



How contact with nature affects children's biophilia, biophobia and conservation attitude in China



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ABSTRACT

The widening gap between humans and nature, driven by urbanization, seems to be an indisputable fact in the modern world. Such a gap may breed apathy towards environmental concerns and wildlife, which would not bode well for the future of biodiversity conservation. However, the consequences of the decline in physical contact with nature are poorly understood, especially in China, which is urbanizing faster than any other country. In this study, we aimed to understand how contact with nature affects children's propensity for biophilia and biophobia, and their conservation attitudes. Fifteen schools with different degrees of urbanization were selected and 1119 pupils aged 9–10 filled out questionnaires. The students reported how frequently they engaged in fifteen outdoor activities, and these scores were summed together to produce a measurement of their contact with nature. The participants were shown twelve specimens of common wild animals in order to examine their biophilia and biophobia, and their willingness to conserve animals. We found children from urban schools had less contact with nature than those from rural schools, although this result was only marginally significant because of one outlying rural school. The children's contact with nature was significantly positively related to their biophilia and negatively related to their biophobia. Children's biophilia, in turn, significantly affected their willingness to conserve animals, and, to a lesser extent, their general attitudes about conservation. As a whole, the study suggests that contact with nature may enhance children's willingness to support animal conservation indirectly by nurturing biophilic attitudes to wildlife.

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1. Introduction

Childhood experience about nature is known to support major developmental processes of adolescence (Kellert, 2002) and increase children's physical and mental health, and their skills in multiple domains (Miller, 2007). Direct and concrete experiences with nature (hereafter referred to as "contact with nature") are considered an efficient way to promote positive attitudes towards biodiversity conservation (Turpie, 2003). A large amount of evidence has also demonstrated the benefits of contact with nature, and an emotional bond with wildlife, for the environmental attitudes and behaviors of adolescents (Collado and Corraliza, 2013; Collado et al., 2013; Duerden and Witt, 2010; Müller et al., 2009), although there are clearly many other factors also influencing such attitudes and behaviors (Kollmuss and Agyeman, 2002). Environmental educationists therefore have stressed activities that

increase children's contact with nature (Bogner, 1998; Farmer et al., 2007; Yardimci and Leblebicioglu, 2012). Indeed, when adult environmentalists are asked about the origin of their commitment to protect the environment, they frequently mention positive experiences with nature during childhood (Chawla, 1999; Chawla and Cushing, 2007; Wells and Lekies, 2006). Nevertheless, studies that focus on how contact with nature affects children's attitude towards wildlife conservation are relatively scarce (but see Ballouard et al., 2012; Zaradic et al., 2009).

Given the potential importance of the relationship between people's experiences in nature and biodiversity conservation (Miller, 2005), it is worrisome that there has been a pervasive decline in outdoor recreation among adults and outdoor activities among children in recent decades (Hofferth, 2009; Pergams and Zaradic, 2008). One driving factor is sprawling urbanization, with more people living in cities now than ever before (Cohen, 2006). Urban areas are highly modified, human-dominated environments where green spaces have shrunken over time (Turner et al., 2004). The wedge between children and nature is driven deeper by another increasingly scarce resource, free time. Children's lives

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have shifted indoors from outdoors, reflecting the rise of virtual entertainment and more sedentary lifestyles for children (Clements, 2004). Children have few opportunities to experience nature by themselves, increasing their estrangement from nature and the occurrence of unwanted side-effects, termed 'nature-deficit disorders' (Louv, 2008).

Can the decline of contact with nature lead to a lack of favorable feelings about nature? People are believed to have an instinctive love for nature and living things, as suggested by the biophilia hypothesis (Kellert, 1993; Wilson, 1984). Early discussion about biophilia mainly concentrated on humans' psychological well-being when exposed to natural features and environments (e.g., rivers, mountains; Ulrich, 1993) and suggested that it is innate. New research, focused more on emotional responses to animals, suggests that biophilia is learned and experiential (Simaika and Samways, 2010). This idea remains controversial, although it is supported by studies in which children's favorable attitudes or interests in plants and animals are enhanced by observing and interacting with them (Ballouard et al., 2012; Lindemann-Matthies, 2005; Tomazic, 2011). Stokes (2006) has suggested that the expression of biophilia must be triggered through contact with nature, perhaps at a young age, otherwise, biophobia, defined as "the fear of living things and aversion, and alienation from nature", may develop (Simaika and Samways, 2010; White and Stoecklin, 1998). For the purposes of this study, we define biophilia and biophobia as children's affective attitudes (like and fear) toward common wild animals, acknowledging that this does not cover the full biophilic concept, and we investigate whether such biophilia and biophobia is affected by contact with nature.

The role of affective attitudes toward nature has been demonstrated to be very important to the development of people's conservation behaviors by numerous models and studies (Ajzen, 1991; Collado et al., 2013; Kaiser et al., 1999; Mulder et al., 2009). Indeed, such attitudes sometimes can be much greater than the role of cognitive considerations in influencing peoples' involvement in biodiversity conservation (Martin-Lopez et al., 2007). It has thus been proposed that the cultivated appreciation of animals be a way of encouraging biodiversity conservation (Simaika and Samways, 2010). Yet few empirical studies have been conducted to test this suggestion (but see Martin-Lopez et al., 2007; Ballouard et al., 2012). At the same time, biophobia has been shown to decrease people's support for protecting animals (Johansson et al., 2012; Knight, 2008). However, the animals presented in these studies were endangered large carnivores not personally experienced by the subjects, and the investigations were conducted through a set of pictures rather than tangible specimen of animals (Knight, 2008). In this study, we aimed to explore whether children's affective attitudes – biophilia and biophobia – towards mounted displays of common but ecologically significant animals could affect their conservation attitudes. Further, we look into whether contact with nature also directly affects conservation attitudes, or does so indirectly, mediated through biophilia and biophobia.

This study was conducted in China where urbanization and other socio-economic changes are occurring more rapidly than any other country (Wan, 2011). The proportion of the population in urban areas has risen from 39.1% in 2002 to 51.3% in 2011, which means more than 20 million people are added to the urban population every year (Zou, 2011). As young people move from the countryside to a city or town for their education (Fu and Liu, 2012; Qian and Geng, 2007; Xu, 2010), Chinese children are faced with the extinction of nature experience (Bao, 2011). Systematic studies to understand how contact with nature declines along the urbanization gradient and the possible consequence of this decline for psychology and attitudes to biological conservation in China are clearly needed.

We conducted an intensive survey of primary school children, from schools spread geographically across China and along the urbanization gradient. In order to understand how contact with nature affects children's biophobia, biophilia and conservation attitude, a series of hypotheses were developed in this study (Fig. 1): H₁: Urbanization will significantly affect children's contact with nature; children in cities will have less contact with nature than those in countryside. H₂: Contact with nature will in turn influence children's biophilia positively and biophobia negatively. H₃: Biophilia, biophobia and contact with nature will affect positively children's willingness to conserve animals and their general attitudes towards conservation. Since gender has been shown to be an important variable influencing biophilia (Bjerke et al., 1998; Kellert and Berry, 1987), we incorporate it as a factor in all our analyses.

2. Methods

2.1. Participants and study sites

The surveys were conducted from April to September 2012. A total of 1119 children from 15 elementary schools participated in the surveys. These schools were located in three rural areas, three small cities, three large cities and two metropolitan cities (Beijing, Shanghai) in China. Schools and cities investigated were chosen on the basis of their geographical spread, and their position on the gradients of urbanization as measured by local per capita Gross Domestic Product (per capita GDP) and resident population density (Table S1).

Children aged 9–10 in grade four of each school participated in the study. We targeted this age group because it is a critical period of cognitive development and the understanding of animals (Kellert, 2002). Middle grade children at this age can experience their nearby wild or semi-wild natural world independently. All human-related and informed consent protocols were approved by all the schools investigated and approval to approach schools was granted by the schools' principals.

2.2. Measures of key constructs

We designed a questionnaire that addressed the following topics: (1) children's contact with nature, (2) children's biophilia, (3) children's biophobia, (4) willingness to conserve animals and (5) their general attitudes toward animal conservation. All constructs were assessed using a Likert-like three point scale with emotive face symbols to make it easy for children to understand (Appendix S2).

Children's answers to all the items in the questionnaires were filled completely by themselves in their classrooms after the animal observation time. They were not allowed to communicate with others while filling the questionnaires. If they had questions, they were allowed to ask for clarification from their teacher or the investigator.

2.3. Children's contact with nature

To measure children's contact with nature, we followed Harvey's (1989) procedure to develop our own scale. Two classes of children in grade four (about 120 students) from one school located in Menglun, Mengla, Yunnan Province, China, a town of about 20,000 inhabitants near our institution, were asked to write freely about all the activities they had experienced with common wild animals and plants. From these lists, we chose the 15 most frequently mentioned outdoor activities, such as "catch butterflies", "plant trees", "observe insects pollinating plants", etc. (see

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