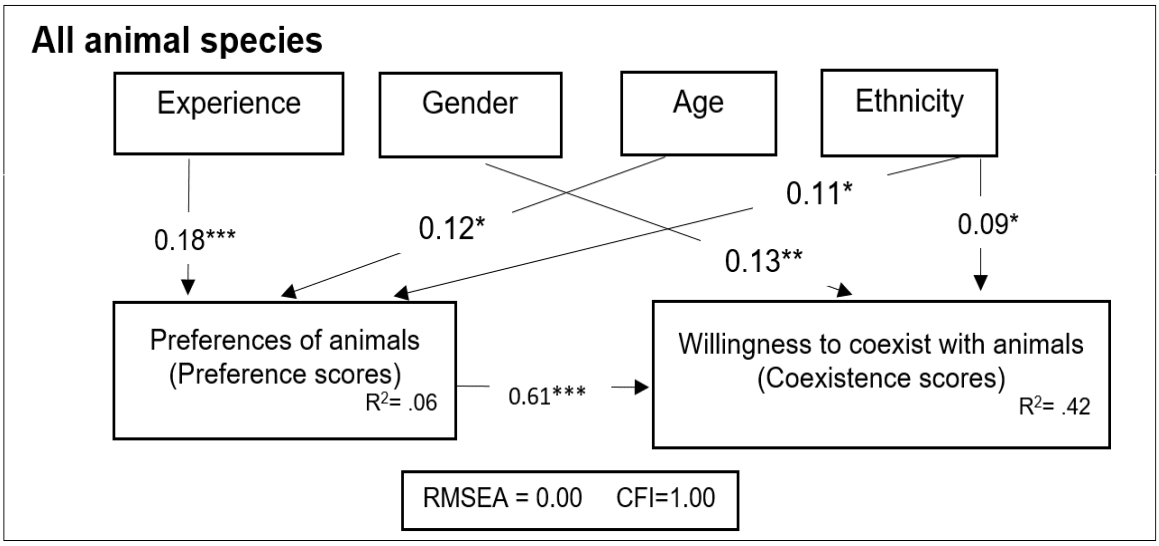


Figure 4-5. Model with standardized estimates (insignificant paths are not shown) estimating Preference and Coexistence using sociodemographic factors, such as sex (male = 1, female = 0), age, ethnicity (Malay = 1, non-Malay = 0), and Experience level. The asterisks indicate levels of significance (* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$).

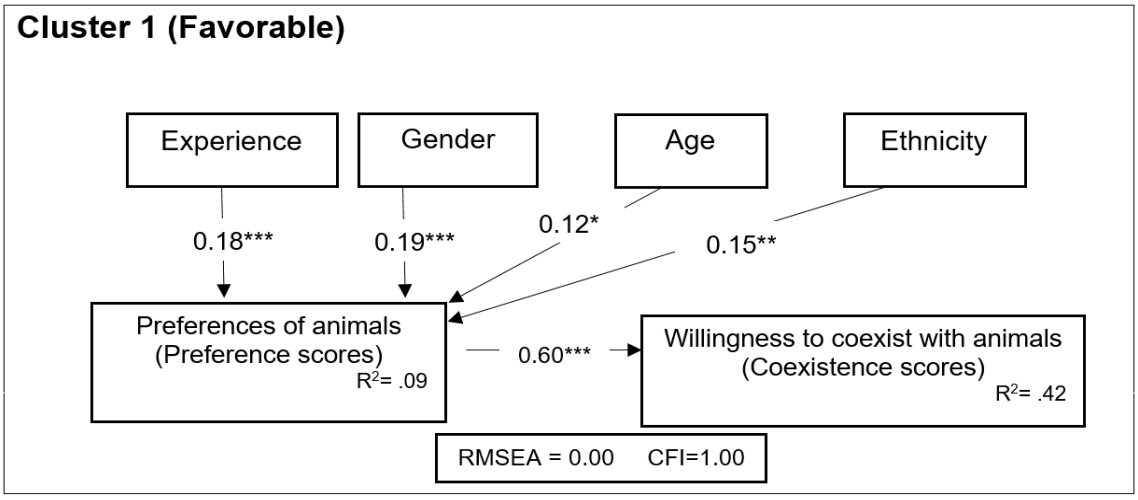
Among the explanatory parameters weighed in, Experience exhibited the strongest effect upon both Preference (Figure 5) and Coexistence scores (Table S1). Nonetheless, gender had no significant path to Preference, but a significant path was observed to Coexistence; whereas the males displayed more willingness to have wild animals nearby, when compared to females. In addition, both age and ethnicity showed positive paths to Preference; while those older and from Malay ethnicity preferred animals more than those young and non-Malays, respectively.

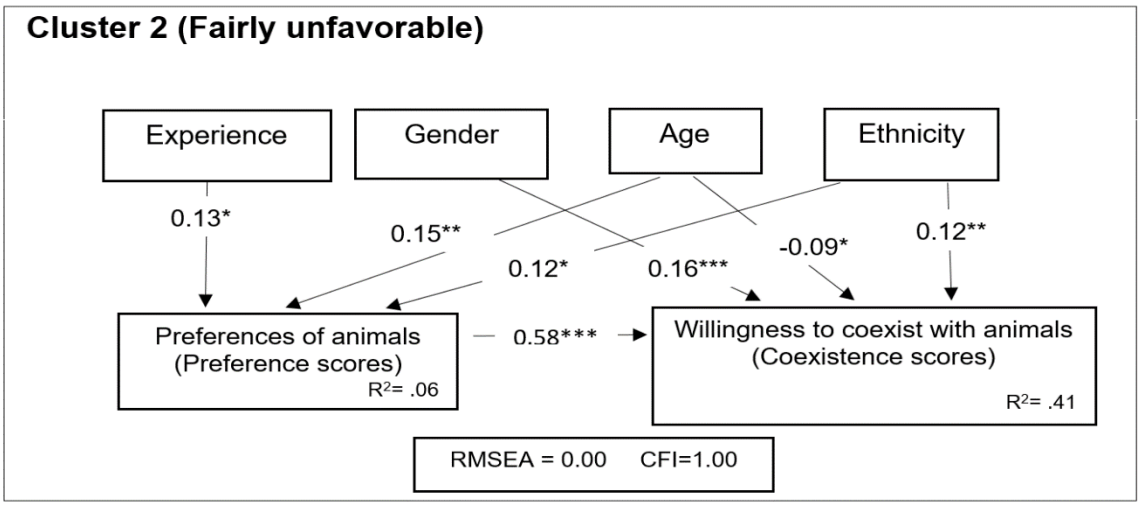
4.2.3 *Subgroup analysis*

All the 22 listed animal species had been grouped into three categories (see Figure 4-4), as given in the following: Cluster 1 consisted of insects (butterfly, dragonfly, firefly, and cicada), and squirrel, while Cluster 2 contained birds (swallow and kingfisher), insects (beetle, cricket, bee, and wasp), and frogs, whereas Cluster 3 was comprised of mammals (flying squirrel, shrew, slow loris, monkey, civet, bat, rat, and wild boar), snakes, and crow (see Figure 4-3). As for results, the mean scores for Preference and Coexistence had been the highest for Cluster 1 (Preference = 3.40, Coexistence = 3.11), followed by Cluster 2 (Preference = 2.88, Coexistence = 2.76), and Cluster 3 (Preference = 2.38, Coexistence = 2.24) (see Figure 4-3), in which the clusters indicated favorable, fairly unfavorable, and unfavorable animals, respectively.

Similar to the findings obtained for all the animals combined, Experience failed to show any significant direct path to Coexistence, but a significant effect was noted on Preference, whereas Preference displayed a strong effect upon Coexistence for all the clusters (see Figure 4-6). With that, the indirect effect of Experience upon Coexistence had been significant, although its total effect was found to be insignificant for Cluster 3 (see Table S1). In addition, the effects of sociodemographic factors displayed some variances among the clusters. For instance, males exhibited higher Preference scores for Cluster 1 and Coexistence scores for Cluster 2, in comparison to females. Meanwhile, age had a positive effect upon Preference for Clusters 1 and 2, but a negative effect on Coexistence for Cluster 2. Besides, the Malays had higher Preference scores for Clusters 1 and 2, while higher Coexistence scores for Cluster 2, as compared to those non-Malays. However, none of the sociodemographic factors showed a significant effect upon Preference or Coexistence scores for Cluster 3.

Furthermore, based on the standardized path coefficients, Experience had the strongest or the second strongest effect upon Preference for all the clusters. Additionally, the total effect of Experience had been comparable to those of other factors, even though gender displayed the strongest effect upon Coexistence for Clusters 1 and 2.





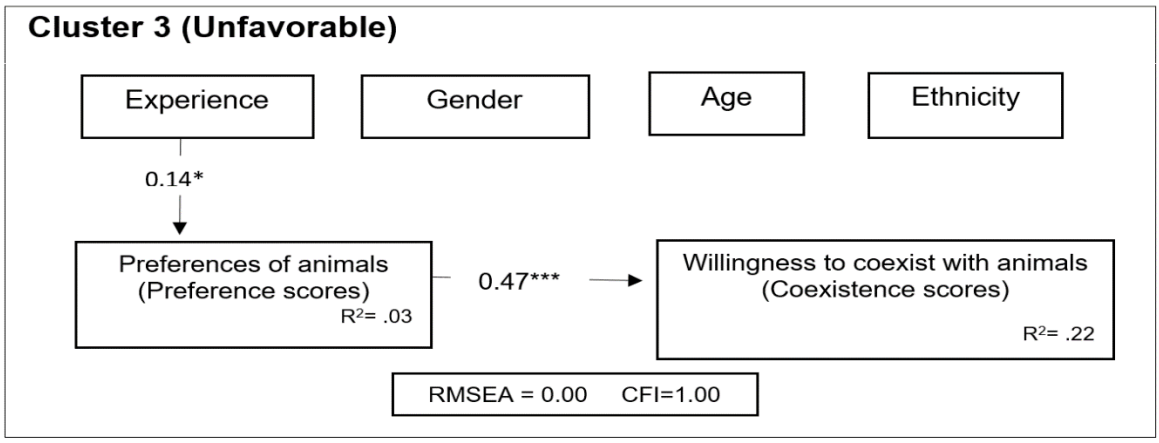


Figure 4-6. The best SEM (Clusters 1–3) with standardized estimates of parameters (insignificant paths omitted), estimating Preference and Coexistence for species grouped into Clusters 1, 2, and 3 (see Figures 4-2 and Table S 4-1). The asterisks indicate levels of significance (* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$).

4.3 Discussion

4.3.1 Preference for and willingness to coexist with wild animals

The most favorable animals among Malaysians had been revealed in this study, which are: insects, such as butterfly, dragonfly, and firefly, as well as squirrel. Other than those, preferences for butterflies and squirrels have been consistent with prior studies conducted in Norway (Bjerke & Ostadhl, 2004), America (Kellert, 1984), Japan (Soga et al., 2016b), and Slovakia (Prokop & Tunnicliffe, 2010). Even though insects, other than butterflies, have been generally deemed as unfavorable in western countries, Malaysians displayed preferences towards certain types of insects, which are consistent with findings obtained from Japanese studies (Hogue, 1987). In addition, as Coexistence scores were also high for these animals, insects appear to be perfect candidates for flagship species in Malaysian urban biodiversity conservation.

In contrast, the scores of Preference for birds were relatively low, although birds have often been the most popular animals (e.g., Norris & Pain, 2002; Schlegel & Rupf, 2010). Nevertheless, a past study revealed that small birds appeared to be the most favorable animals among Malaysian urbanites (Nik Mohamad, 2011). However, several types of birds, for instance, kingfishers, swallows, and crows, do not make positive representatives of 'small birds' for those from urban areas. This result might be partly due to the choice of bird species listed in the surveys. Hence, it is necessary to identify the popular bird species among Malaysian urbanites to be selected as apt flagship for bird species.

Furthermore, all mammals, except squirrels, received lower scores for both Preference and Coexistence. These results are inconsistent with those obtained by past studies, which revealed higher appreciation for large mammals in America and Germany (Kellert, 1996), as well as East Africa (Kaltenborn et al., 2006). Meanwhile, a previous study in Japan also found lower scores for Coexistence by the Japanese for mammals (Hosaka et al., 2017b). Therefore, a relatively positive attitude towards insects, whereas negative attitude towards mammals might be a characteristic among Asians.

Additionally, the reason for the lowest Preference and Coexistence scores directed towards wild boar had been mainly due to religious concern. As the Malays are predominately Muslims, wild boars and pigs are seen as taboo. Besides, wild boars are also known as pests that often cause damages to agricultural crops, and sometimes, injure people. For instance, the number of complaints regarding

boars appeared to be the second highest after the macaque, among the complaints filed against wild animals in Malaysia (Department of Wildlife and National Parks, 2015).

Furthermore, the number of species with Preference scores higher than the neutral point (average: 3.0) referred to only 7 out of the 22 listed species. Although it had been a challenging task to compare this result directly with those of other researches due to the variance in opted animals; 15 out of 21 species in Tanzania (Kalterborn et al., 2006), 11 out of 24 species in Norway (Bjerke & Østdahl, 2004), and 16 out of 29 species in Japan (Hosaka et al., 2017b) obtained Preference scores higher than the neutral score. Thus, Malaysians might have lower preference and appreciation for common wild animals than those from other nations.

Meanwhile, activities for both protection and sustainable use of biodiversity are typically focused on national parks and sanctuaries in Malaysia, but scarce in urban or suburban areas with several exceptions, for instance, firefly conservation in Kuala Selangor (Nada & Kirton, 2004). Hence, these findings are deemed useful in selecting flagship animals in urban areas located in Malaysia.

4.3.2 *Factors affecting preference and willingness for coexistence*

Moreover, this study discovered that Experience had a significantly positive effect upon Preference and Coexistence scores for all animals combined. This is, in fact, consistent with the results of past studies, which showed that childhood nature experience was positively correlated with preference towards animals among children (Zhang et al., 2014; Soga et al., 2016b). This study further demonstrated that the effect of nature experiences in childhood did persist until adulthood, which also supports the hypothesis that biophilia is triggered by nature experiences during childhood (Nabhan & St. Antoine, 1993).

Besides, the results in this study are consistent with the extinction of experience hypothesis (Miller, 2005), where those with fewer contact with the nature displayed little interest towards the natural world. A consequence of this could lead to degradation of local and global natural environments and biodiversity. Thus, providing urban residents and children, especially, with chances to interact with nature must be made a high priority in urban biodiversity conservation events.

Apart from Experience, gender, age, and ethnicity also did affect Preference scores. Males displayed higher Preference and Coexistence scores, compared to females, which is consistent with studies across the globe, including in the United States (Kellert, 1993), Norway (Bjerke & Østdahl, 2004), Tanzania (Kaltenborn et al., 2006), China (Zhang et al., 2014), and Japan (Soga et al., 2016b). Moreover, the higher preference scores by those elder, as compared to those younger, for favorable animals (i.e., small birds and insects) are consistent with studies performed in Norway (Bjerke & Østdahl, 2004) and Japan (Hosaka et al., 2017b). Older people also indicated lower Coexistence scores to fairly unfavorable animals. Higher preferences for favorable animals, but lower willingness to have the animals nearby among older people might reflect their utilitarian values upon wild animals (Kellert, 1996). The results also showed that the Malays preferred like wild animals than the Chinese and the Indians. This is probably because the Malays were historically settled in rural areas than those non-Malays (Evers, 1977), thus exhibiting greater psychological attachment towards natural landscape and wild animals. However, further study is required to confirm this conclusion because only a small number of non-Malay respondents (n = 51) had been involved in this study.

Even though Experience emerged as an important factor in estimating Coexistence scores, it had only indirect effects upon Preference, hence indicating that the positive effect of Experience was not transmitted directly to Coexistence, but in an indirect manner, which is via positive shifts in

Preference. Similarly, past studies have exhibited a lack of direct effects of nature experience upon willingness to promote biodiversity conservation (Zhang et al., 2014; Soga et al., 2016b), pro-environmental commitment (Müller et al., 2009), and tolerance towards wild animals when they caused problems (Hosaka et al., 2017a), pointing out that childhood nature experience alone may not be sufficient to promote stronger public affective attitudes (e.g., approval of conservation and coexistence) towards nature and wild animals if experiences do not contribute to Preference. Furthermore, Preference was not the sole determinant of Coexistence, as people also considered the nuisances, risks, and costs involved with those animals habituating nearby. This is particularly evident for unfavorable animals, where Preference exhibited low path coefficients to Coexistence, while Experience had insignificant effect upon Coexistence.

With that, a question is raised, 'How then can public acceptance be promoted towards unfavorable animals?' In fact, several studies have shown that public information campaigns and educational programs have successfully changed public attitudes towards unfavorable animals, for instance, snakes (Ballouard et al., 2012), toads (Tomazic, 2011), and tarantulas (Kawahara & Pyle, 2013). Besides, people need to be educated on how to avoid problems caused by animals with appropriate information about risks because perceived risk is often higher than the actual risk (Dickman, 2010; Hudenko et al., 2010). Furthermore, lower acceptance among older people than younger people, as well as among females than males, has been reported in prior studies (Sakurai et al., 2014; Butler et al., 2003; Siemer et al., 2009), thus reflecting their concerns due to the lack of power and knowledge to deal with problems. Moreover, educational programs for older people and females might be effective in promoting public willingness to coexist with wild animals in Malaysia.

4.4 Conclusion

Encouraging children to interact with the nature can effectively promote public preferences towards wild animals, which, in turn, could promote willingness to coexist with the animals. Nevertheless, increment in childhood nature experiences alone may not be sufficient to promote public willingness to coexist with wild animals in urban areas. Thus, in order to promote biodiversity conservation programs, effective strategies must be devised to increase acceptance of wild animals via relevant environmental education and public communication, as well as opportunities for nature activities meant for children.

Table S 4-1. The standardized path coefficients for direct, indirect, and total effects on willingness for coexistence (Coexistence) towards animal species (see Figures 4-4 and 4-5). The level of significance was *p <0.05, **p<0.01, *** p<0.001.

All species (22 species)	Direct (c)	Indirect (axb)	Total effect [(axb)+c]
Experience	0.056	0.107**	0.163**
Gender	0.125 **	0.025	0.150**
Age	-0.061	0.075 *	0.014
Malay	0.094*	0.059	0.153**

Path Cluster 1 (5 species)	Direct	Indirect	Total effect
Experience	0.079	0.108***	0.187***
Gender	0.084	0.112***	0.196***
Age	-0.034	0.071*	0.037
Malay	0.072	0.087**	0.159**

Path Cluster 2 (7 species)	Direct	Indirect	Total effect
Experience	0.092	0.075*	0.167**
Gender	0.156***	0.028	0.184***
Age	-0.089*	0.088**	-0.001
Malay	0.118**	0.071*	0.189***

Path Cluster 3 (10 species)	Direct	Indirect	Total effect
Experience	0.007	0.065*	0.072
Gender	0.013	-0.003	0.010
Age	0.004	-0.003	0.001
Malay	0.097	-0.050	0.047

Chapter 5

The importance of nature-related experiences on school children's preferences for and willingness to coexist for nature conservation

5.1 Introduction

The benefits of nature contact for children includes health and well-being (Miller, 2007), as well as social and skills development (Maller, 2009). In fact, the psychological nature develops a biophilia innate, which is significant for development among children (Wilson, 1984). Hence, studies concerning children focused on nature experience and conservation attitudes have been broadly carried out in Western countries, such as Norway (Bjerke, 1998), China (Zhang et al., 2014), Japan (Soga et al., 2016b), and Portugal (Almeida, Vasconcelos, & Strecht-Ribeiro, 2014).

In fact, some of such studies have supported the hypothesis that children involved in nature activities frequently displayed higher preference towards wild animals than those who did less frequently (Zhang et al., 2014; Soga et al., 2016b). Through daily contact with nature, involvement at an early age could strengthen the children's emotional bonds with, passion in, and concern for the natural environment (Chawla, 1988, 2009; Collado, Staats, & Corraliza, 2013).

Besides, the direct experience involves actual physical contact with the natural settings and non-human species, which refer to the spontaneous play in forest, creek, neighborhood park, backyard, or even a vacant lot (Kellert, 2002). The direct and indirect (vicarious) experiences gained by children could lead to an essential pathway towards shaping environmental attitudes and behaviors in adulthood (Wells & Lekies, 2006). However, these direct and indirect nature experiences, as detailed in Chapter 1, have pointed out several changes as a consequence of rapid urbanization and land use changes (Sodhi et al., 2004), crime (Sreetheran & Van den Bosh, 2015), and parental concern regarding outdoors safety (Valentine, Mckendrickt, Valentine, & Mckendrick, 1997), which have led constriction in opportunities and orientations for direct nature experiences (Soga & Gaston, 2016).

Furthermore, in the modern and urbanized cultures, children have become more exposed to vicarious experiences. 'Virtual nature' is defined as 'nature experienced vicariously via electronic means'. In fact, screen-based entertainment has become a vital experience among children, thus generating a decrease among children to have direct contact with nature (Zaradic & Pergams, 2007). Besides,

frequent contact with virtual nature experiences tends to sensationalize nature's hazards and habitats, hence generating the perception that local natural areas are simultaneously dangerous and lackluster (Zaradic & Pergams, 2007). Furthermore, Bixler and Floyd (1997) asserted that the negative perceptions of wild nature had been related to the lowest preference for wild nature, while those with higher disgust sensitivity and with desire for modern comforts displayed less preferences for wildlands, but more preferences for indoor, built, and human-modified environments. Meanwhile, as for long-term implications, children having less contact with direct nature could consequently face some threats in mental, health, and well-being aspects (Maller et al., 2010; Maller, 2009), social skills (White, 2004), as well as a decrease in their emotion affinity to have had feeling in nature, thus leading to disaffection upon biodiversity conservation (Miller, 2005).

Furthermore, over the last century, Malaysia, being one of the 12 megadiverse nations at a global scale, has been facing rapid changes from one dominated by natural landscapes to agricultural landscapes. As a developing and urbanizing country in the Southeast Asia region (Global Diversity Outlook, 2001), within the last 50 years, the forested area of Peninsular Malaysia has declined from 73% in late 1960s to 44% in 2001 (Abdullah & Nakagoshi, 2006; Vincent & Hadi, 1993). The land had been converted to agricultural areas mainly for rubber and oil palm plantations, which increased from 1% to 3% and 24% to 51%, respectively (Abdullah & Nakagoshi, 2006). Moreover, the rapid physical development activities in the future could affect about 15,000 species of vascular plants in Malaysia, 307 species of mammals, 785 species of birds, 242 species of amphibians, 567 species of reptiles, as well as 2,068 species of freshwater and marine fishes (National Policy on Biological Diversity 2016 – 2025, 2016). Nevertheless, the last decade of the century witnessed urbanization that began having an impact upon the growth of urban population, which expanded from 19.0% in 1950 to 28.4% in 1970, and 62.0% in 2000 (Yaakob et al., 2010). Hence, its population grew from 6.5 million in 1957 to a whopping 22 million in 2000 (Yaakob et al., 2010).

Economic development that promotes urbanization results in rapid housing expansion. However, the health and well-being of communities are often dismissed in urbanization due to pressure towards developing better economies. Hence, continuous urbanization and industrialization, indirectly, lead to tensions between the need for a better built environment and the push for economic growth. One specific phenomenon in Malaysia is the introduction of the mixed-use urban neighborhood, where residential development is nestled within industrial establishments. As availability of natural environments is a key aspect in enabling children to interact with nature (Maller, 2009), the rapid

changes in land use and urbanization that took place from 1960 to 2000 have likely caused negative preferences to natural landscape and wild animals in Malaysian school children.

Children preference towards natural landscapes

Landscape preferences have been widely discussed in the area of landscape planning and environmental psychology. Besides, a growing body of studies has proven that individuals' affective attitudes concerning nature play a key role in the decision-making process pertaining to biodiversity conservation and wildlife management (Herzon & Mikk, 2007; Martin-Lopez et al., 2007, Johansson et al., 2012; De Pinho et al., 2014). Furthermore Ulrich (1986) claimed that most of the reviewed works were concerned about preferences for natural landscapes, forests, urban versus natural scenes, as well as the importance of vegetation in urban landscapes. Meanwhile, worldwide researchers have looked into cultural and sub-cultural (Buhyoff & Wellman, 1983; Talbot & Kaplan, 1984; Tips & Savasdisara, 1986a,b,c; Kaplan & Herbert, 1987; Yang & Kaplan, 1990; Yu, 1995), ethnicity (Kaplan & Talbot, 1988), and group (Buhyoff et al., 1978; van den Berg et al., 1998; Brush et al., 2000) variances in preference. Moreover, several factors, such as personality (Macia, 1979; Abello & Bernaldez, 1986), environmental orientation (Kaltenborn & Bjerke, 2002), and education background (Kent, 1993) have been reported to influence preference.

Bearing in mind that understanding people's perceptions of, and attitudes to, landscape is important because in time, they could influence their behaviors towards them in varied circumstances. In fact, even researchers have acknowledged that sometimes, people act and think in a contradicting manner (Ajzen & Fishbein, 1980, p. 239). Understanding young people's environmental attitudes, hence, is essential because in time, they will face environmental issues and require the skills and disposition to work on resolutions in addressing the problems (Bradley, Waliczek, & Zajicek, 1999).

However, quantitative studies have mainly focused on adults, while assessing children's attitudes towards built and natural environment has remained scarce. Besides, children's affinity for natural environment has been widely expressed in the United States, Brazil, and New York (Chawla, 1988; Bizerril, 2004, Korpela, 2002; Moore, 1986; Sobel, 1993; Sebba, 1995), and showed that children with frequent exposure to the natural environment gained beneficial effects on their psychological or cognitive well-being in relatively short-term (Faber Taylor et al., 1998; Faber Taylor, Kuo & Sullivan, 2001, 2002; Wells, 2000; Wells & Evans, 2003).

On top of that, Bixler, Floyd, and Hammitt (2002) looked into the correlation between play environments prior to age ten and adolescents' environmental preferences within the domains of education, recreation, and work. The findings supported the notion that childhood play location did affect later interests in wildlands, environmental preferences, outdoor recreation, and occupations that involved outdoor environments.

Meanwhile, Taylor, Kuo, and Sullivan (2002) examined parent ratings of the naturalness of the view from home, which had been used to predict children's performance on several tests of concentration, impulse inhibition, and delay of gratification. The findings suggested that, for girls, green space immediately outside home could help them to lead more effective and self-disciplined lives. As for boys, perhaps more distant green spaces are equally important. Besides, the children's home setting could also influence landscape preferences, especially in central urban neighborhood, which could be most intensively affected by the increasing traffic and lack of social safety. Hence, urban children get less opportunity to play outside and explore their neighborhood independently (Kytta, 1995; van der Spek & Noyon, 1993).

Moreover, in the wake of urbanization growth, urban dwellers have increased desires for recreation and landscape experiences (Boll, Haaren & Ruschkowski, 2014). In a social survey among Hamburg residents (n = 400), the study found that both outdoor recreation within and outside of the city had been fairly or very important for more than 70% of the questioned urban dwellers. Interestingly, preference for a recreation area outside of the city did not depend on the frequency of use, which indicated that certain recreation areas had a symbolic value besides their use value. Moreover, the main features of the recreation areas were perceived naturalness, which had been strongly related to preference. The respondents considered the diversity, the uniqueness, and the naturalness of the landscape to be far more important than the accessibility of the recreation areas and the provision of service facilities.

Other than that, O'Brien and Murray (2007) discovered that childhood effect was linked to childhood contacts with nature and early environmental education to adulthood perception of UGS. Besides, nature education provides children with more opportunities to interact with nature, such as studying wildlife, tree planting, and gardening. As such, forest and nature schools established in other nations could offer valuable references for Chinese cities, for instance. Thus, measuring children's attitudes towards natural landscape preferences can support the awareness among children concerning

biodiversity conservation, which later could enhance their willingness to conserve it and show pro-environmental behavior.

Children preferences towards wild animals

Besides, it is significant to understand the factors that could influence landscape preferences and affective attitudes (i.e., preference and willingness to coexist, in this study) towards wild animals, in the attempt to design effective educational programs, which could enhance such attitudes. In fact, studies from other nations, such as Japan (Todorova, Asakawa, & Aikoh, 2004), the United Kingdom (Özgüner & Kendle, 2006), China (Jim & Shan, 2013), the United States (Jenkins et al., 2015), and Malaysia (Mansor & Said, 2008; Nor Akmar, 2012), have revealed that the correlations between individual factors (e.g. age, education, gender, race/ethnicity, personal experiences, and companions) and environmental factors (e.g. physical, cultural, and political environment) could influence landscape preferences. Meanwhile, attitudes towards animals have been known to vary greatly based on sociodemographic factors (Dickman, 2010; Kellert et al., 1996), including age (Sakurai et al., 2014), gender (Kellert & Berry, 1987; Herzog, 2007), ethnicity (Bencin et al., 2016), residential area (Lindsey et al., 2005), pet ownership (Tore Bjerke, Østdahl, & Kleiven, 2003), and socioeconomic level (Ogra, 2008; Lüchtrath & Schraml, 2015).

Moreover, numerous studies have explored the effects of being in natural areas upon adults and children's health, well-being, as well as environmental concern. Nonetheless, the combined effects of direct and vicarious experiences upon landscape attitudes, as well as preferences for and willingness to coexist with wild animals, have remained underexplored in developing countries, such as Malaysia. Both landscape and wildlife have a prominent function in providing opportunities and motivation for people to be in nature.

For instance, middle and high school students who had played in wild environments exhibited more positive perceptions towards natural environments, outdoor recreation activities, and future outdoor careers (Bixler et al., 2002). Nevertheless, at the same time, young children have become increasingly separated from the natural world as their access to the outdoor world is diminishing. The importance of school and prior-to-school settings in connecting children with nature has been acknowledged. Some benefits that children can gain from engaging with the nature, according to Dowdell, Gray, and Malone (2011), are that natural environments support children's imaginative play, the development

of positive relationships, and allow for the environment to become a place of learning. Therefore, in order to generate effective use of outdoors, early childhood centers need to provide children with access to the natural environment and teachers should support children to develop a relationship with the nature (Dowdell et al., 2011).

Thus, it is vital to understand the types of nature that children mostly prefer. In order to comprehend the stewardship of future generations, the perceptions of the present children (hereafter known as Preference) and their willingness to coexist (Coexistence) are important to measure their levels of biodiversity support. Moreover, children's attitudes towards the nature can act as a foundation for the expression of further environmental capabilities in the future.

Research objectives and research questions

This study had hypothesized that the children at present times, even in Peninsular Malaysia, experienced vicarious experience than direct nature experience. In order to test this hypothesis, a questionnaire survey was carried out among 401 school children around Kuala Lumpur pertaining to their experience with nature-related activities. Given that other factors, such as gender, ethnicity, and their school locations or environments, could be associated with experiences of nature-related activities, various sociodemographic factors had been embedded in the questionnaire to control possible confounding effects. With that, the following research questions had been addressed:

(i) Which is frequently experienced by Malaysian school children; direct or vicarious nature-related experience?
(ii) Do nature-related experiences (i.e. direct or vicarious) and sociodemographic aspects have an influence upon children's landscape preferences or attitude?
(iii) Do nature-related experiences influence the preferences (collectively termed as perception) and the willingness to coexist with wild animals among Malaysian school children?

Study areas

The study site had been mainly focused within Peninsular Malaysia, as detailed in Chapter 2 (Chapter 2.3; survey procedure for school children).

Data analysis

In the attempt to answer the first question, the frequencies of both direct (18 nature activities) and indirect experiences (8 activities) scores were determined. The indirect experiences in this chapter refer to the frequency of children visiting nature-based places (i.e. forest, beach, and river), as well as places related to nature, such as zoo or aquarium. The responses were scored on a 4-point scale (1 = never, 2 = seldom, 3 = sometimes, 4 = often), where the details that these items roughly corresponded to 'less than once a month', 'almost every month', 'almost every week', and 'almost every day', respectively. Furthermore, the mean values of 18 items and 8 items had been applied as measures of frequencies for direct (Cronbach alpha = 0.76) and indirect experiences of nature, in which internal consistency was acceptable (Cronbach alpha = 0.65). Next, in calculating the mean values for vicarious experiences, the total scores of the three questions were calculated. Then, the sum of the scores for vicarious experience was divided by the three items. The mean values for vicarious experiences ranged from 1 to 4.

Next, in the attempt to answer the second question, the mean scores for each of the six main landscapes were calculated. As a result, varying scores were obtained for forest, rubber estate, oil palm plantation, paddy field, urban cities, and urban recreation park landscapes. Then, the generalized linear mixed models (GLMMs) had been applied to identify the effects of the landscape preferences and the nature-related experiences. As such, the mean scores of landscape preferences were used as the response variable. Meanwhile, the explanatory variables were comprised of sociodemographic factors (gender, age, and ethnicity), school locations (urban and rural), and both nature-related experiences (direct and vicarious). Besides, the respondents' IDs were used as random effect. As for the third question, the GLMMs had been applied again to determine if the effects of nature-related experiences influenced the preferences towards (collectively termed as perception) and willingness to coexist with wild animals. Other than that, several sociodemographic factors were investigated to control their possible confounding effects upon conservation attitudes (e.g., preferences and coexistence), such as gender, ethnicity, and the location of schools.

Furthermore, in measuring children's preferences towards and willingness to coexist with each animal species, three questions were posed and their responses were scored on a 3-point scale. Instances of the questions are: (1) 'Do you like this animal species?' (1 = like, 0 = no feeling, -1 = dislike); and (2) 'Are you happy if this animal species is around you?' (1 = happy, 0 = no feeling, -1 = unhappy). The mean values of these items (Cronbach alpha = 0.79) were used to measure the children's

preferences towards wild animals. Moreover, the scores for preferences towards wild animals (hereafter, Preference scores) ranged from -22 to 22. In measuring children's willingness to coexist with animals, they were also asked if they would be happy if they lived closer to the animals (1= happy, 0= no feeling, -1= no). The scores for willingness to coexist with animals (hereafter, Coexistence scores) also ranged from -22 to 22. The mean values of these items (Cronbach alpha = 0.80) were used to measure the children's willingness to coexist with wild animals.

For each child, both Preference and Coexistence scores associated with each animal species had been calculated by the average scores of the school children's Preference and Coexistence scores (-1, 0, 1) for each in a separate manner. Preference and Coexistence scores for animal species both ranged from -1 to 1.

Next, in order to measure school children preferences towards nature landscapes, they were given a colored photograph with six main landscapes found in Peninsular Malaysia. This photograph approach had been adapted from several prior studies, such as that employed in German (Hofmann et al., 2012) and Michigan (Kaplan & Talbot, 1988). The selection of pictures was obtained from a list of main nature land use in Peninsular Malaysia, which ranged from forest, agricultural, and human-modified landscapes (Abdullah & Hezri, 2008). In fact, the 8 main places selected reflected the common places visited by the children in the Peninsular Malaysia region. Furthermore, these school children were asked to respond to the photographs that comprised of a variety of urban and natural areas, including forest, paddy field, oil palm, rubber plantation, urban cities areas, as well as well-manicured park settings, such as urban recreational park.

In addition, each picture differed in color, angle, and quality of image. Besides, the respondents were given three different pictures for each nature landscape to minimize the aspect of biasness. The related question for the nature landscapes section is: 'Do you like this nature landscapes?'. The related responses were recorded based on a 3-point scale (0= dislike, 1=no feeling, 2=like). After that, the mean values for nature landscapes preferences items had been employed to measure the children's affective attitudes toward landscapes. Each child's response for preference towards landscapes ranged from -1 to 1.

5.2 Results

5.2.1 Frequency of nature-related experience

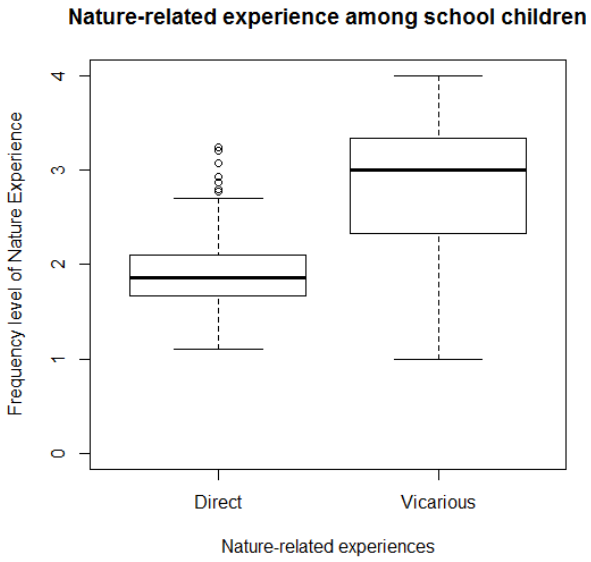


Figure 5-1. Nature-related experiences among Malaysian school children (n=401).

The results showed that vicarious emerged as the most frequent nature-related experience among Malaysian children (Figure 5-1). A majority of the school children experienced often frequently vicarious activities, such as reading books or watching television about nature or wildlife programs, talking with parents or friends about nature or wildlife, and playing games related to nature, instead of having direct contact with the nature itself. Besides, the direct and vicarious experiences displayed by the respondents were positively correlated to each other (Pearson's $r = 0.41$, $p < 0.001$).

5.2.2 Preferences for natural landscapes

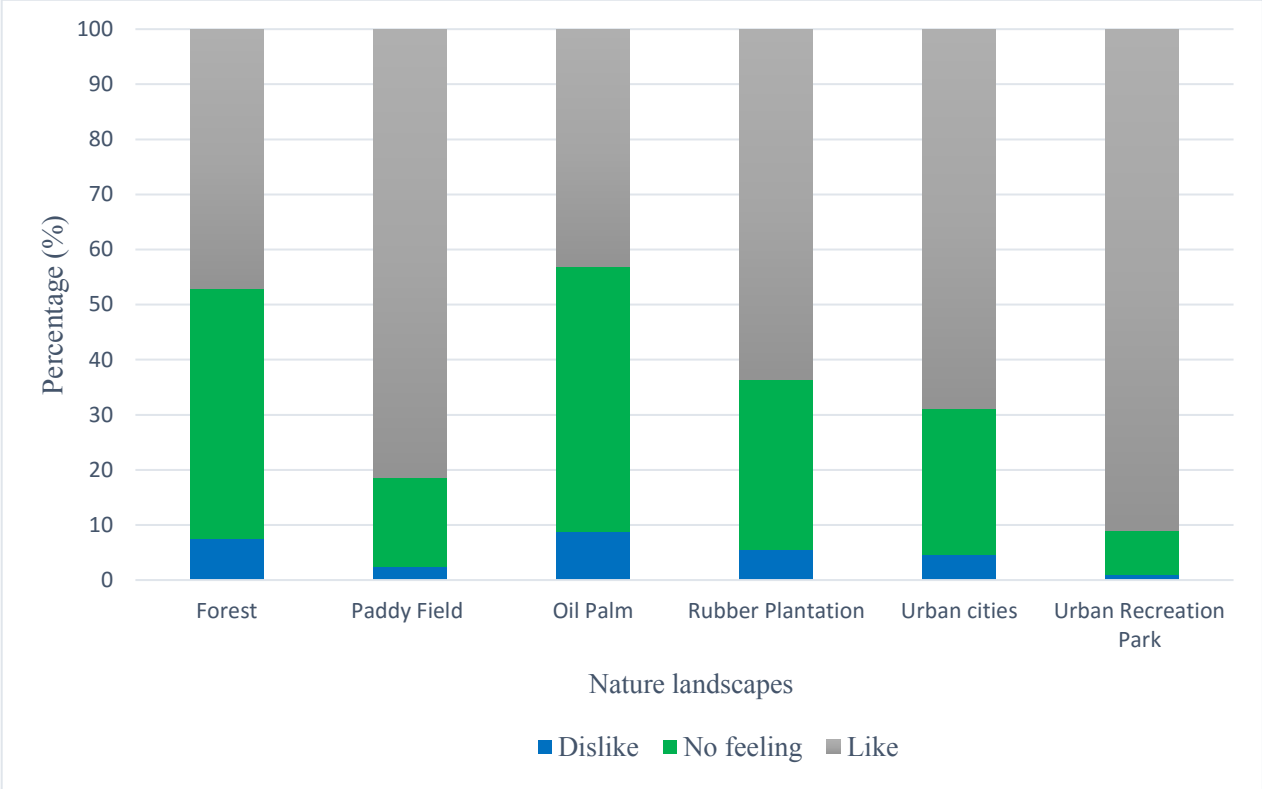


Figure 5-2. Preferences for natural landscapes among Malaysian school children (n=401).

The preferences for natural landscapes revealed the three highest scores for urban recreation park, paddy field, and urban cities. However, rubber plantation, forest, and oil palm plantation appeared to be the three lowest preferences for landscapes (Figure 5-2).

Table 5-1. Mean scores of landscape preferences among Malaysian school children (n= 401).

Landscapes	Mean Score
Forest	0.40
Paddy field	0.79
Oil palm plantation	0.35
Rubber plantation	0.59
Urban cities	0.65
Recreation urban park	0.91

Moreover, the children's preferences showed positive attitudes towards the six selected nature landscapes, in which the highest preference was the recreation urban park (Figure 5-2, Table 5-1; Mean score = 0.91), while the lowest was oil palm plantation areas (Mean score = 0.35).

Table 5-2. Results retrieved from GLMM that included six explanatory variables [Direct, vicarious, and indirect nature experiences; gender (male as reference); ethnicity (Malay as reference); and school location (urban as reference)] to explain children's preference for forest, paddy field, oil palm plantation, rubber plantation, urban cities, and recreation urban park landscapes.

Landscapes (preferences)	Direct	Vicarious	Indirect	Male	Malay	Urban school	R^2
Forest	0.38***	0.08	-0.08	0.17**	0.03	0.20**	0.13
Paddy field	0.17*	-0.02	0.09	0.01	0.03	-0.04	0.04
Oil Palm	0.22	0.04	0.08	0.06	-0.09	0.06	0.04
Rubber plantation	0.28**	0.03	-0.07	0.02	0.02	0.02***	0.06
Urban cities	-0.21*	0.03	-0.09	0.04	0.16	-0.10	0.04
Recreation urban park	-0.04	0.06*	0.04	-0.02	0.13**	-0.01	0.04

The levels of significance: *p <0.05, **p<0.01, *** p<0.001.

On top of that, the linear mixed models showed that the children's preferences for landscapes had been significantly associated with direct nature experience (Table 5-2). Children who frequently indulged in direct nature experience displayed positive feelings to all four selected landscapes, except for oil palm and recreation urban park. Meanwhile, gender was significantly associated with forest landscape preferences, whereas for ethnicity, the Malays showed a significant preference towards recreation urban park. Besides, the urban school children were significantly related to forest and rubber plantation landscapes. On the other hand, children with less direct nature experiences significantly preferred urban cities, whereas attached to vicarious experiences preferred recreation urban park landscapes.

5.2.3 The Preferences towards and Willingness to coexist with wild animals

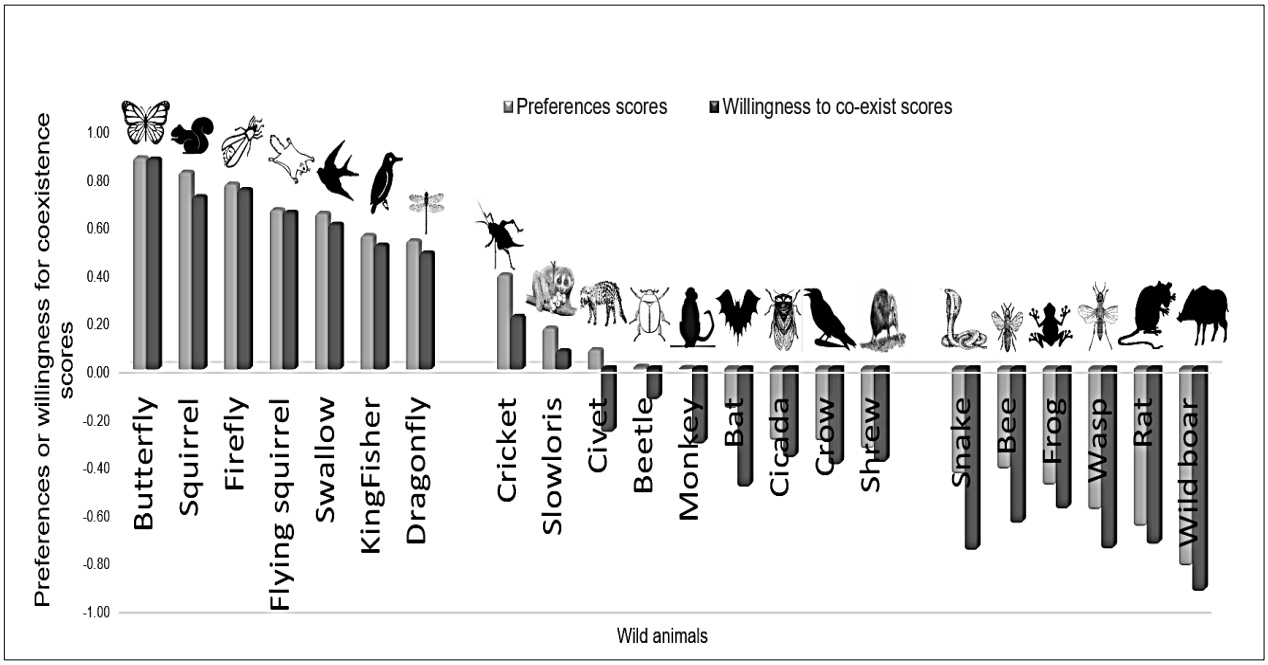


Figure 5-3. Species classification (Clusters 1, 2, and 3) based on Ward's dendogram of hierarchical cluster analysis.

In fact, a marked variation was discovered in Preference and Coexistence scores among the 22 listed animal species (Figure 5-3). The animals with the highest Preference scores among the children were insects (e.g., butterfly, dragonfly, and firefly), birds (e.g., swallow and kingfishers), squirrels, and flying squirrels. On the contrary, animals with the lowest Preference scores included snake, wasp, bee, frog, wild boar, and rat. Similarly, the respondents assigned the highest Coexistence scores to

insects, birds (except crow), squirrels, and flying squirrels, while the lowest were given to wild boar, rat, snake, frog, bee, and wasp (Figure 5-3).

Additionally, the linear mixed models showed that the children's preference towards and willingness to coexist with wild animals had been significantly associated with direct nature experience (Table 5-3). Through the use of cluster analysis, the animal species were divided into three main groups; from favorable to unfavorable. Besides, the aspect of willingness to coexist with animals was positively correlated with Preference for animals ($r = 0.98$, $df = 20$, $p < 0.001$) (Figure 5-4).

Table 5-3. Results retrieved from the GLMM, which included six explanatory variables to explain children's preferences towards and willingness to coexist with animals. The levels of significance were *p <0.05, **p<0.01, and *** p<0.001. The standardized regression coefficients for childhood nature experiences (Vicarious, Direct, and Indirect) and various sociodemographic factors [gender (male as reference), ethnicity (Malay as reference), and school location (urban as reference)] to predict preference towards (Preference), and willingness to coexist with (Coexistence), each animal group, and the fitness of the model (R^2).

Preference	Mean	Gender	Malay	School (urban)	Vicarious Experience	Indirect Experience	Direct Experience	R^2
Cluster 1 (Favorable)	0.66	0.02	0.06	0.03	0.01	-0.02	0.25***	0.096
Cluster 2 (Fairly unfavorable)	-0.10	0.22***	0.08	0.19***	0.06	0.01	0.17**	0.179
Cluster 3 (Unfavorable)	-0.57	0.26***	-0.04	0.12*	0.05	-0.02	0.10	0.128
All species (22 animals)	0.05	0.16***	0.04	0.12***	0.04	-0.01	0.18***	0.191
Co-existence	Mean	Gender	Malay	School (urban)	Vicarious Experience	Indirect Experience	Direct Experience	R^2
Cluster 1 (Favorable)	0.60	0.01	0.06	0.01	0.04	-0.01	0.20***	0.062
Cluster 2 (Fairly unfavorable)	-0.29	0.16***	0.10	0.20***	0.12***	-0.08	0.20**	0.173
Cluster 3 (Unfavorable)	-0.73	0.15***	-0.05	0.04	0.08**	-0.05	0.13*	0.106
All species (22 animals)	-0.09	0.11***	0.04	0.10**	0.08***	-0.05	0.18***	0.169

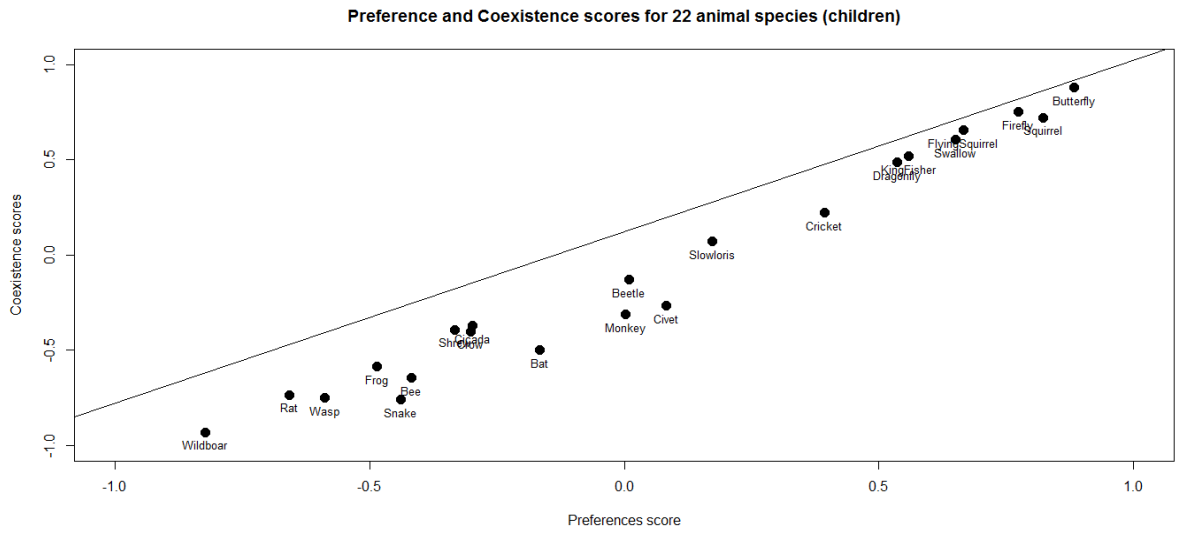


Figure 5-4. Preference and Coexistence scores for 22 wild animal species. The classification of the species had been based on Ward's dendogram of hierarchical cluster analysis.

The direct experience with nature was significantly correlated with Preference for all combined animal species and all clusters, except for Cluster 3, which appeared to be the most despised group. Nonetheless, the vicarious experience exhibited insignificance in predicting Preferences for any of the animal group (Table 5-3). Similarly, the direct nature experience was the most important factor that predicted the level of willingness to coexist with wild animals, except for Cluster 3. Meanwhile, vicarious experience to nature emerged as a significant factor in predicting the willingness to coexist with all animals groups, except Cluster 1 (favorable species). On top of that, among the sociodemographic factors, gender and school location appeared to display significant effects upon the level of willingness to coexist with and preference towards wild animals. Furthermore, males and school children from urban areas exemplified more fondness towards animals, when compared to females, except Cluster 1. Similarly, males were more willing to coexist with most of the wild animals listed, except for Cluster 1. However, ethnicity failed to exhibit any significant effect upon neither Preference nor Coexistence.

5.3 Discussion

5.3.1 Nature-related experiences among Malaysian school children

It appeared that Malaysian children did experience both direct and vicarious experiences for nature. However, the vicarious type emerged to be an important trend to experience nature. In this present modern life, it has been well-documented that children have shifted in their ways of spending their leisure time. In fact, about 70% of Southeast Asian children play mobile games during their spare time, compared to 56% in the United States. Moreover, the Association of Southeast Asian Nations (ASEAN) countries, such as Indonesia, Singapore, Vietnam, Thailand, and Malaysia, have projected that children have shown changes in play trends, especially those in urban areas, whereas attraction to screen-based entertainment and gadgets (e.g., internet and online games) has increased substantially (Venture Beat, 2016). Simply put, modern children are strongly influenced by electronic media, such as the internet. Hence, it is important to monitor the shift that is taking place in children's experiences related to the nature and how these changes could affect their physical and mental health, as well as their attitudes towards nature. Moreover, this particular study supports the findings retrieved from researches conducted in Japan (Soga & Gaston, 2016; Soga, Gaston, Yamaura, et al., 2016) and the United States (Zaradic & Pergams, 2007), which explored vicarious nature experience as the trend that represents the principal shift away from *biophilia* hypothesis (Wilson, 1984; Nabhan & St. Antoine, 1993) to *videophilia* (Zaradic & Pergams, 2007).

5.3.2 Landscape preferences

This present study revealed that children who had frequent contact with nature displayed a positive view with nature-based landscape preferences. This result supports those who frequently experienced direct nature were more appreciative towards the value of nature (Soga, Gaston, Koyanagi, Kurisu, & Hanaki, 2016a). Besides, experiencing nature during childhood bides rather well for significantly positive feelings, which in turn, may allow children to continue building their appreciation and gain the benefits from nature later in their life (Cheng & Monroe, 2012). As such, it has repeatedly been demonstrated that direct nature contact generates positive impacts on mental, emotional, and social development among children (C. J., Maller, 2009), people's behavior (Rajecki, 1982), as well as improved aesthetic appreciation and recreation (Dallimer et al., 2014; Lohr & Pearson-Mims, 2005). Furthermore, a significant association was found between childhood nature experiences and adults' attitudes towards natural entities, such as trees, and nature-based practices like gardening. Moreover, the present findings reported that direct nature experience had been mostly significant towards forest landscape among children's nature preferences (Table 5-2). Indeed, the preference towards forest landscape in a direct manner suggests that children favor wild natural, hence indicating a positive sign of nature conservation effect. In the case of Malaysia, urban children preferred natural landscapes, such as forest and rubber plantation. Therefore, nearby forest areas can become a suitable playscape for children to enhance their physical performances, along with their socialization skills (Said, 2012). Similarly, a positive relationship was discovered between childhood nature experience and interest in environmentally friendly practices (Cheng & Monroe, 2012), as well as between positive perceptions of natural environments and outdoor recreation activities (Bixler & Floyd, 1997). Moreover, more time at outdoors can help children to develop positive values regarding the nature and contribute a close bond with the nature (Davis et al., 2006).

Besides, it had been clear that boys had more opportunities to explore the nature independently, as compared to girls, hence suggesting their preferences towards forest, which reflected almost nil influence by the nature of their immediate home vicinity (e.g., neighborhood park) as they could have played further away (Lachowycz & Jones, 2013). Hence, the spatial ranges displayed by the boys (distance travel away from home unaccompanied by adults) to play further unsupervised suggests flexibility (Hart, 1978), as well as preferences towards being engaged in rough and wild adventure at competitive places (Singer et al., 2009). Moreover, the significant preferences of nature landscapes towards forest and rubber plantation by urban children point out their increasing desire for natural

areas, when compared to their rural counterparts (Kaplan et al., 1972; Boll, Haaren, & Ruschkowski, 2014). Both forest and rubber plantation landscapes are obviously located within rural and natural areas (Thompson, 2004), hence fulfilling the desires of urban children's outdoor environments diversity and naturalness of the landscape (Boll et al., 2014).

5.3.3 Preferences towards and willingness to coexist with wild animals

The most preferred animals among Malaysian school children were insects (e.g., butterfly, dragonfly, and firefly), birds (e.g., swallow and kingfishers), flying squirrels, and squirrels. In fact, appreciation for birds and butterflies appears to be consistent with prior studies in Japan (Soga, Gaston, Yamaura, et al., 2016b) and Portugal (Almeida et al., 2014). Although insects (except for butterflies) were generally the least preferred species in the Western countries (Almeida et al., 2014), Malaysian school children preferred several types of insects, notably dragonfly and firefly, which is consistent with the findings obtained from a study conducted in Japan (Hogue, 1987). Similarly, the highest Coexistence scores for insects can be a potential candidate for Malaysian flagship species in urban biodiversity conservation.

Besides, the school children's Preference for birds (except for crow) was relatively high, which contradicted the adult's Preference that showed a lower score for the bird group (see details in Chapter 4). Birds have been often seen as most favorable and most popular animals (Almeida et al., 2014; Schlegel & Rupf, 2010; Soga, Gaston, Yamaura, et al., 2016b). Besides, a study showed that small birds appeared to be the most favorable animal among Malaysian adult urbanites (Nik Mohamad, 2011).

Meanwhile, direct nature experience had a significantly positive effect upon school children's Preference and Coexistence scores for all wild animals combined. Hence, these present findings are consistent with those from past studies, which displayed that childhood nature experience was positively correlated with preference towards animals among children (Zhang et al., 2014; Soga et al., 2016b). This research had further determined that the effect of direct nature experiences among children improved biophilia towards animals (Zhang et al., 2014). Hence, Davis, Rea, and Waite (2006) suggested that frequent time at outdoors could help children to develop positive values about nature, and eventually develop a close bond with the nature. An emotional bond with the nature,

especially during early childhood, seems to contribute to a critical driver of conservation attitudes (Cheng & Monroe, 2012; Collado & Corraliza, 2013).

In addition, this study also demonstrated the direct and vicarious experiences had been correlated to Coexistence for wild animals. Children who managed to explore both direct and vicarious experiences displayed more willingness to have the wild animals nearby their residential areas, as compared to those who did not have contact with nature experience. Interestingly, both direct and vicarious experiences did not only affect children's willingness to conserve nature (Soga et al., 2016b), but it is also a key in alleviating the willingness to coexist with animals. Increased levels of coexistence can further encourage long-term planning of community support for conservation efforts, ultimately, in urbanized societies (Inskip et al., 2016; Manfredo, Teel, & Dietsch, 2016).

Moreover, vicarious experiences have become more predominant in children's lives via various means, such as books and other print media, mass media, and computers (Kellert, 2002). As such, hands-on contact with the nature is paramount during childhood (Kellert, 2002), indicating that the importance of vicarious contact should not be dismissed. Children's everyday play at outdoors has shifted to indoors (Hart, 1999; Soga et al., 2016b), thus children's opportunity for spontaneous contact with nature is diminishing (Chawla, 1994; Kellert, 2002; Kuo, 2003). Nonetheless, vicarious experience has both positive and negative implications for children's development and conservation attitudes (Zaradic & Pergams, 2007).

Other than that, gender and school location were also important among sociodemographic factors in Preference towards and Coexistence with wild animals. Boys tended to have positive association with Preference and Coexistence scores than girls. In fact, this is consistent with the studies performed worldwide, where males mostly preferred animals than females, including in the United States (Kellert, 1993), Norway (Bjerke & Østdahl, 2004), Tanzania (Kaltenborn et al., 2006), China (Zhang et al., 2014), and Japan (Soga et al., 2016b). Besides, urban children exhibited more positive attitudes for Preference towards and Coexistence with wild animals, suggesting their desire for wild animals more than those from rural areas. Perhaps, this could be a result from the support given by family or parents in encouraging children to instill stronger attitudes for nature (Kals, Schumacher, & Montada, 1999). Spending more time with the nature helps children develop a bond with the nature (Cheng & Monroe, 2012). Given that nature is fun and joyful, in contrast to everyday urban living, shapes a positive view towards nature among urban dwellers (Lekies, Yost, & Rode, 2015).

5.4 Conclusion

This has been the first study to document children's nature-related activities and their willingness for coexistence with wild animals. The school children experienced both direct and vicarious nature-related experiences. The vicarious type appeared to be the most frequent experience, indicating an ongoing decline among children in coming to direct contact with the nature. However, only direct nature experience had an influence upon children' landscape preferences. Preferences towards and willingness to coexist with animals had been greatly affected by children's direct and vicarious experiences. Hence, providing hands-on environmental education to encourage children should be consistently organized. Besides, direct contact with the nature allows children to continue building a positive bond with the nature, which will be beneficial in their future lives.

Chapter 6

General discussion

Exploring connections with the nature both during childhood or present experiences alleviate biodiversity conservation opportunities, especially among urbanites. Besides, the findings obtained from this study could be integrated with the planning among environmental educators, city planners, and landscape managers. The direct nature-related experiences have remained as an essential element to improve children's attitudes, although vicarious experience has substituted direct contact with the nature.

Overall, this study has successfully identified the nature-related experiences among adults and school children residing in Peninsular Malaysia, apart from determining the significant factors that influenced affective attitudes towards nature conservation in Malaysia. Within the issues discussed in Chapter Three until Chapter Five, acknowledgement for human and nature interactions among children and adults is indeed an important factor in shaping appreciation for nature conservation. Additionally, nature experience during childhood time is vital as a logical starting point in the search for long-term solutions to extinction of species and habitat degradation (Kahn, 1997; 2002). This mechanism of affective attitudes among the public promotes a support for urban biodiversity conservation efforts. Therefore, the findings of this study are summarized as follows:-

Research hypothesis	Supported / Rejected
The younger generations experienced fewer nature-related activities than older generations.	Partially supported. Some evidenced that younger adults had experienced fewer nature-related activities compared to older adults (except for climbing trees and participation in traditional outdoor games).
The level of childhood nature-related experiences differed between those who grew up in rural areas and those who grew up in urban areas.	Supported. The results significantly showed that Malaysian adults who grew up in urban areas had fewer experiences in the nature-related activities than those who grew up in rural areas.

The wild animals that Malaysians preferred and wished to coexist with are birds and small mammals group.	Rejected. Malaysians showed their highest Preference and Coexistence scores for insects (e.g., butterfly, dragonfly, firefly, cicada, beetle, and cricket), and squirrels.
Experience scores affected Preference and Coexistence scores towards wild animals. If so, how strong are the effects of Experience compared to those effects of sociodemographic factors.	Supported. Experience had a significant positive effect on Preference scores only. Experience had the strongest or the second strongest effect compared to sociodemographic factor upon Preference for all clusters of wild animals. However, the hypothesis is rejected for the Experience path that had no direct effect upon Coexistence scores.
School children experienced vicarious nature experience more frequently than direct nature experience.	Supported. Vicarious nature-related experience was the most frequent mode experienced by the school children.
School children preferred more manicured landscapes (urban parks or urban cities areas) than natural landscapes (forest or agricultural landscapes).	Supported. School children showed higher preferences for urban park areas. Oil palm and forest landscapes displayed the lowest preference scores.
Direct and vicarious nature experiences had influenced Preference and Coexistence scores towards wild animals among school children.	Supported. Direct experience with nature influenced the children's Preference scores towards wild animals. Both direct and vicarious experiences had an effect upon children's Coexistence scores towards wild animals.

6.1 Understanding the importance of nature-related experiences in urban and rural environments

Direct nature experiences during childhood are essential in enhancing both psychological and physical development among children, particularly those from urbanized societies. One consequence of fewer human and nature interactions includes reduced acknowledgement of the natural environment. Hence, this study greatly contributes to the body of knowledge pertaining to childhood nature-related experiences, especially among tropical developing countries, where urbanization and lifestyle changes have been taking place in a rapid manner. More importantly, understanding the most common nature-related activities experienced during childhood can be beneficial in reconnecting future children with the nature in a global context. Even though this present study portrayed a minimal decline in nature-related experiences among generations, efforts to develop urban parks and other public spaces in the attempt to reconnect urban children with the nature are utmost important to enhance better urban planning, especially for tropical developing nations, such as Malaysia.

6.2 Importance of attitudes in urban biodiversity design and planning management

A decline in direct nature experience can lead to disaffection towards natural environments and wildlife, as well as public indifference towards biodiversity conservation. Since urban biodiversity is essential in balancing the services of ecosystem, particular attention should be directed towards displaying appreciation for ecosystem services, such as the wildlife and landscape management.

Furthermore, if green space areas and forests decrease, 'extinction of experience' cycle could decrease as well i.e., where people have less interaction with the nature, and may breed apathy towards environmental concerns and wildlife, which would not bide well for future urban biodiversity conservation (Zhang et al., 2014). In fact, attitudes can significantly affect the success of conservation initiatives (Mir et al., 2015), thus the fundamental to enhance the attitudes among the public should be made a vital agenda. Besides, the rapid urbanization pace could be a potential reawakening of conservationist needs to gain support from the society for biodiversity conservation.

On top of that, urban landscapes could function as learning platforms to gain direct nature experience, including those within neighborhoods, as well as through various social and cultural diversity, in gaining wider support for urban community activities related to the nature. In addition, a formulation of better policy framework in gathering significant combinations for effective implementation of actions should be introduced among landscapes planners, wildlife managers, and environmental educators. Fostering an innovative education system is also a platform to offer opportunities for environmental and biodiversity learning in cities. Thus, implementation for environmental education should be enhanced to generate better designs of interpretive experiences, which are relevant and effective for future children, so that they could be interested in, as well as be seriously concerned about environmental issues.

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APPENDIX

A1. Demographics profile for adults' respondents in percentage (n=378)

Socio-demographic characteristic (%)	Rural (n = 177)	Urban (n = 180)
	Gender	
Male	50	30
Female	50	70
	Age group (year)	
20–29	16	14
30–39	18	17
40–49	25	23
50–59	23	29
> 60	18	17
	Completed education level	
Primary school	13	3
Secondary school	60	60
Tertiary (University)	27	37
	Ethnicity	
Malay	87	85
Chinese	7	9
Indian	6	6
	Children	
Has child	65	59
Does not have a child	35	41
	Annual income (USD)	
< 4, 000	28	16

4,001–8,000	47	58
8,000 –12, 000	24	19
> 12, 001	2	8
	Annual income (MYR)	
< 20,000	28	16
20,001–35,000	47	58
35,001–50,000	24	19
	Length of stay in current residence (year)	
< 5	28	18
5–10	24	43
11–20	18	32
> 20	30	7
	Childhood residential setting	
Urban area	26	47
Rural area	74	53

A2. Demographics profile for schoolchildren' respondents in percentage (n=401)

Socio-demographic characteristic (%)	Rural (n = 130)	Urban (n = 271)
	Gender	
Male	33	67
Female	32	68
	Age group (year)	
10	25	75
11	48	52
12	32	68
	Ethnicity	
Malay	34	66
Chinese	50	50
Indian	42	58
Orang Asli	0	100
	Pet owners	
Yes	33	67
No	32	68
	Had a personal gadget	
Yes	32	68
No	35	65
	Watch Cartoon Everyday	
Yes	27	73
No	37	63

A3. Questionnaire Phase 1 (Adult survey)

Questionnaire on public perception toward Green space and Biodiversity

TMU & FRIM

Objective

1. To understand what kind of green space people value.
2. To understand what kind of animal people like (or dislike) to be around.
3. To understand the needs for policy and governance toward biodiversity conservation and natural environment management
4. To understand how these responses differ among different attributes, residential areas and experiences of respondents.

Section A: About green space

Q1 How much are you satisfied with green spaces around your house?

1. Very much satisfied.
2. Satisfied
3. Not very satisfied.
4. Not satisfied at all.

Q2 Where would you like for “green space” to be? Please choose no more than 3 options.

1. In my own garden or veranda
2. In the park
3. At public spaces such as schools and city halls
4. At open spaces in front of the station and road sides
5. At open spaces of apartments and condominiums
6. At buildings, factories and offices
7. Near rivers and ponds
8. At places for religious ceremonies (such as temples, mosque, and church)
9. In agricultural lands
10. In grass lands
11. Forests and woods
12. Others (please indicate)
13. I do not want “green”

Q3 What do you want to do to increase the green space around you. Please choose as many as you like.

1. Increase plants in your own garden or veranda
2. Growing flowers and vegetables in community gardens
3. Participate in greening activity (flower planting, weeding, cleaning, etc.) of local community or government

4. Participate in tree planting/forest management activities as a volunteer -
5. Learning through nature classes or field courses
6. Conduct activities of environmental education and conservation as a leader
7. Making a donation for greening activity
8. Others (please indicate)
9. I do not want to increase “greens”.

Section B: About wildlife

Q4 To what extent do you know about the following animals? Please choose one of the 1-4. Watching the real animal includes not only in the field but also at the zoo or insectarium.

	Do not know	Only know by name	Have watched picture or movie	Have watched real animal
Macaque	1	2	3	4
Wild bore	1	2	3	4
Civet	1	2	3	4
Bat	1	2	3	4
Rat	1	2	3	4
Slow Loris	1	2	3	4
Flying squirrel	1	2	3	4
Shrew	1	2	3	4
King fishers	1	2	3	4
Crow	1	2	3	4
Swallow/Swiftlet	1	2	3	4
Squirrel	1	2	3	4
Snake	1	2	3	4
Frog	1	2	3	4
Beetle	1	2	3	4
Cricket	1	2	3	4
Cicada	1	2	3	4
Butterfly	1	2	3	4
Dragonfly	1	2	3	4
Wasp	1	2	3	4
Bee	1	2	3	4
Firefly	1	2	3	4

Q5 To what extent is your feelings for the following animals? Please choose one of the 1 to 5.

	Dislikable	Relatively dislikable	Not likable nor dislikable	Relatively likable	Likable
Macaque	1	2	3	4	5
Wild boar	1	2	3	4	5
Civet	1	2	3	4	5
Bat	1	2	3	4	5
Rat	1	2	3	4	5
Slow loris	1	2	3	4	5
Flying squirrel	1	2	3	4	5
Shrew	1	2	3	4	5
King fishers	1	2	3	4	5
Crow	1	2	3	4	5
Swallow/Swiftlet	1	2	3	4	5
Squirrel	1	2	3	4	5
Snake	1	2	3	4	5
Frog	1	2	3	4	5
Beetle	1	2	3	4	5
Cricket	1	2	3	4	5
Cicada	1	2	3	4	5
Butterfly	1	2	3	4	5
Dragonfly	1	2	3	4	5
Wasp	1	2	3	4	5
Bee	1	2	3	4	5
Firefly	1	2	3	4	5

Q6 Where is the desirable place for the following animals to inhabit? Please choose one of the 1 to 5.

	Nowhere is desirable	Distant park and forest	Park and forest nearby	Home garden or veranda	Anywhere is fine
Macaque / Monkey	1	2	3	4	5
Wild boar	1	2	3	4	5
Civet	1	2	3	4	5
Bat	1	2	3	4	5
Rat	1	2	3	4	5
Slow loris	1	2	3	4	5
Flying squirrel	1	2	3	4	5
Shrew	1	2	3	4	5
King fishers	1	2	3	4	5
Crow	1	2	3	4	5
Swallow/Swiftlet	1	2	3	4	5
Squirrel	1	2	3	4	5
Snake	1	2	3	4	5
Frog	1	2	3	4	5
Beetle	1	2	3	4	5
Cricket	1	2	3	4	5
Cicada	1	2	3	4	5
Butterfly	1	2	3	4	5
Dragonfly	1	2	3	4	5
Wasp	1	2	3	4	5
Bee	1	2	3	4	5
Firefly	1	2	3	4	5

Section C: About policy and governance

Q7 Do you know the word “biodiversity”?

1. Yes, I know the meaning.
2. I have heard the word, but I do not know the meaning.
3. No, I do not know.

Q8 Which idea is most agreeable to you?

1. We should protect the environment and habitats of wildlife as the first priority even if our way of life is partly restricted.
2. We should balance human needs and wildlife conservation.
3. We should not restrict our way of life even if the environments and habitats of wildlife are degraded.
4. Others ( )

Q9 Do you agree about conservation and enrichment of wild plants and animals in urban settings?

1. I totally agree.
2. I partly agree, but only in the designated area or park (not near my house).
3. I do not agree.
4. I do not know.

Q10 How should government help in biodiversity conservation and natural environment management. Please select not more than 3 of the answers from 1-14.

1. Protection and conservation of existing green areas such as forests
2. Expansion of areas such as agricultural lands and community gardens
3. Development of green corridors such as wayside trees to connect parks and open spaces
4. Strict regulation in large-scale land clearance and building construction

5. Setting lower tax rates on companies, groups or individuals who act for conservation and creation of green areas

6. Support for greening activity of the public by providing seedlings for planting

7. Providing opportunities for nature experience such as forest management activities

8. Training local leaders for nature observation and conservation

9. Providing information on greening events via newsletter and internet

10. Facilitating collaboration among government, publics and organizations toward greening

11. Extermination and appropriate management of pests and harmful animals

12. Others ( )

Section D: About yourself.

F1 Gender

1. Male 2. Female

F2 Age

1. 20－29

2. 30－39

3. 40－49

4. 50－59

5. 60－69

6. 70－79

7. Over 80

F3 Education level

1. Primary school

2. Junior high school

3. High school
4. University/College
5. Graduate school
6. Others ( )

F4 Ethnicity

1. Malay
2. Chinese
3. Indian
4. Orang Asli
5. Others ( )

F5 Do you have a child (less than 17 years old) living with you?

1. I have a child in lower secondary school (13-15 years)
2. I have a child in primary school
3. I have a child below the age of primary school - pre-school
4. I do not have a child

F6 Residential area ( )

F7 Type of your house

1. Owner occupied isolated house.
2. Rental public apartment
3. Owner occupied apartment
4. Company owned house
5. Rental private isolated house
6. Rental private apartment
7. Dormitory

8. Others ( )

F8 How long have you lived at the current residential area?

1. Less than 1 year
2. 1-3 years
3. 3-5 years
4. 5-10 years
5. 10-20 years
6. More than 20 years

F9 Type of your business/occupation

1. Agriculture, forestry or fishery
2. Commerce, technology and service industry
3. Education
4. Management and governance
5. Expertise
6. Administrator
7. Other type of business
8. Student
9. Housewife/husband
10. No occupation

F11 Annual income (RM)

1. Below 2500
2. 2,501 - 5,000
3. 5,001 - 10,000
4. 10,001 - 20,000

5. 20,001 - 35,000
6. 35,001 - 50,000
7. 50,001 - 70,000
8. 70,001 - 100,000
9. Exceeding 100,000

F12 Where did you live during your childhood?

1. Old township (established more than 50 years ago)
2. Isolated house in a new township (established less than 50 years ago)
3. Apartment house in a new township (established less than 50 years ago)
4. Village or rural area

F13 Please select all the activities you experienced in your childhood

1. Observation of animals and plants
2. Tree climbing
3. Fishing and fish catching
4. Frog catching
5. Catching spiders
6. Flower and fruit collecting
7. Eating fruits which you collected
8. Playing with herbs or weeds
9. Making a boat with a bamboo leaf
10. Making a spinning top/Kite
11. Making a crown with flowers
12. Making a bamboo gun
13. Playing with silts
14. Playing games using seeds, sticks and other parts of plants (Please describe_____)?

15. Playing in the river/waterfall

16. Sliding on the river bank or slope

17. Playing with kites

18. Other activities in the field (_____)

F14 Do you feel that a childhood spent outdoor is brings positive development to a person?

1. Yes

2. No

F14 If you have children, which green spaces would be favorable for them to play in?

1. Natural forests and rivers

2. Agricultural lands (including orchards, paddy fields and plantations)

3. Parks and green spaces in urban settings

4. Any green spaces at all

5. None of the places above, because (state your reasons ……..……..)

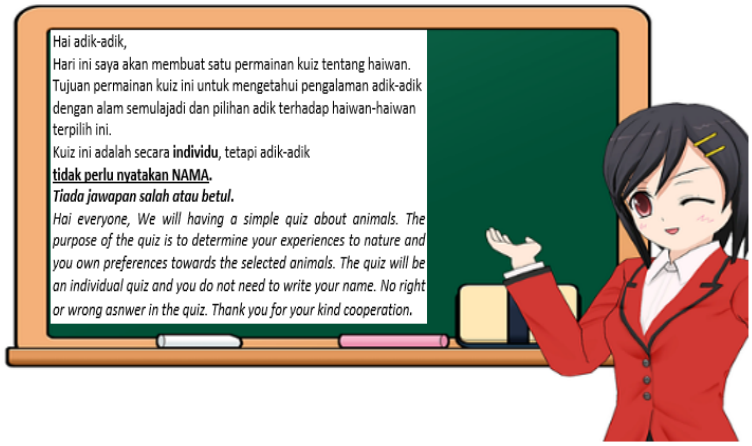
Thank you very much for your cooperation.

A4. Questionnaire Phase 2 (School children survey)

Cover page of the questionnaire form

Pengalaman kanak-kanak sekolah berinteraksi dengan alam semula jadi

The experience of school children interact with nature



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NAMA SEKOLAH/ *SCHOOL NAME*: .....

KELAS/ *CLASS* : .....

TARIKH KUIZ/*DATE*: .....

A. Sikap terhadap kesediaan memelihara alam
The attitudes of willingness to preserve nature

1. Ini adalah permainan kuiz haiwan. *This is an animal quiz*

Bulatkan (o) pilihan adik-adik di dalam kotak yang disediakan. Dari gambar-gambar yang dikongsi, saya PERNAH/TIDAK PERNAH melihat haiwan ini di luar. ***From the pictures shared, I have seen/ never seen these animals outside in nature. Kindly Circle (O) your own choices in the provided boxes.***

No.	**Pernah LIHAT haiwan ini** ***Have you seen those animal species in the list***	TIDAK *(Never)*	PERNAH *(Seen)*
a.	Squirrel *Tupai*	Tidak pernah / Never	Pernah lihat/ Seen
b.	Wild boar *Babi hutan*	Tidak pernah / Never	Pernah lihat/ Seen
c.	Bat *Kelawar*	Tidak pernah / Never	Pernah lihat/ Seen
d.	Civet *Musang*	Tidak pernah / Never	Pernah lihat/ Seen
e.	Butterfly *Rama-rama*	Tidak pernah / Never	Pernah lihat/ Seen
f.	Dragonfly *Pepatung*	Tidak pernah / Never	Pernah lihat/ Seen
g.	King fishers *Burung raja udang*	Tidak pernah / Never	Pernah lihat/ Seen
h.	Crow *Gagak*	Tidak pernah / Never	Pernah lihat/ Seen
i.	Shrew *Tikus kesturi*	Tidak pernah / Never	Pernah lihat/ Seen
j.	Firefly *Kelip-kelip*	Tidak pernah / Never	Pernah lihat/ Seen
k.	Cicada *Riang-riang*	Tidak pernah / Never	Pernah lihat/ Seen
l.	Beetle *Kumbang*	Tidak pernah / Never	Pernah lihat/ Seen
m.	Monkey *Monyet*	Tidak pernah / Never	Pernah lihat/ Seen
n.	Bee *Lebah*	Tidak pernah / Never	Pernah lihat/ Seen
o.	Snake *Ular*	Tidak pernah / Never	Pernah lihat/ Seen
p.	Rat *Tikus*	Tidak pernah / Never	Pernah lihat/ Seen
q.	Slow loris *Kongkang*	Tidak pernah / Never	Pernah lihat/ Seen
r.	Flying squirrel *Tupai terbang*	Tidak pernah / Never	Pernah lihat/ Seen
s.	Wasp *Tebuan*	Tidak pernah / Never	Pernah lihat/ Seen
t.	Swallow *Burung layang-layang*	Tidak pernah / Never	Pernah lihat/ Seen
u.	Frog *Katak*	Tidak pernah / Never	Pernah lihat/ Seen
v.	Cricket *Belalang hijau*	Tidak pernah / Never	Pernah lihat/ Seen

2.Adakah adik SUKA atau TIDAK SUKA spesies haiwan di senarai? Rujuk haiwan bergambar, bulatkan (O) di kotak yang berkaitan. ***Are you <u>likes or dislikes</u> this animal species? Refer the pictures, kindly circle (O) on the related box.***

No.	Perasaan terhadap haiwan ini ***Feelings toward those animal species…***	**TIDAK SUKA** ***Dislike***	**TIADA PERASAAN** ***No feeling***	**SUKA** ***Like***
a.	Squirrel *Tupai*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*
b.	Wild boar *Babi hutan*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*
c.	Bat *Kelawar*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*
d.	Civet *Musang*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*
e.	Butterfly *Rama-rama*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*
f.	Dragonfly *Pepatung*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*
g.	King fishers *Burung raja udang*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*
h.	Crow *Gagak*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*
i.	Shrew *Tikus kesturi*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*
j.	Firefly *Kelip-kelip*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*
k.	Cicada *Riang-riang*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*
l.	Beetle *Kumbang*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*
m.	Monkey *Monyet*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*
n.	Bee *Lebah*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*
o.	Snake *Ular*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*
p.	Rat *Tikus*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*
q.	Slow loris *Kongkang*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*
r.	Flying squirrel *Tupai terbang*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*
s.	Wasp *Tebuan*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*
t.	Swallow *Burung layang-layang*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*
u.	Frog *Katak*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*
v.	Cricket *Belalang hijau*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*

3.Adakah adik AKAN atau TIDAK AKAN melindungi spesies haiwan di senarai?. Rujuk haiwan bergambar, bulatkan (O) di kotak yang berkaitan.

Would you like to <u>PROTECT or NOT WILLING TO PROTECT</u> this animal species ?

No.	Kesanggupan untuk lindugi haiwan ini… ***Willingness to protect these animal species***	**TIDAK** *Not willing*	**TIADA IDEA** *No idea*	**AKAN MELINDUNGI** *Willing to protect*
a.	Squirrel *Tupai*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*
b.	Wild boar *Babi hutan*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*
c.	Bat *Kelawar*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*
d.	Civet *Musang*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*
e.	Butterfly *Rama-rama*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*
f.	Dragonfly *Pepatung*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*
g.	King fishers *Burung raja udang*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*
h.	Crow *Gagak*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*
i.	Shrew *Tikus kesturi*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*
j.	Firefly *Kelip-kelip*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*
k.	Cicada *Riang-riang*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*
l.	Beetle *Kumbang*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*
m.	Monkey *Monyet*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*
n.	Bee *Lebah*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*
o.	Snake *Ular*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*
p.	Rat *Tikus*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*
q.	Slow loris *Kongkang*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*
r.	Flying squirrel *Tupai terbang*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*
s.	Wasp *Tebuan*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*
t.	Swallow *Burung layang-layang*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*
u.	Frog *Katak*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*
v.	Cricket *Belalang hijau*	**Tidak** *Not willing*	**Tiada idea** *No idea*	**Akan melindungi** *Willing to protect*

4.Kesanggupan untuk hidup berdekatan dengan haiwan di persekitaran perumahan ***Willingness for coexist with animals, if the species living nearby their residential areas***		**TIDAK GEMBIRA** *Not Happy*	**TIADA IDEA** *No idea*	**GEMBIRA** *Happy*
a.	Squirrel *Tupai*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*
b.	Wild boar *Babi hutan*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*
c.	Bat *Kelawar*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*
d.	Civet *Musang*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*
e.	Butterfly *Rama-rama*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*
f.	Dragonfly *Pepatung*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*
g.	King fishers *Burung raja udang*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*
h.	Crow *Gagak*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*
i.	Shrew *Tikus kesturi*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*
j.	Firefly *Kelip-kelip*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*
k.	Cicada *Riang-riang*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*
l.	Beetle *Kumbang*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*
m.	Monkey *Monyet*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*
n.	Bee *Lebah*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*
o.	Snake *Ular*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*
p.	Rat *Tikus*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*
q.	Slow loris *Kongkang*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*
r.	Flying squirrel *Tupai terbang*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*
s.	Wasp *Tebuan*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*
t.	Swallow *Burung layang-layang*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*
u.	Frog *Katak*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*
v.	Cricket *Belalang hijau*	**Tidak** *Not Happy*	**Tiada idea** *No idea*	**Gembira** *Happy*

B. Interaksi dengan alam semulajadi/ Nature-related experiences

1. Kekerapan beraktiviti dengan alam semulajadi **Tandakan (/) untuk jawapan adik-adik* ***Frequency of nature experiences***		Tidak pernah ***Never***	Jarang ***Seldom***	Kadang-kadang ***Sometimes***	Kerapkali ***Often***
a.	Sentuh atau mengambil tumbuh-tumbuhan atau bunga *Flower or plants collecting*				
b.	Lihat atau sentuh haiwan *Observation of animals*				
c.	Kutip herba, rumpai, rumput *Herbs or weeds collecting*				
d.	Memancing *Fishing*				
e.	Main layang-layang (buatan sendiri) *Playing with handmade kites*				
f.	Membuat gelongsor di tebing sungai atau main gelongsor di air terjun *Sliding on the river bank or slope*				
g.	Buat dan main gasing (atau gasing gergasi) *Making and playing spinning top*				
h.	Bermain permainan menggunakan biji benih, batang dan bahagian tumbuhan yang lain (*congkak, masak-masak*, *tarik upih kelapa;…*) *Playing games using seeds/sticks/or other parts of plants*				
i.	Bermain dalam lumpur *Playing with silts*				
j.	Membuat senapang buluh *Making a bamboo gun*				
k.	Buat mahkota dengan bunga-bungaan *Making a crown with flowers*				
l.	Tangkap serangga *(apa sahaja jenis serangga)* *Insects catching*				
m.	Buat rakit guna buluh *Making a boat with a bamboo sticks*				
n.	Panjat pokok *Tree climbing*				
o.	Makan buah-buahan yang dikutip *Eating fruits which self-collected*				
p.	Mandi sungai atau air terjun *Swim in river or waterfall*				
q.	Tangkap katak *Frog catching*				
r.	Tangkap labah-labah *Spiders catching*				
2. Saya TELAH melawat tempat-tempat berikut… ***The places that I have been visited***		Tidak pernah ***Never***	Jarang ***Seldom*** *(Kurang daripada sekali sebulan)*	Kadang-kadang ***Sometimes*** *(Sekali sebulan)*	Kerapkali ***Often*** *(Hampir setiap hari)*
a.	Hutan atau sungai *Forest or river*				
b.	Taman permainan, Taman awam, Taman bunga *Neighbourhood park/Public park/Garden*				
c.	Akuarium atau Zoo *Aquarium or Zoos*				
d.	Pulau atau kawasan berpantai *Island or beach*				
e.	Dusun buah-buahan/Pesta buah-buahan *Fruit farm/Orchard*				

f.	Sawah padi, Ladang getah, Kebun kelapa sawit *Paddy field/ Rubber estate/Oil palm plantation*				
g.	Taman rama-rama atau Taman burung *Bird or Butterfly Park*				
h.	Pusat santuari konservasi, Pusat perlindungan serta pemulihan haiwan; **Gajah** *atau* **Penyu** *atau* **Orang utan**….(select either one) *Conservation santuary centre/ Elephant conservation centre/Turtle santuary/Orang utan santuaries & rehabilitation Center*				
3. Pengalaman yang "mewakili" alam ***Vicarious /Symbolic experience***		Tidak pernah ***Never***	Jarang ***Seldom***	Kadang-kadang ***Sometimes***	Kerapkali ***Often***
a.	Baca buku atau menonton program TV mengenai alam semula jadi atau hidupan liar *Reading a book or Watched television about nature environment or widllife programs*				
b.	Bercakap tentang alam semula jadi dan hidupan liar bersama kedua ibubapa atau kawan *Talking with parents or friends about nature or wildlife*				
c.	Bermain permainan video yang berkaitan dengan alam semula jadi atau haiwan *Playing video game about nature or wildlife*				

C. 1. Ini adalah saya/ **This is me**…….. □ *Melayu/* ***Malay*** □ *Cina/* ***Chinese*** □ *India /* ***Indian***

□ *Orang Asli* □ *Lain-lain/* ***Others****…….*

2. Saya/ **I am a** …… □ Lelaki/ Boy □ Perempuan/Girl

3. Umur saya/ **Age** ……. *tahun/years*

4. Pekerjaan Ibu/ **Mother's occupation** ……...

5. Pekerjaan ayah/ **Father's occupation**……

6. Pemandangan landskap di kampung saya adalah/ **My landscape in the hometown are**….

a) Kampung (Ibu)/ **Hometown (Mother)**	b) Kampung (Bapa)/ **Hometown (Father)**
i) □ Sawah padi/ **Paddy field**	□ Sawah padi/ **Paddy field**
ii) □ Ladang kelapa sawit / **Oil palm plantation**	□ Ladang kelapa sawit / **Oil palm plantation**
iii) □ Ladang getah / **Rubber estate**	□ Ladang getah / **Rubber estate**
iv) □ Pantai atau Sungai / **Beach or River**	□ Pantai atau Sungai **Beach or River**
v) □ Hutan /Bergunung-ganang **Forest/ Mountain**	□ Hutan /Bergunung-ganang **Forest/Mountain**
vi) □ Bandar/ **Urban areas**	□ Bandar/ **Urban areas**
vii) □ Saya TIDAK ada kampung/ **I have no hometown**	□ Saya TIDAK ada kampung/ **I have no hometown**

7. Suka subjek Sains?/ ***I love Science subject*** □ Ya/ **Yes** □ Tidak/ **No**

8.Saya memiliki gajet kepunyaan sendiri di rumah/***I have my own gadget at home*** □ Ya/***Yes*** □ Tidak/***No***

(Telefon bimbit/ Ipad / X-box / Permainan Video)/ ***Handphone/Ipad/X-box/Video game***

9. Menonton kartun setiap hari?/ ***Watching cartoon everyday?*** □ Ya/***Yes*** □ Tidak/***No***

10. Mempunyai haiwan peliharaan di rumah/***Have my own pet*** □ Ya/ ***Yes*** □ Tidak/ ***No***

(kucing, anjing, arnab, ikan, tikus belanda, kura-kura, atau lain-lain..?) /
(cat,rabbit,fish,hamster,tortoise or others..?)

a) King fishers *Burung raja udang*

b) Crow *Gagak*

c) Shrew *Tikus kesturi*

d) Civet *Musang*

e) Butterfly *Rama-rama*

f) Dragonfly *Pepatung*

g) Squirrel *Tupai*

h) Wild boar *Babi hutan*

i) Bat *Kelawar*

j) Firefly *Kelip-kelip*

k) Cicada *Riang-riang*

l) Beetle *Kumbang*

The 22 animal species in the list

m) Monkey *Monyet*

n) Bee *Lebah*

o) Snake *Ular*

p) Rat *Tikus*

q) Slow loris *Kongkang*

r) Flying squirrel *Tupai terbang*

s) Wasp *Tebuan*

t) Swallow *Burung layang-layang*

u) Frog *Katak*

v) Cricket *Belalang hijau*

The 22 animal species in the list

11.Saya suka pada kawasan landskap seperti ……. (rujuk lampiran landskap yang diberi)

I love to the landscape areas as in the pictures.....(refer to the landscapes attachment)

1. **Hutan utama** / *Primary forest*

								
Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*

2. **Sawah padi/** *Paddy field*

								
Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*

3. **Ladang kelapa sawit/** *Oil palm plantation*

								
Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*

4. **Kawasan Bandar** / *Urban area*

								
Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*

5. **Ladang pokok getah** /*Rubber estate*

								
Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*

6. **Taman rekreasi/** ***Recreational area***

								
Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*	Tidak suka *Dislike*	Tiada perasaan *No feeling*	Suka *Like*